

EXTINCT AND VANISHING
MAMMALS
of the
OLD WORLD

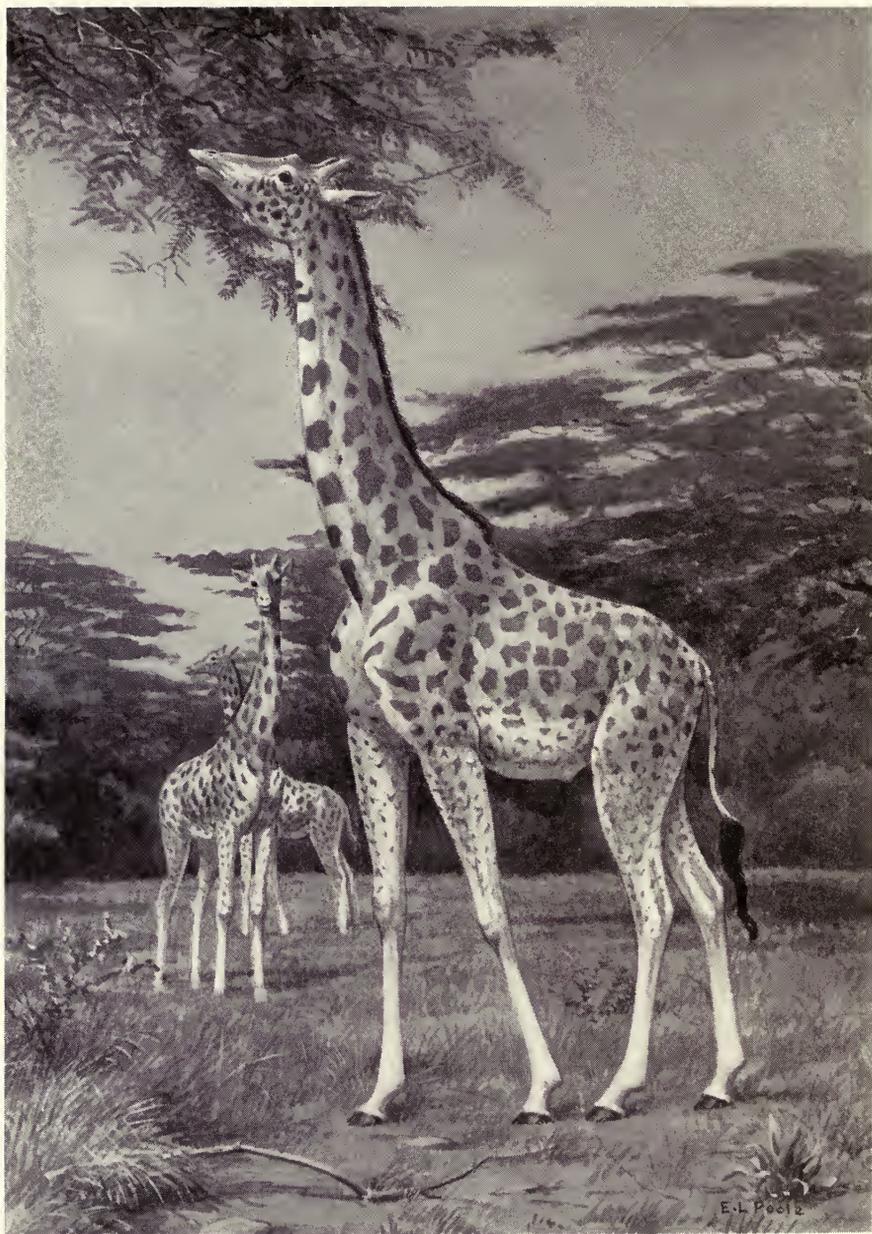
FRANCIS HARPER

From the collection of the

o Preinger Library

San Francisco, California
2006

REPORT OF THE
COMMISSIONERS OF THE LAND OFFICE



KORDOFAN GIRAFFE (*Giraffa camelopardalis antiquorum*)

"Whenever I have watched them feeding on the tall feathery-leaved acacias, to which they are very partial, or stalking slowly and majestically through the park-like country they very commonly frequent, giraffes have always appeared to be amongst the most graceful and beautiful of all wild creatures."—FREDERICK C. SELOUS, 1914.

GEORGE W. ROUSE
MICHIGAN VALLEY
AND SON, CITY, NEVADA

EXTINCT AND VANISHING MAMMALS

of the
OLD WORLD

by
FRANCIS HARPER



FORESTA INSTITUTE
FOR
OCEAN
MOUNTAIN
STUDIES
15 FRANKTOWN ROAD
CARSON CITY, NEVADA 89701

QE881
H33

illustrations by
EARL L. POOLE

1945

SPECIAL PUBLICATION No. 12
AMERICAN COMMITTEE FOR INTERNATIONAL WILD LIFE PROTECTION
NEW YORK ZOOLOGICAL PARK, NEW YORK 60, N. Y.

ORCHARD HOUSE
WASHOE VALLEY
CARSON CITY, NEVADA

RECEIVED
MAY 1909
OTC NORTH

INSTITUTE AT
RD 1
MAY
1909

There are no words that can tell the hidden spirit of the wilderness, that can reveal its mystery, its melancholy, and its charm. There is delight in the hardy life of the open, in long rides rifle in hand, in the thrill of the fight with dangerous game. Apart from this, yet mingled with it, is the strong attraction of the silent places, of the large tropic moons, and the splendour of the new stars; where the wanderer sees the awful glory of sunrise and sunset in the wide waste spaces of the earth, unworn of man, and changed only by the slow changes of the ages from time everlasting.

THEODORE ROOSEVELT
African Game Trails

THE LORD BALTIMORE PRESS
BALTIMORE, Md., U. S. A.

FOREWORD

IN 1933 Dr. John C. Phillips, a founder and the first chairman of the American Committee for International Wild Life Protection, now in its twelfth year, was an official observer for our Government at the meetings of the London Convention for the Protection of the Fauna and Flora of Africa. He returned from that conference, which concerned itself primarily with the larger mammals of Africa, with the conviction that there was a basic need for the compilation of our present knowledge concerning the recently extinct and vanishing mammals, if we are to plan intelligently for the future preservation of wild life in this fast-changing world. This would be a pioneer job requiring the use of widely scattered sources. Such a compilation could serve as a sound foundation for future plans that would have to be developed to meet the ever-increasing threats of extermination. This research could also spotlight the species that are most threatened and reveal probable causes of extinction that might suggest new lines of effective action to improve their chances of survival.

For this task the American Committee engaged the services of Dr. Francis Harper, an experienced mammalogist and a meticulous research worker. Dr. Harper started the project in May, 1936, and devoted more than three years to the work. The magnitude of the undertaking proved to be much greater than originally expected, and the reasons for this are clearly set forth by the author in the introduction to the present volume. He has spoken for the Committee in the acknowledgments of assistance.

The American Committee takes this opportunity to repeat its expression of gratitude to Dr. Harper for the hard work and care that he has devoted to the preparation of this volume. We are likewise grateful to Mr. Paul H. Oehser, editor of the United States National Museum, for the supervision of this volume through the press and for the preparation of the index.

This whole undertaking would not have been possible without generous financial assistance. This has come from about 40 different sources, including the American Philosophical Society, the Academy of Natural Sciences of Philadelphia, the Boone and Crockett Club, the Conservation Committee of the New York Zoological Society, the American Wild Life Institute, and several members and mem-

ber organizations of the American Committee, as well as special friends.

On account of its length the publication committee decided to publish *Extinct and Vanishing Mammals* in two volumes. The late Dr. Glover M. Allen, in a large measure, prepared the volume on *Extinct and Vanishing Mammals of the Western Hemisphere*, including also certain marine mammals of all the oceans. The New World volume of more than 600 pages was published in 1942 as Special Publication No. 11 of the American Committee for International Wild Life Protection. It was dedicated to the late Dr. John C. Phillips.

The Committee appreciates the fact that ever-changing conditions require additions and supplements to the data in these volumes in order to bring them up to any given date. Nevertheless, keeping the information current will be a small task compared with the historical study, the verification of references, the bibliographical research, and the evaluation and compilation of information carried out by Harper and Allen in their pioneer work on the (recently) extinct and vanishing mammals of the Old World and the Western Hemisphere.

It is our sincere hope that these volumes may serve as a foundation of information on which will be built future plans for the preservation of vanishing species of mammals in their native habitats. In many cases this may be most effectively brought about within a framework of international cooperation such as the London Convention or the Inter-American Convention. In other instances a threatened species may be regarded as a sort of international trust by the country under whose jurisdiction it may fall. For example, if the Great Asiatic One-horned Rhinoceros (*Rhinoceros unicornis*) should vanish from the earth (very few hundred survive today) it would be a world calamity and not of concern merely to the ruler of Assam who controls their last principal hide-out.

International wild-life conservation should be a concern of all people! We must keep faith with our wild-life heritage and preserve it for the wise use of generations to come!

HAROLD J. COOLIDGE, Jr.

(for the Committee)

Washington, D. C.

April 20, 1945

Publication Committee:

CHARLES M. B. CADWALADER

ALEXANDER WETMORE

HAROLD J. COOLIDGE, Jr.

CONTENTS

FOREWORD	PAGE V
----------------	-----------

INTRODUCTION

Origin, plan, methods.....	1
Acknowledgments	7
Factors in the progressive depletion of the Old World's mammalian faunas	8
Australia	9
Malay Archipelago	10
Asia	11
Europe	13
Africa	15
Madagascar	16
The chronology of extinction.....	17
The record of extinction by families.....	21
Summary and conclusions.....	22

ACCOUNTS OF EXTINCT, VANISHING, OR THREATENED MAMMALS

Order MARSUPIALIA: Marsupials.....	25
Family Dasyuridae: Dasyures, etc.....	25
Genus Antechinus: Broad-footed Marsupial Mice.....	25
Genus Phascogale: Brush-tailed Marsupial Rats.....	26
Genus Sminthopsis: Sminthopses	29
Genus Dasyurus: Native Cats.....	32
Genus Sarcophilus: Tasmanian Devil.....	38
Genus Thylacinus: Tasmanian Wolf.....	40
Family Myrmecobiidae: Marsupial Anteaters.....	43
Genus Myrmecobius: Numbats	43
Family Peramelidae: Bandicoots.....	47
Genus Perameles: Bandicoots	47
Genus Macrotis: Rabbit-bandicoots or Bilbies.....	51
Genus Chaeropus: Pig-footed Bandicoots.....	58
Family Phalangeridae: Phalangers, etc.....	60
Genus Tarsipes: Honey Possum.....	60
Genus Gymnobelideus: Leadbeater's Opossum.....	61
Genus Pseudocheirus: Ringtails	63
Family Phascolarctidae: Koalas.....	64
Genus Phascolarctos: Koalas.....	64

	PAGE
Order MARSUPIALIA—Continued.	
Family Vombatidae: Wombats.....	72
Genus Vombatus: Common Wombats.....	72
Genus Lasiorhinus: Hairy-nosed Wombats.....	74
Family Macropodidae: Kangaroos, Wallabies, etc.....	77
Genus Bettongia: Rat-kangaroos	77
Genus Aepyprymnus: Rufous Rat-kangaroo.....	84
Genus Potorous: Rat-kangaroos	86
Genus Caloprymnus: Desert Rat-kangaroo.....	91
Genus Lagorchestes: Hare-wallabies	93
Genus Lagostrophus: Banded Wallaby.....	96
Genus Onychogalea: Nail-tailed Wallabies.....	98
Genus Petrogale: Rock-wallabies	102
Genus Thylogale: Pademelons	106
Genus Wallabia: Wallabies	114
Genus Macropus: Kangaroos	120
Order INSECTIVORA: Insectivores.....	122
Family Soricidae: Shrews.....	122
Genus Crocidura: Musk-shrews	122
Order PRIMATES: Primates.....	123
Family Lemuridae: Lemurs.....	123
Genus Microcebus: Dwarf Lemurs.....	123
Genus Cheirogaleus: Mouse Lemurs.....	126
Genus Phaner: Fork-marked Lemur.....	129
Genus Haplemur: Gentle Lemurs.....	130
Genus Lemur: True Lemurs.....	132
Genus Lepilemur: Sportive Lemurs.....	144
Family Indriidae: Sifakas, Indri, and Avahis.....	146
Genus Propithecus: Sifakas	146
Genus Indri: Indri	155
Genus Avahi: Avahis	156
Family Daubentoniidae: Aye-aye.....	158
Genus Daubentonia: Aye-aye	158
Family Colobidae: Leaf-eating Monkeys.....	160
Genus Colobus: Colobus Monkeys.....	161
Family Pongidae: Anthropoid Apes.....	164
Genus Pongo: Orang-utan	164
Genus Gorilla: Gorillas	168
Genus Pan: Chimpanzees	176
Order EDENTATA: Edentates.....	181
Family Manidae: Pangolins.....	181
Genus Smutsia: Giant and South African Pangolin.....	181
Genus Phataginus: Three-cusped Pangolin.....	186
Genus Uromanis: Long-tailed Pangolin.....	189

	PAGE
Order RODENTIA: Rodents.....	190
Family Leporidae: Hares and Rabbits.....	190
Genus Pentalagus: Amami Hare.....	190
Family Castoridae: Beavers.....	191
Genus Castor: Beavers	191
Family Cricetidae: Hamsterlike Rodents.....	200
Genus Lophiomys: African Maned Rats.....	200
Family Muridae: Old World Rats.....	205
Genus Rattus: Typical Rats.....	205
Genus Mastacomys: Broad-toothed Rats.....	210
Genus Zyzomys: White-tailed Rats.....	211
Order CARNIVORA: Carnivores.....	211
Family Canidae: Wolves and Foxes.....	211
Genus Simenia: Simenian Foxes.....	212
Genus Canis: Wolves	213
Genus Nyctereutes: Raccoon-dogs	215
Family Ursidae: Bears.....	217
Genus Ursus: Bears	217
Family Mustelidae: Weasels, etc.....	232
Genus Mustela: Weasels, Minks, and Stoats.....	233
Genus Martes: Sables and Martens.....	235
Genus Gulo: Wolverines	241
Family Viverridae: Civets, Mongooses, etc.....	244
Genus Arctictis: Binturongs	244
Genus Fossa: Fossane	249
Family Protelidae: Aard-wolves.....	250
Genus Proteles: Aard-wolves	250
Family Felidae: Cats.....	254
Genus Cryptoprocta: Fossa	254
Genus Felis: Cats	256
Genus Lynx: Lynxes	265
Genus Caracal: Caracals	272
Genus Acinonyx: Cheetahs	274
Genus Leo: Lions	288
Genus Panthera: Leopards and Tigers.....	299
Order PROBOSCIDEA: Proboscideans.....	310
Family Elephantidae: Elephants.....	310
Genus Elephas: Asiatic Elephants.....	311
Genus Loxodonta: African Elephants.....	316
Order PERISSODACTYLA: Odd-toed Ungulates.....	322
Family Equidae: Horses, Zebras, and Asses.....	322
Genus Equus: Horses, Zebras, and Quagga.....	322
Genus Asinus: Asses	345

	PAGE
Order PERISSODACTYLA—Continued.	
Family Tapiridae: Tapirs.....	371
Genus Aerocodia: Malay Tapir.....	372
Family Rhinocerotidae: Rhinoceroses.....	375
Genus Rhinoceros: Asiatic One-horned Rhinoceroses.....	375
Genus Dicerorhinus: Asiatic Two-horned Rhinoceroses.....	390
Genus Diceros: Black Rhinoceroses.....	396
Genus Ceratotherium: White Rhinoceroses.....	402
Order ARTIODACTYLA: Even-toed Ungulates.....	414
Family Hippopotamidae: Hippopotamuses.....	414
Genus Hippopotamus: Common Hippopotamuses.....	414
Genus Choeropsis: Pygmy Hippopotamus.....	419
Family Camelidae: Camels and Llamas.....	421
Genus Camelus: Camels.....	421
Family Tragulidae: Chevrotains.....	425
Genus Hyemoschus: Water Chevrotains.....	425
Family Moschidae: Musk Deer.....	427
Genus Moschus: Musk Deer.....	427
Family Cervidae: Deer.....	435
Genus Muntiacus: Muntjaks.....	435
Genus Rucervus: Swamp Deer.....	436
Genus Cervus: Red Deer and Sikas.....	443
Genus Elaphurus: Père David's Deer.....	467
Genus Rangifer: Reindeer.....	469
Family Giraffidae: Giraffes and Okapi.....	484
Genus Giraffa: Giraffes.....	484
Genus Okapia: Okapi.....	506
Family Bovidae: Cattle, Sheep, Goats, and Antelopes.....	510
Genus Novibos: Cambodian Wild Ox.....	510
Genus Bos: Cattle.....	511
Genus Bibos: Gaurs and Bantengs.....	514
Genus Poëphagus: Yaks.....	528
Genus Bison: Bisons.....	531
Genus Bubalus: Asiatic Buffaloes.....	538
Genus Anoa: Dwarf Buffaloes.....	548
Genus Syncerus: African Buffaloes.....	554
Genus Ovis: Sheep.....	557
Genus Ammotragus: Audads.....	600
Genus Capra: Goats and Ibexes.....	606
Genus Capricornis: Serows.....	635
Genus Alcelaphus: Hartebeests.....	642
Genus Damaliscus: Bontebok and allies.....	653
Genus Connochaetes: Gnus.....	659
Genus Cephalophus: Duikers.....	663

Order ARTIODACTYLA—Continued.

Family Bovidae—Continued.	PAGE
Genus Oreotragus: Klipspringers	668
Genus Nesotragus: Sunis	672
Genus Dorcatragus: Beira	674
Genus Ammodorcas: Dibatag	675
Genus Saiga: Saiga Antelope.....	677
Genus Gazella: Gazelles	683
Genus Aegoryx: White Oryx.....	690
Genus Oryx: Oryxes	693
Genus Hippotragus: Roan and Sable Antelopes and Blaauw- bok	698
Genus Addax: Addax	711
Genus Tragelaphus: Bushbucks	716
Genus Taurotragus: Elands	722
BIBLIOGRAPHY	733
INDEX	811

FIGURE	PAGE
26. Binturong: <i>Arctictis binturong</i> subsp. (After photograph in Brehm and specimen in Philadelphia Zoo).....	246
27. Aard-wolf: <i>Proteles cristatus</i> subsp.....	253
28. Fossa: <i>Cryptoprocta ferox</i> Bennett (After photograph in Brehm).....	255
29. European Lynx: <i>Lynx lynx lynx</i> (Linnaeus) (After Standard Nat. Hist., etc.)	266
30. Barbary Lynx: <i>Caracal caracal algirus</i> (Wagner) (From specimen in Philadelphia Zoo).....	273
31. Indian Cheetah: <i>Acinonyx jubatus venaticus</i> (Hamilton Smith).....	284
32. King Cheetah: <i>Acinonyx rex</i> Pocock (After Pocock, 1927).....	287
33. Mongolian Wild Horse: <i>Equus przewalskii</i> Poliakov (After photograph in Brehm).....	326
34. Quagga: <i>Equus quagga</i> Gmelin (After Standard Nat. Hist.)....	335
35. Burchell's Zebra: <i>Equus burchellii burchellii</i> (J. E. Gray) (After Brehm)	340
36. Mountain Zebra: <i>Equus zebra zebra</i> Linnaeus (After photographs in Brehm and Newnes).....	343
37. Nubian Wild Ass: <i>Asinus asinus africanus</i> Fitzinger.....	346
38. Indian Wild Ass: <i>Asinus hemionus khur</i> (Lesson).....	365
39. Malay Tapir: <i>Acrocodia indica</i> (Desmarest).....	373
40. Great Indian Rhinoceros: <i>Rhinoceros unicornis</i> Linnaeus.....	376
41. Javan Rhinoceros: <i>Rhinoceros sondaicus</i> Desmarest.....	382
42. Northern White Rhinoceros: <i>Ceratotherium simum cottoni</i> (Lydekker) (After Lang).....	408
43. Pygmy Hippopotamus: <i>Choeropsis liberiensis</i> (Morton).....	420
44. Water Chevrotain: <i>Hyemoschus aquaticus</i> subsp. (After Brehm).....	426
45. Schomburgk's Deer: <i>Rucervus schomburgki</i> Blyth.....	437
46. Barbary Stag: <i>Cervus elaphus barbarus</i> Bennett.....	458
47. Père David's Deer: <i>Elaphurus davidianus</i> Milne Edwards.....	468
48. Spitsbergen Reindeer: <i>Rangifer platyrhynchus</i> (Vrolik) (After Wollebaek, 1926)	480
49. Southern Giraffe: <i>Giraffa camelopardalis capensis</i> (Lesson) (After Brehm, Lydekker, etc.).....	504
50. Okapi: <i>Okapia johnstoni</i> (P. L. Selater).....	507
51. Caucasian Bison: <i>Bison bonasus caucasicus</i> Hilzheimer.....	538
52. Common Anoa: <i>Anoa depressicornis</i> (Hamilton Smith).....	551
53. European Mouflon: <i>Ovis musimon</i> (Pallas).....	575
54. Barbary Sheep: <i>Ammotragus lervia</i> subsp.....	600
55. Mediterranean Ibex: <i>Capra pyrenaica hispanica</i> Schimper (After Lydekker and Ward).....	613
56. Abyssinian Ibex: <i>Capra walie</i> Rüppell (From photograph, Field Museum)	624
57. Markhor: <i>Capra falconeri</i> subsp. (After Cassell).....	628

FIGURE	PAGE
58. Sumatran Serow: <i>Capricornis sumatraensis sumatraensis</i> (Bechstein) (After Mohr, 1934).....	636
59. Bubal Hartebeest: <i>Alcelaphus buselaphus buselaphus</i> (Pallas) (After photograph in Brehm).....	644
60. Bontebok: <i>Damaliscus dorcas</i> (Pallas) (After Brehm and Lydekker)	655
61. White-tailed Gnu: <i>Connochaetes gnou</i> (Zimmermann).....	662
62. Saiga: <i>Saiga tatarica</i> (Linnaeus) (After Brehm).....	681
63. White Oryx: <i>Aegoryx algazel</i> (Oken) (From specimen in Philadelphia Zoo)	692
64. Blaauwbok: <i>Hippotragus leucophaeus</i> (Pallas) (After Daniell, in Jardine's Naturalist's Library).....	699
65. Giant Sable Antelope: <i>Hippotragus variani</i> Thomas.....	709
66. Addax: <i>Addax nasomaculatus</i> (Blainville) (After Brehm, etc.)..	713
67. Nyala: <i>Tragelaphus angasii</i> Angas (After Selater and Thomas, 1900)	718

THIS INVESTIGATION HAS BEEN AIDED BY A GRANT FROM THE
PENROSE FUND OF THE AMERICAN PHILOSOPHICAL SOCIETY

INTRODUCTION

ORIGIN, PLAN, METHODS

THE present work had its origin in a strongly felt need for definite information on the mammals that have become extinct during the Christian Era, on those that are now threatened with the same fate, on the factors contributing to the progressive depletion of the world's mammalian faunas, and on the measures that have been hitherto or may be hereafter undertaken for their preservation. It consists to a large extent of an inventory of vanishing resources, as an essential step in their conservation.

The plan and the inception of this investigation are due to the keen interest and foresight of the late Dr. John C. Phillips, founder and first chairman of the American Committee for International Wild Life Protection. The work has been carried out under the auspices of that organization and has been supported in part by a grant from the Penrose Fund of the American Philosophical Society. The Academy of Natural Sciences of Philadelphia was chosen as the headquarters of the investigation, largely on account of the very exceptional resources of its library in the literature of natural history.

As originally projected, the investigation was to have covered the entire world and the results were to be published in a single volume. Owing to limitations of time, space, and available funds, as well as the unforeseen magnitude of the task, the present volume is restricted to the mammals of the Old World. The major part of my work was concluded early in 1939; in only a few instances, therefore, has it been possible to take into account the subsequently published literature. Another volume, prepared in large part by Dr. Glover M. Allen, late curator of mammals at the Museum of Comparative Zoölogy, and published in December, 1942, deals with the mammals of the New World and with the marine forms.

It was also hoped to include in the Introduction a general survey of conservation conditions—so far as they affect mammals—in the various countries of the world. Although it has not been possible to carry out this feature, fortunately the need for it has

been obviated in part by Brouwer's *The Organisation of Nature Protection in the Various Countries* (1938).¹

In the preparation of the accounts of the various mammals treated, the aim has been to assemble and to present in concise form such information as could be obtained on the following points:

- Former range and numbers;
- Present range and numbers (of vanishing species);
- Date and rate of disappearance in each country (of species that have become extinct, either locally or completely);
- Causes of depletion or extinction, either direct or indirect;
- Economic uses or importance;
- Esthetic considerations;
- The measures that have been or might be undertaken for the preservation of each vanishing species.

The primary source of this information has been the published literature. For this purpose, the library of the Academy of Natural Sciences of Philadelphia has been the mainstay. In addition, I have drawn to some extent upon the library resources of the United States National Museum, the Museum of Comparative Zoölogy, the American Museum of Natural History, the Charles Sheldon Collection at Yale University, and the American Philosophical Society.

An especially valuable source of information has been correspondence with zoölogists and conservation officials in most of the countries of the Old World. By means of questionnaires, distributed for the most part through the collaboration of the International Office for the Protection of Nature in Brussels, a great mass of fresh and largely unpublished data on the distribution, numbers, economic status, and conservation of mammals has been assembled.

The unselfish cooperation of these contributors, on a scale perhaps unprecedented in this field, has been an extremely helpful and highly appreciated feature of the investigation.

Additional material and documents bearing upon the present subject had been accumulating for some years in the office of the American Committee for International Wild Life Protection, and these have been utilized to considerable advantage.²

Perhaps few zoölogists have had better occasion than myself to become impressed with the inexhaustible nature (and at the same time the inadequacy) of the literature on systematics, distribution,

¹ Special publication of the American Committee for International Wild Life Protection, No. 9.

² Dr. Glover M. Allen, in making use of office data of this sort in his companion volume on mammals of the Western Hemisphere (1942), seems to have been under the erroneous impression that I was responsible for gathering practically all of them, and consequently he has mentioned my name with the best of intentions but with considerably greater frequency than the facts would warrant. Credit for many of the data is due to sources indicated above.

economics, life histories, and related phases in the study of mammals. Likewise few can become more conscious than myself of the incompleteness of the present report on the points it endeavors to cover. The chief handicap has been the sheer limitations of time, despite unremitting labor during a period of practically three years. Secondary handicaps have been the nonavailability of certain literature, and the virtually unusable nature (to an Anglo-Saxon) of much of the literature in the Slavic and Oriental languages.

In nearly every case a separate account has been provided for each species or subspecies coming within the scope of the present report. In matters of taxonomy and nomenclature I have endeavored to follow the best authorities available, as exemplified in recent monographs, catalogues, or check-lists. However, unanimity of opinion on every detail is not to be expected of the specialists in this field.

A really surprising amount of confusion in the nomenclature of even some of the largest and best-known of the Old World mammals has come to light as an incidental feature of the present investigation. This seems to be due largely to lack of proper attention to type descriptions and type localities, and to some extent to disregard of the International Rules of Zoological Nomenclature. I have attempted to straighten out some of the major nomenclatural difficulties in two preliminary papers (Harper, 1939, 1940), while a few minor points, relating especially to type localities, are touched upon in the present work.

Each account furnishes, in addition to the technical name of the mammal under discussion, its common names in English and (if known) in French, German, Italian, and occasionally other languages of western Europe. No attempt has been made to compile names from unfamiliar or unwritten languages, and in only a few exceptional cases have any been included. This statement, however, does not apply to such native names as may have been taken over bodily into the English or other European languages.

After the common names comes the original reference, or citation of the type description. I have been able to verify probably 95 percent of these original references in the library of the Academy of Natural Sciences of Philadelphia, and a few others elsewhere. A statement of the type locality is then added in parentheses; as far as feasible, it is given in the form of an exact quotation from the original description. In many cases brief supplementary or explanatory remarks are called for.

No attempt has been made to supply a complete list of synonyms, and usually none whatever are cited. In certain cases, however, where circumstances seem to render it advisable, one or more synonyms are cited. For example, if the name considered valid and

adopted here happens to be less familiar than one or more that are replaced, the latter may be cited. Or, if certain recently proposed names are not considered valid, these may likewise be cited in synonymy.

Persons interested in the study of mammals have frequent need of consulting good illustrations of the various species and subspecies. For this reason a special point has been made of supplying references to such illustrations. While such a list of references can rarely be exhaustive, it is believed that the hundreds of references given here include at least a majority of the good published figures or plates of the mammals under discussion. In the case of slightly differentiated subspecies, an outstanding difficulty very frequently encountered has been the determination of the particular one figured. Even if the author or artist has provided a trinomial designation—and this is far from being a universal practice—there is always a possibility of misidentification, or of eventual refinement of classification that will throw the identification into doubt, *unless the geographical provenance of the specimen figured is accurately stated*. The frequent disregard of this rule is the cause of endless vexation, and it detracts seriously from the value of the figures as zoölogical illustrations. Thus, in many cases the subspecific identity of a figure mentioned in the references is in doubt, and some of these cases are indicated by a parenthetical query: "subsp.?" This uncertainty of identification extends inevitably even to some of Mr. Poole's excellent drawings that illustrate the present text. For some are based upon "zoo" specimens, many of which are notoriously of uncertain provenance or even represent the hybrid offspring of different subspecies in captivity; while others are based upon previously published figures, themselves of somewhat uncertain subspecific identity.

A brief description of each species or subspecies is included. In its preparation I have aimed to utilize the type description so far as it is at all adequate; but in many cases later and more complete or more accurate descriptions have necessarily been drawn upon for at least some of the characters. Constant caution is required, however, in making use of reviews, catalogues, or monographs in which the descriptions may be based upon specimens of *unspecified provenance*. In all possible cases I have indicated the source of the information by a direct quotation or, in the case of translation or paraphrasing, by at least a bibliographical reference.

It may be remarked here that the entire report is documented with such references to the fullest possible extent, not only as a matter of simple justice to the authors of the works drawn upon, but as an essential aid to the reader in verifying statements, and in ascertaining what source material has been utilized on the one hand,

or overlooked or disregarded on the other hand. The common literary sins of failing to acknowledge sources of information, of giving incomplete references, and of taking liberties with quotations, have been scrupulously avoided as far as has lain within my power. These matters have called for the closest possible attention in a work that is so largely a compilation as the present one.

Perhaps no two mammalogists would agree completely on just what species or subspecies come properly within the scope of this report. In the first place, that scope is not completely explained in the rather brief title chosen. With the exception of a few partially aquatic species, such as the hippopotamuses, only land mammals are included. The various marine and fresh-water species are dealt with in Dr. Allen's volume (1942). A somewhat more exact but unduly awkward title might have been *Land Mammals of the Old World that are Extinct, or Vanishing, or in Need of Special Protection*. Some of the forms included are no doubt actually increasing under protection at the present moment but nevertheless deserve and require the fullest possible care in order that they may continue to survive.

It has been deemed advisable to include all African mammals accorded protection in Schedules A and B of the London Convention of 1933, even if subsequent investigation has shown that certain forms are in less urgent need of close protection than was at first supposed. On the other hand, the simple limitations of time and funds have excluded a certain number of rare and more or less endangered species whose status is probably more unsatisfactory than that of a good many included species.

Finally, there are doubtless a considerable number of other mammals (especially small, inconspicuous, or secretive species) that have progressed far toward the vanishing point, or that have actually become extinct, without their status having become known to zoölogists. There is no royal road to the discovery of such a state of affairs. Time and again extinction has taken place years in advance of the fact coming to scientific attention. Thus, at the very best, the present report could embody no more than a certain portion of the current (and decidedly incomplete) knowledge on the subject.

A few words may be said here on the difficult subject of the arrangement or sequence of the systematic groups—families, genera, species, and subspecies. The present arrangement of families is according to Simpson (1931). Beyond this point there is apparently no single, comprehensive, up-to-date guide to be followed. Many recent authors of faunal lists or catalogues do not even undertake an explanation of the sequence they adopt. For the large group of ungulate mammals Lydekker's well-known catalogue (1913-1916) furnishes a convenient guide in the arrangement of genera, species,

and subspecies. In the same way Iredale and Troughton's Australian check-list (1934) serves for the marsupial groups. In other groups (such as the Carnivora and the Primates) I have merely attempted to follow general usage in so far as any such usage has been discoverable. In the category of subspecies, the original, "nominated," or "typical" subspecies is introduced first, and is followed by the others, usually in a more or less geographical sequence from north to south or east to west.

Under each family heading a brief paragraph has been introduced, stating the general distribution of the family, the number of genera and species or subspecies it contains (exclusive of fossil forms), and the number of forms that have called for discussion in Dr. Allen's preceding volume and in the present volume. The number so treated varies from one in each of several families to more than a hundred in the cattle family (Bovidae). Since no indigenous land mammals occur in Antarctica, there is no need of further mention of this region in the distributional statements.

The 1933 London Convention for the Protection of the Fauna and Flora of Africa is mentioned with considerable frequency in this volume. Since some readers may not be familiar with this Convention and its far-reaching importance in the cause of international wildlife preservation, a few words of explanation are inserted here. The conference was called by invitation of Great Britain and was attended by accredited representatives of the nine countries having territories in Africa. The Convention became effective in January, 1936, when it had been ratified by five of the nine participating governments. By January, 1940, ratification by three more countries had taken place. Among the measures agreed upon by the Convention are the establishment of national parks and nature reserves, the regulation of traffic in animals, and the prohibition of encircling fires and (wherever possible) of the use of poison, dazzling lights, nets, and traps for hunting animals. The Annex to this Convention lists, as Class A species, 17 mammals, 3 birds, and 1 plant, for which rigid protection is agreed upon. It also lists, as Class B species, 13 mammals and 9 birds which, although not requiring such rigid protection, may be taken only under a special form of license. The number of mammals so protected is actually much larger than indicated in the above statements; for example, the 40 forms of Madagascar lemurs count as only a single item in the list, and the same is true of the dozen subspecies of Giraffes. Further details are set forth in Special Publications 6 and 10 of the American Committee for International Wild Life Protection (1935 and 1940).

ACKNOWLEDGMENTS

The chief burden of promoting the present investigation, in both a spiritual and a financial sense, was magnanimously assumed in the first place by the late Dr. John C. Phillips, not merely in his capacity as chairman of the American Committee for International Wild Life Protection, but as a more or less personal responsibility. The main lines of the investigation have been carried out as originally planned by him. Other members of the Committee have also made generous contributions of funds, information, and advice. When the magnitude of the task began to exceed all original estimates, a grant from the Penrose Fund of the American Philosophical Society provided timely aid. After Dr. Phillips's death in November, 1938, a subcommittee, consisting of Dr. Alexander Wetmore, Mr. Charles M. B. Cadwalader, and Mr. Harold J. Coolidge, Jr., by vigorous action found the means for completing the investigation.

I am further and particularly indebted to Mr. Cadwalader, as director and president of the Academy of Natural Sciences of Philadelphia, for the provision of desk space and library facilities in this institution. The already great resources of the Academy's library have been considerably augmented, during and in behalf of this investigation, by the acquisition of numerous important works on mammals, through the efforts of Mr. Cadwalader, Mr. Brooke Dolan, II, and Mr. George L. Harrison.

The whole-hearted cooperation of the International Office for the Protection of Nature in Brussels, and particularly of its Secretary, Mrs. Tordis Graim, is most gladly and gratefully acknowledged. Mrs. Graim has generously undertaken and admirably fulfilled the task not only of distributing questionnaires to numerous zoölogists and conservation officials in the Old World, but also of translating and compiling the very valuable data thus obtained.

Through the courtesy of Dr. H. E. Anthony and Mr. George G. Goodwin, of the American Museum of Natural History, lengthy portions of indispensable works in Russian by Ognev and Nasonov have been translated at that institution and placed in my hands. Thereby a great deal of important information, not generally available to non-Russian zoölogists, has been incorporated in the pages of the present work.

I must not omit to mention the patience and accommodation of Dr. Remington Kellogg, of the United States National Museum, during the hours I have spent in his office, consulting various works not available in Philadelphia.

No words of mine can add to the value of the drawings produced by the masterful strokes of Earl Poole's pen. They will be appreciated by the reader not only as unusually faithful delineations of

the mammals they represent, but as a welcome embellishment of the long pages of text.

The host of correspondents and collaborators, who have contributed first-hand and hitherto unpublished information of very exceptional value, and whose names will be found in proper place on scores of the following pages, deserve the highest gratitude of the sponsors and the compiler of this report. Without their contributions the work would have been deprived of one of its most essential features.

Finally, the most cordial thanks are due to the various authors and publishers whose books and papers have been utilized in the preparation of this work. It is hoped that they will be rewarded in part, at least, by the complete acknowledgment of all items of information so derived.

NOTE: Of the following accounts of Old World species, 17, which Dr. Francis Harper did not have opportunity to prepare on account of taking up other investigations, were written by Glover Morrill Allen and are subscribed with his initials. These accounts are in large part based on the data already brought together by Dr. Harper, to whom every credit is due for the extensive research and correspondence which he undertook in order to assemble the essential facts. The 17 accounts are: *Crocidura fuliginosa trichura*, Christmas Island Shrew; *Rattus macleari*, Captain Maclear's Rat; *Rattus nativitatis*, Christmas Island Burrowing Rat; *Colobus polykomos* and *Colobus badius* races, Colobus Monkeys; *Pan troglodytes* and races, the Chimpanzee; *Pongo pygmaeus*, the Orang-utan; *Hippopotamus amphibius* and races, the Hippopotamuses; *Choeropsis liberiensis*, Pygmy Hippopotamus; *Hyemoschus aquaticus* and races, Water Chevrotains; *Cervus elaphus barbarus*, North African Red Deer; *Loxodonta africana africana*, South African Bush Elephant; *Diceros bicornis* and races, Black Rhino; *Equus burchellii burchellii*, Burchell's Zebra; *Equus zebra* and race, Mountain Zebra; *Equus quagga*, the Quagga; *Oryx gazella* and race, Gemsbok; *Aegoryx algazel*, Scimitar Oryx; and *Syncerus caffer caffer*, Cape Buffalo.
G. M. A.

FACTORS IN THE PROGRESSIVE DEPLETION OF THE OLD WORLD'S MAMMALIAN FAUNAS

IN the course of the present studies on the mammals that have become extinct during the Christian Era, and on others that are now threatened with the same fate, it has become convincingly evident that the process of extinction is taking place at a steadily accelerated rate. During this period of approximately 2,000 years,

the world has lost, through extinction, about 106 known forms of mammals. About 28 percent of these are subspecies of still existing species, but the full species completely and irretrievably lost number approximately 77.

Between A. D. 1 and 1800, about 33 mammals are more or less definitely known to have become extinct (see list, pp. 17-18). Each half-century period since 1800 shows a steadily increasing rate of extinction. The last 100 years have witnessed the passing of about 67 percent of the 106 extinct forms. In the past 50 years approximately 38 percent as many forms have been exterminated as in all previous recorded history. At the present time more than 600 others require consideration as vanishing or threatened forms. It is well within the bounds of possibility that during the next hundred years we may be extinguishing this group at the approximate rate of one form per year.

In seeking the causes of this world-wide tragedy, it becomes apparent that conditions vary widely over the different regions of the globe, although there is a single major underlying factor nearly throughout.

For the purposes of the present inquiry, we may here pass briefly in review the major regions that are covered in this volume: Australia, the Malay Archipelago, Asia, Europe, Africa, and Madagascar.

AUSTRALIA

Conditions in Australia are peculiar and exceptional, owing to the fact that its unique native mammalian fauna is predominantly marsupial, and so lowly organized as to be quite unfitted for coping with certain exotic and aggressive species introduced by civilized man. The chief of these are the European Red Fox, the Domestic Cat, the European Rabbit, the House Rats, and the House Mouse. Further competition results from the encroachment of hosts of sheep and cattle upon the ancestral grazing grounds of the herbivorous marsupials. An apparently minor predatory role is played by the Dingo (*Canis dingo*), which was presumably introduced by aboriginal man.

The Fox and the Cat (which has become feral in large numbers) have long been active in the direct extermination of the smaller and comparatively helpless marsupials. The Rabbit, in millions, operates indirectly but no less effectively by overrunning the land, occupying all available burrows, and depriving the herbivorous marsupials (even such large species as the kangaroos) of the food necessary to their existence. The introduced rats and mice usurp the habitats of the native species. Even sanctuaries are not proof against such enemies as the foregoing.

The serious depletion of the native fauna by these agencies is supplemented by widespread bush fires, by conversion of a vast acreage of wild land into crop or grazing lands, by the huge fur trade, by epizootic disease, and by the large-scale use of poisoned bait, which takes toll of many animals besides the pests against which it is directed.

Altogether, the situation in Australia has gotten largely beyond human control. The rapidly growing list of extinct forms already contains at least the following 11:

- Freckled Marsupial Mouse (*Antechinus apicalis*)
- New South Wales Barred Bandicoot (*Perameles fasciata*)
- Western Barred Bandicoot (*Perameles myosura myosura*)
- Nalpa Bilby (*Macrotis lagotis grandis*)
- Leadbeater's Opossum (*Gymnobelideus leadbeateri*)
- Gaimard's Rat-kangaroo (*Bettongia gaimardi*)
- Gilbert's Rat-kangaroo (*Potorous gilbertii*)
- Broad-faced Rat-kangaroo (*Potorous platyops*)
- Parma Wallaby (*Thylogale parma*)
- Toolach Wallaby (*Wallabia greyi*)¹
- White-tailed Rat (*Zyromys argurus argurus*)

Dr. W. K. Gregory, of the American Museum of Natural History, says (1924, p. 11): "Late in the eighteenth century, there arrived in Australia by far the most destructive placental mammal the world has ever seen, *Homo sapiens*, variety *europaeus*, who has devastated the continent and is now completing the work of destruction."

MALAY ARCHIPELAGO

Insular faunas are of extraordinary interest because of their tendency toward endemism and because of the light they throw upon geological history and evolutionary processes. At the same time, by reason of the more or less strictly circumscribed nature of their habitats, and by reason of a certain lack of adaptability or self-defense, they are peculiarly vulnerable to attack and extermination by enemies of foreign origin. Thus the Malay Archipelago commands the attention of the conservationist as well as of the evolutionist. Incidentally, it was in this environment, in the fertile mind of Alfred Russel Wallace, that one of the germs of the evolutionary idea developed.

So far this region, containing the richest insular faunas of the entire world, has fared moderately—or at least comparatively—well, having lost only three mammals, all from tiny Christmas Island, lying some 200 miles off the south coast of Java. These are a shrew (*Crocidura fuliginosa trichura*) and two species of indigenous rats (*Rattus macleari* and *R. nativitatis*), all of which have succumbed

¹ A single captive remained alive in 1938 (Troughton, 1938, p. 407).

to an invasion of House Rats and Domestic Cats, either through direct attack or through some epizootic introduced by one or both of these animals.

On the other hand, through the archipelago generally, cultivated areas and the native population show a strong tendency to increase; this is especially true of the Sunda Islands and the Philippines. Thus the native mammals are engaged in a steady retreat into the dwindling forests.

In the Netherlands Indies many good protective measures have been adopted. No less than 76 nature reserves have been created, and these may be regarded as the final refuge of the native fauna. Hunting and export of wild animals are prohibited except under special license.

In Borneo and New Guinea the native population is less dense than in the Sunda Islands, and there is apparently little use by the natives of firearms—that primary factor in the extermination of wild life.

The vanishing mammals of the archipelago, for which special concern is felt, include the following:

- Orang-utan (*Pongo pygmaeus*)
- Sumatran Elephant (*Elephas maximus sumatranus*)
- Javan Rhinoceros (*Rhinoceros sondaicus*)
- Sumatran Rhinoceros (*Dicerorhinus sumatrensis sumatrensis*)
- Babirussa (*Babirussa babyrussa*)
- Javan Banteng (*Bibos sondaicus sondaicus*)
- Bornean Banteng (*Bibos sondaicus lowi*)
- Tamarao or Dwarf Buffalo of Mindoro (*Anoa mindorensis*)
- Common Anoa of Celebes (*Anoa depressicornis*)
- Mountain Anoa of Celebes (*Anoa fergusonii*)
- Sumatran Serow (*Capricornis sumatraensis sumatraensis*)

Of these, the Javan Rhinoceros is in the most serious condition, being reduced to perhaps two dozen individuals.

ASIA

The fauna of this greatest of the continents has been safeguarded in part by natural conditions. Chief among these is the sparsity of the human population over such vast areas as the taiga and the tundra of Siberia and the deserts of Mongolia, Chinese Turkestan, Persia, and Arabia. The great mountain masses of the Himalaya, Tian Shan, and Altai systems, as well as numerous lesser ranges, have also afforded a measure of protection to the mammals adapted to these high altitudes.

A factor in the preservation of the large mammals of Afghanistan and Tibet has been the exclusion of all but a handful of foreigners. India, despite its teeming population, has not exter-

minated a single mammal, thanks to the protective attitude toward game assumed both by the native rulers and by the British administration. In China, unfortunately, there seems to be little or no thought of the conservation of wild life on the part of the great mass of the population.

One of the most decisive factors in the accelerated depletion of the game resources of Asia (and of other continents likewise) during recent years has been the increasing use of modern rifles of high power and precision. This has been especially noticeable in Tibet, according to reports of recent explorers, and also in Arabia. In the deserts of Iraq and Arabia pursuit of gazelles and other animals by motor car has recently become a very serious menace to their survival.

The Asiatic rhinoceroses, the Saiga Antelope, such large horned ruminants as the Wapiti and other members of the deer family, and even the lowly pangolins, have been victimized in a peculiarly distressing way, merely because of the apparently wholly mythical value of the horns, scales, and other parts of the body in the Chinese pharmaceutical trade. This belief is so deeply rooted that probably no educational campaign would be effective in staving off the extermination of any species at the mercy of the peoples who regard powdered rhino horn, for example, as a panacea. Even in countries far beyond China's borders, protection of rhinoceroses and other species in similar demand is made extraordinarily difficult by the fabulous prices set upon them and by the incentive for poaching under these circumstances. When the last Asiatic rhino is gone, and the fancied benefits from its powdered horn are no longer available, possibly then the tragic fallacy of the whole business will dawn upon those responsible for the extermination of this section of the world's fauna.

Of fur-bearing animals, probably the highly prized Siberian Sables have been subjected to severest pressure, but the Soviet Government has created several great reserves for their protection, and has maintained a closed season on Sables over the whole territory of the USSR.

Despite the many-sided attack upon Asiatic mammals—for the sake of their meat, hides, fur, horns, scales, and even raw body fluids—that continent has exterminated to date, as far as known, only three forms: the Japanese Wolf (*Canis hodophilax*), the Syrian Wild Ass (*Asinus hemionus hemippus*), and Schomburgk's Deer (*Rucervus schomburgki*).

There are a number of others, however, for which the same fate is more or less imminent. Notable among these are the following:

- Indian Cheetah (*Acinonyx jubatus venaticus*)
- Asiatic Lion (*Leo leo persicus*)

Przewalski's Horse (*Equus przewalskii*)
 Transcaspian Wild Ass (*Asinus hemionus finschi*)
 Indian Wild Ass (*Asinus hemionus khur*)
 Javan Rhinoceros (*Rhinoceros sondaicus*)
 Asiatic Two-horned Rhinoceroses (*Dicerorhinus sumatrensis lasiotis* and
D. s. niger)
 Yarkand Stag (*Cervus yarkandensis*)
 McNeill's Deer (*Cervus macneilli*)
 White-lipped Deer (*Cervus albirostris*)
 Malayan Gaur (*Bibos gaurus hubbachi*)
 Gobi Argali (*Ovis ammon darwini*)
 Semipalatinsk Argali (*Ovis ammon collium*)
 Anadyr Bighorn (*Ovis nivicola* subsp.)

There are doubtless additional forms of Asiatic Wild Sheep whose existence is seriously threatened, but information on the present status of certain ones is scarcely sufficient to warrant a definite statement.

EUROPE

In view of the fact that the European type of culture has generally had such a devastating effect upon native faunas wherever it has spread in colonies and settlements throughout the rest of the world, it is gratifying to find that the mammalian fauna of Europe itself has retrograded no further than it has. The chief impoverishment has naturally occurred in the British Isles and other densely populated countries of Western Europe. And yet fewer Recent mammals have been exterminated in Europe than in North America or Australia or Africa. They seem to number only six, as follows:

European Lion (*Leo leo* subsp.)
 European Wild Horse (*Equus caballus* subsp.)
 Aurochs (*Bos primigenius*)
 Caucasian Bison (*Bison bonasus caucasicus*)
 Pyrenean Ibex (*Capra pyrenaica pyrenaica*)
 Portuguese Ibex (*Capra pyrenaica lusitanica*)

The retrogression of the European fauna has no doubt been due in the first place to the widespread clearing of forests and their replacement by lands devoted to habitations, transportation systems, crops, or grazing. Hunting, however, has constituted the most important part of the direct human pressure upon the wild animals. While this sort of pressure began to be felt ages ago, it was primarily the invention and improvement of firearms that enabled man to proceed with ever-increasing rapidity on his course of extermination. Species of comparatively large size, furnishing valuable meat and hides, have been the principal sufferers. Thus four of the six extinct European mammals are members of the cattle family (Bovidae).

In Europe, as contrasted with the United States, there is a far greater proportion of closely guarded private estates, and hunting of large game is chiefly restricted to the wealthy few. This condition of affairs has resulted in a much slower rate of extermination than in the United States, despite the large number of national parks and wild-life refuges in this country. Furthermore, the European attitude appears much more tolerant toward such predatory animals as Wolves and Brown Bears, which have been able to survive so far in such countries as Spain, France, Italy, Yugoslavia, Greece, Bulgaria, Rumania, Czechoslovakia, Poland, the Baltic States, Russia, and Scandinavia. Americans have been more ruthless in exterminating, or attempting to exterminate, any predatory animal conflicting, or presumed to conflict, with human interests. Unfortunately, the American method of dealing with predators by means of poison has attained a certain vogue in Bulgaria.

A few of the more important vanishing mammals of Europe may be mentioned here. The Brown Bear (*Ursus arctos*) and the Wolf (*Canis lupus*) are probably doomed to disappear almost entirely from Western Europe, although they will long survive in Russia and Siberia. The European Wildcat (*Felis silvestris silvestris*) has become extremely scarce in general; perhaps its greatest danger lies in extinction by dilution through interbreeding with feral Domestic Cats. The insular Wildcats (Cretan, Sardinian, Corsican, and British—*Felis agrius*, *F. sarda*, *F. reyi*, and *F. silvestris grampia*) are probably endangered in like manner. The European Beaver (*Castor fiber*), persecuted for its fur, remains in only a few isolated colonies. There is some doubt as to whether any representatives of the Finland Reindeer (*Rangifer tarandus fennicus*) and the Novaya Zemlya Reindeer (*R. t. pearsoni*) still survive; the animal of Novaya Zemlya has fallen victim to visiting ships' crews and to Samoyed immigrants. While the stock of the Lithuanian Bison (*Bison bonasus bonasus*) is greatly reduced, and while there has been considerable mixture in captivity with the Caucasian Bison (*B. b. caucasicus*) and with the American Bison (*Bison bison bison*), energetic protection in sanctuaries assured its survival up to 1939, at least. Two of the four races of the Spanish Ibex (*Capra pyrenaica*) have been exterminated by excessive hunting, and the fate of those remaining has become uncertain during recent events in Spain. The Cyprian Mouflon (*Ovis ophion ophion*) has become reduced to a precariously small stock.

The British Isles have long since lost the Brown Bear, the Wolf, the Beaver, the Wild Boar (*Sus scrofa*), and the Reindeer (*Rangifer tarandus*). No doubt insularity has here played a part in the early disappearance of these mammals.

AFRICA

As long as the African Continent was occupied by primitive savages, without modern weapons, animal life was, in a large sense, in a virtual state of equilibrium. When European settlement began, and firearms were introduced, the death knell of a very considerable proportion of the population of large mammals was sounded. Thus the Atlas Bear (*Ursus crowtheri*), the Barbary and the Cape Lions (*Leo leo leo* and *L. l. melanochaitus*), the Quagga (*Hippotigris quagga*), Burchell's Zebra (*Hippotigris burchellii burchellii*), the Bubal Hartebeest (*Alcelaphus buselaphus buselaphus*), the Rufous Gazelle (*Gazella rufina*), and the Blaauwbok (*Hippotragus leucophaeus*) have departed finally and completely from the African scene. The typical subspecies of the Cape Hartebeest (*Alcelaphus caama*) may also be extinct, but imperfect knowledge of its distribution precludes a definite statement. A long time previously the Algerian Wild Ass (*Asinus atlanticus*) became extinct, from unknown causes. These losses by extinction are divided almost equally between South Africa—the region most thoroughly settled by Europeans—and the Barbary States, where the well-armed Moors long held sway.

A century ago the Boer hide-hunters decimated the remarkable antelope and zebra fauna of South Africa. In the last half-century, firearms in the hands of improvident and short-sighted natives have wrought extremely serious havoc among the dwindling herds of African game in general. As intertribal warfare has practically ceased, and as the benefits of modern medicine and sanitation have penetrated far into the jungles and deserts, the native populations have increased, and their demands for a meat diet have decimated the game. Encircling fires, a method of hunting practiced on a fairly large scale in the savanna regions, have been extremely destructive, even in the absence of firearms. Professional hunters in the employ of great industrial enterprises, as in various parts of the Belgian Congo, have simply wiped out the antelopes over large areas. Hasty and probably ill-considered campaigns for the control of the tsetse fly have too often resulted in hecatombs of the large game mammals. In recent years the animals of the desert, such as Oryx and Gazelles, have become subject to attack from motor cars.

In South Africa the Bontebok (*Damaliscus dorcas*), the Blesbok (*Damaliscus phillipsi*), and the White-tailed Gnu (*Connochaetes gnou*) no longer roam the free veldt, but have become restricted to enclosed farms and preserves. A remnant of the Cape Mountain Zebra (*Hippotigris zebra zebra*) was preserved at the eleventh hour.

Among other vanishing or threatened African mammals, the following may be mentioned in particular:

- Barbary Lynx (*Caracal caracal algerus*)
- South African Bush Elephant (*Loxodonta africana africana*)
- African Manatee (*Trichechus senegalensis*)
- Nubian Wild Ass (*Asinus asinus africanus*)
- Somali Wild Ass (*Asinus asinus somaliensis*)
- Southern White Rhinoceros (*Ceratotherium simum simum*)
- Northern White Rhinoceros (*Ceratotherium simum cottoni*)
- Pygmy Hippopotamus (*Choeropsis liberiensis*)
- Barbary Stag (*Cervus elaphus barbarus*)
- Congo Giraffe (*Giraffa camelopardalis congoënsis*)
- Nigerian Giraffe (*Giraffa camelopardalis peralta*)
- Angola Giraffe (*Giraffa camelopardalis angolensis*)
- Southern Giraffe (*Giraffa camelopardalis capensis*)
- Okapi (*Okapia johnstoni*)
- Cape Buffalo (*Syncerus caffer caffer*, here restricted to the South African animal)
- Egyptian Arui (*Ammotragus lervia ornata*)
- Libyan Arui (*Ammotragus lervia fassini*)
- Nubian Ibex (*Capra nubiana nubiana*)
- Abyssinian Ibex (*Capra walie*)
- Cuvier's Gazelle (*Gazella cuvieri*)
- Slender-horned Gazelle (*Gazella leptoceros*)
- Mhorr Gazelle (*Gazella dama mhorr*)
- White Oryx (*Aegoryx algazel*)
- Giant Sable Antelope (*Hippotragus varians*)
- Addax (*Addax nasomaculatus*)
- Nyala (*Tragelaphus angasi*)
- Mountain Nyala (*Tragelaphus buxtoni*)
- Senegambian Giant Eland (*Taurotragus derbianus derbianus*)
- Congo Giant Eland (*Taurotragus derbianus congolanus*)

A very considerable number of game reserves have been established in various parts of Africa, and there should be a great many more of them, effectively supervised. Herein lies the chief hope for the survival of many of the larger African mammals.

MADAGASCAR

The mammalian fauna of this great island is particularly noteworthy for its very high degree of endemism and for the preponderance of lemurs. Madagascar and its outliers boast no less than three families and forty species and subspecies of lemurs, not one of which extends to the African mainland. Fortunately a fair proportion of these remain more or less common, being protected from persecution by native superstition. However, one species, the Hairy-eared Mouse Lemur (*Cheirogaleus trichotis*), is apparently extinct. The following seem to exist in very small numbers, and

should be safeguarded by every possible means from further decrease:

Coquerel's Dwarf Lemur (*Microcebus coquereli*)
 Crossley's Mouse Lemur (*Cheirogaleus major crossleyi*)
 Gray Lemur (*Haplemur griseus griseus*)
 Broad-nosed Gentle Lemur (*Haplemur simus*)
 Diademed Sifaka (*Propithecus diadema diadema*)
 Major's Sifaka (*Propithecus verreauxi majori*)
 Aye-aye (*Daubentonia madagascariensis*)

Two peculiar carnivores, the Fossane (*Fossa fossa*) and the Fossa (*Cryptoprocta ferox*), are also endemic in Madagascar. The former is accorded protection under Schedule A of the London Convention of 1933, and probably the latter is almost equally deserving of consideration.

Perhaps the greatest danger to mammalian life in Madagascar is the steady reduction of the forest areas through burning and clearing by the natives. It is highly important from the point of view of conservation that this process should be halted.

THE CHRONOLOGY OF EXTINCTION

It may be of interest to the historian of mammalogy to list the extinct forms here in some sort of chronological order. They will be arranged chiefly by half-century periods and by regions within those periods; but those forms that passed out of existence prior to 1800 will be placed in a single group. It should be borne in mind that in most cases the date of extinction can be only roughly indicated. For this reason the sequence within the regional half-century groups will be systematic rather than chronological. In some cases, however, it is possible to add a more approximate date of extinction after the name of the species or subspecies. Certain cases of probable but unproved extinction are indicated by a question mark.

Years 1-1800 (33 forms):

EUROPE

European Lion (*Leo leo* subsp.), 80-100
 European Wild Horse (*Equus caballus* subsp.)
 Aurochs (*Bos primigenius*), 1627

AFRICA

Algerian Wild Ass (*Asinus atlanticus*)
 Blaauwbok (*Hippotragus leucophaeus*), 1800

WEST INDIES¹

- Four Antillean insectivores (*Nesophontes edithae*; *N. micrus*; *N. longirostris*; *N. zamicus*)
 Lesser Falcate-winged Bat (*Phyllops vetus*)
 Cuban Yellow Bat (*Natalus primus*)
 Smaller Puerto Rican Ground Sloth (*Acratocnus odontrionus*)
 Larger Puerto Rican Ground Sloth (*Acratocnus major*)
 Smaller Hispaniolan Ground Sloth (*Acratocnus(?) comes*)
 Larger Hispaniolan Ground Sloth (*Parocnus serus*)
 Barbuda Musk-rat (*Megalomys audreyae*)
 Hispaniolan Spiny Rat—two species (*Brotomys voratus*; *B. contractus*)
 Cuban Short-tailed Hutia (*Geocapromys columbianus*)
 Crooked Island Hutia (*Geocapromys ingrahami irrectus*)
 Great Abaco Hutia (*Geocapromys ingrahami abaconis*)
 Haitian Hexolobodon (*Hexolobodon phenax*)
 Least Hispaniolan Hutia (*Plagiodontia spelaeum*)
 Puerto Rican Isolobodon (*Isolobodon portoricensis*)
 Haitian Isolobodon (*Isolobodon levir*)
 Narrow-toothed Hutia (*Aphaetretus montanus*)
 Two agoutilike rodents (*Heteropsomys insularis*; *Homopsomys antillensis*)
 A Puerto Rican hystricomorph (*Heptaxodon bidens*)
 "Quemi" of Oviedo (*Quemisia gravis*), about 1550?
 A Puerto Rican giant rodent (*Elasmodontomys obliquus*)

SOUTH AMERICA

- Patagonian Giant Ground Sloth (*Grypotherium listai*)

OCEANS

- Steller's Sea-cow (*Hydrodamalis gigas*), 1768

Years 1801-1850 (2 forms):

NORTH AMERICA

- Eastern Bison (*Bison bison pennsylvanicus*), 1825

WEST INDIES

- Hispaniolan Hutia (*Plagiodontia aedium*)

Years 1851-1900 (31 forms):

AUSTRALIA

- Gilbert's Rat-kangaroo (*Potorous gilbertii*)

¹ Possibly the extinction of some of the forms listed under this heading, known from bones found in cavern deposits, may have occurred more than 2,000 years ago. They are recognized, however, as pertaining to the Recent fauna.—A. W.

EUROPE

Portuguese Ibex (*Capra pyrenaica lusitanica*), about 1892

AFRICA

Atlas Bear (*Ursus crowtheri*)

Cape Lion (*Leo leo melanochaitus*), about 1865

Quagga (*Hippotigris quagga*), about 1878

MADAGASCAR

Hairy-eared Mouse Lemur (*Cheirogaleus trichotis*)

NORTH AMERICA

Gull Island Meadow Mouse (*Microtus pennsylvanicus nesophilus*),
1890's

Plains Grizzly (*Ursus horribilis horribilis*)

California Coast Grizzly (*Ursus californicus*), about 1886

Sacramento Grizzly (*Ursus colusus*), about 1862

Navajo Grizzly (*Ursus texensis navaho*)

Sonora Grizzly (*Ursus kennerleyi*)

Mendocino Grizzly (*Ursus mendocinensis*), about 1875

New Mexico Grizzly (*Ursus horriaeus*)

Sea Mink (*Mustela macrodon*), about 1880

Eastern Wapiti (*Cervus canadensis canadensis*), about 1885

Oregon Bison (*Bison bison oregonus*), about 1850's

WEST INDIES

?Two Antillean insectivores (*Nesophontes paramicrus*; *N. hypomicrus*)

?Puerto Rican Long-nosed Bat (*Monophyllus frater*)

?Jamaican Long-tongued Bat (*Reithronycteris aphylla*)

A Puerto Rican bat (*Stenoderma rufum*)

?Puerto Rican Long-tongued Bat (*Phyllonycteris major*)

?Haitian Long-tongued Bat (*Phyllonycteris obtusa*)

Jamaican Rice Rat (*Oryzomys antillarum*), about 1880's

St. Vincent Rice Rat (*Oryzomys victus*), about 1897?

Santa Lucia Musk-rat (*Megalomys luciae*)

Larger Cuban Spiny Rat (*Boromys offella*)

Lesser Cuban Spiny Rat (*Boromys torrei*)

FALKLAND ISLANDS

Antarctic Wolf (*Dusicyon australis*), 1876

GALÁPAGOS ISLANDS

Chatham Island Rice Rat (*Oryzomys galapagoensis*)

Years 1901-1944 (40 forms):

AUSTRALIA

- Freckled Marsupial Mouse (*Antechinus apicalis*)
 New South Wales Barred Bandicoot (*Perameles fasciata*)
 Western Barred Bandicoot (*Perameles myosura myosura*)
 Nalpa Bilby (*Macrotis lagotis grandis*)
 Leadbeater's Opossum (*Gymnobelideus leadbeateri*)
 Gaimard's Rat-kangaroo (*Bettongia gaimardi*)
 Broad-faced Rat-kangaroo (*Potorous platyops*)
 Parma Wallaby (*Thylogale parma*)
 Toolach Wallaby (*Wallabia greyi*)
 White-tailed Rat (*Zyzomys argurus argurus*)

MALAY ARCHIPELAGO

- Christmas Island Shrew (*Crocidura fuliginosa trichura*), about 1904
 Maclear's Rat (*Rattus macleari*), about 1904
 Bulldog Rat (*Rattus nativitatis*), about 1904

ASIA

- Japanese Wolf (*Canis hodophilax*)
 Syrian Wild Ass (*Asinus hemionus hemippus*), about 1927
 Schomburgk's Deer (*Rucervus schomburgki*), 1930's

EUROPE

- Caucasian Bison (*Bison bonasus caucasicus*), 1930's
 Pyrenean Ibex (*Capra pyrenaica pyrenaica*), 1910's

AFRICA

- Barbary Lion (*Leo leo leo*), 1922
 Burchell's Zebra (*Hippotigris burchellii burchellii*)
 Bubal Hartebeest (*Alcelaphus buselaphus buselaphus*), 1920's?
 Rufous Gazelle (*Gazella rufina*), 1920's?

NORTH AMERICA

- Long-eared Kit Fox (*Vulpes macrotis macrotis*), 1900's
 Newfoundland Wolf (*Canis lupus beothucus*), 1910's
 Florida Wolf (*Canis niger niger*), 1920's
 Tejon Grizzly (*Ursus tularensis*), 1916
 Texas Grizzly (*Ursus texensis texensis*), 1910's?
 ?Mount Taylor Grizzly (*Ursus perturbans*)
 Black Hills Grizzly (*Ursus rogersi bisonophagus*)
 ?Lillooet Grizzly (*Ursus pervagor*)
 ?Klamath Grizzly (*Ursus klamathensis*)
 Southern California Grizzly (*Ursus magister*), 1908

?Apache Grizzly (*Ursus apache*)
 Henshaw's Grizzly (*Ursus henshawi*), 1920's
 Eastern Cougar (*Felis concolor couguar*)
 Arizona Wapiti (*Cervus canadensis merriami*), 1906
 Badlands Bighorn (*Ovis canadensis auduboni*), 1900's?

WEST INDIES

Cuban Solenodon (*Solenodon cubanus*), about 1910
 Martinique Musk-rat (*Megalomys desmarestii*), 1902

GALÁPAGOS ISLANDS

James Island Rice Rat (*Nesoryzomys swarthi*)

This record shows a steadily accelerated rate of extinction in each of the last three half-century periods. About 38 percent of the losses have been sustained since 1900. This indicates how difficult is the task of preserving native faunas in the present era of intensive modern invention and industrial expansion.

THE RECORD OF EXTINCTION BY FAMILIES

The following record indicates how these losses by extinction are divided among the various mammalian families:

Bears (Ursidae), 17
 Spiny rats and their relatives (Echimyidae), 15
 Cattle, sheep, goats, and antelopes (Bovidae), 10
 Hamsterlike rodents (Cricetidae), 8
 Antillean insectivores (Nesophontidae), 6
 Leaf-nosed bats (Phyllostomidae), 6
 Kangaroos and their relatives (Macropodidae), 5
 Wolves and foxes (Canidae), 5
 Horses, zebras, and asses (Equidae), 5
 Ground sloths (Megalonychidae), 4
 Cats (Felidae), 4
 Bandicoots (Peramelidae), 3
 Old World rats (Muridae), 3
 Deer (Cervidae), 3
 Giant rats (Dinomyidae), 2
 Dasyures and their relatives (Dasyuridae), 1
 Phalangers and their relatives (Phalangeridae), 1
 Solenodons (Solenodontidae), 1
 Shrews (Soricidae), 1
 Long-legged bats (Natalidae), 1
 Lemurs (Lemuridae), 1
 Giant ground sloths (Megatheriidae), 1
 Heptaxodon (Heptaxodontidae), 1
 Weasels and their relatives (Mustelidae), 1
 Steller's Sea-cow (Hydrodamalidae), 1

There is the clearest sort of significance in the losses sustained by the larger predatory mammals as a group (Ursidae, Canidae,

and Felidae), because of their competition with man for food in the shape of the ungulate mammals, both wild and domesticated, such as cattle, sheep, goats, antelopes, horses, asses, swine, and deer. In the case of such formidable carnivores as wolves, bears, lions, tigers, and leopards, the matter of outright self-defense on man's part may also be involved. Moreover, it is natural that the large game species of the cattle and deer families, which require extensive feeding grounds and are eagerly sought by mankind for food, should have suffered some of the principal losses.

SUMMARY AND CONCLUSIONS

During the past 2,000 years the world has lost, through extinction, about 106 forms (species or subspecies) of mammals. They are distributed by regions as follows: Australia, 11; Malay Archipelago, 3; Asia, 3; Europe, 6; Africa, 9; Madagascar, 1; North America, 27; West Indies, 41; South America, 1; Falkland Islands, 1; Galápagos Islands, 2; oceans, 1. Approximately 67 percent of these losses have occurred during the past century, and 38 percent during the past half-century. Thus the rate of extinction is being steadily accelerated.

In addition to the mammals already extinct, more than 600 others require consideration as vanishing or threatened forms.

Insular faunas, partly by reason of their circumscribed nature and partly by reason of a certain lack of adaptability or self-defense, are particularly vulnerable to attack or competition by man and by certain mammalian pests introduced by him. There may be a further reason for the decadence of insular faunas in some cases, such as that of the West Indies, in the virtually total lack of native mammalian predators; these would doubtless have played a beneficial role by eliminating the less fit individuals, and thereby contributing to the survival of the fittest individuals, among the species preyed upon.

In general, it is fairly obvious that species of restricted distribution and specialized habits have less chance of survival than those of wide distribution and generalized habits.

The primary factor in the depletion of the world's mammalian faunas is civilized man, operating either directly through excessive hunting and poisoning, or indirectly through invading or destroying natural habitats, placing firearms in the hands of primitive peoples, or subjecting the primitive faunas of Australia and of various islands to the introduction of aggressive foreign mammals, including fox, mongoose, cat, rat, mouse, and rabbit. Except in the West Indies, comparatively few species seem to have died out within the past 2,000 years from natural causes, such as evolutionary senility, disease, or climatic change.

The chief hope for the survival of the larger mammals of the world lies in the establishment and maintenance of a sufficient number of sanctuaries. This will avail in most parts of the world, but the matter is not so simple in Australia. Unless sanctuaries in that country can be surrounded with fences that are proof against foxes, rabbits, cats, and house rats, even they will not avail for many of the smaller Australian mammals. So perhaps the darkest picture today, as far as the future of mammals is concerned, is to be found in Australia, where many of the primitive native species cannot stand up against the highly organized introduced pests, and where conditions have gotten largely beyond human control.

ACCOUNTS OF EXTINCT, VANISHING, OR THREATENED MAMMALS

Order MARSUPIALIA: Marsupials

Family DASYURIDAE: Dasyures, etc.

This family, consisting of about 13 genera, is limited to Australia, Tasmania, New Guinea, and certain smaller neighboring islands. Of approximately 75 known forms, 14 call for discussion in the present work.

Freckled Marsupial Mouse

ANTECHINUS APICALIS (J. E. Gray)

Phascogale apicalis J. E. Gray, Ann. Mag. Nat. Hist., ser. 1, vol. 9, p. 518, 1842.
("Doubtless from Australasia" = South-Western Australia, *vide* Iredale and Troughton, 1934, p. 6.)

FIGS.: Gould, 1863, vol. 1, pl. 39; Cabrera, 1919, pl. 5, fig. 2.

This marsupial of Western Australia, little larger than a mouse, does not seem to have been collected for more than 30 years and is probably extinct.

The general color is freckled reddish gray; eye ring whitish; under parts dull white or yellowish; pouch hairs dark rufous; front and outside of forearm rufous; rest of outer surface of limbs dull gray; ears short; tail tapering, variegated like back, and tipped with black. Head and body, 111-120 mm.; tail, 85-89 mm. (Thomas, 1888, pp. 277-278.)

Very little information concerning this species is on record, and some of that is conflicting. Gould evidently gave it much too wide a range in stating (1863, p. 46) that it "is very generally distributed over every part of the colony of Western Australia." His actual records are from the vicinity of Moore's River, Perth, and King George's Sound.

Thomas (1888, p. 278) records specimens from Albany and Victoria Plains, Western Australia, and even from Queensland.

Shortridge states (1910, p. 840; map, p. 842) that it is "confined to the forest districts of the South-West, where it is apparently a rare species." He records three specimens from Albany in the Perth Museum.

On the other hand, Glauert states (1933, p. 19) that the species is not represented in the West Australian Museum at Perth and is now probably extinct.

Furthermore, despite the various specimens recorded by Gould, Krefft, Thomas, and Shortridge, E. Le G. Troughton writes (*in litt.*, April 16, 1937) that "this species is not represented in the Perth Museum, and is probably known only from the type in the British Museum, and one in the Australian Museum. Apparently extinct or represented by small colonies only." Iredale and Troughton (1934, p. 6) limit the range to "South-Western Australia," omitting Queensland.

The species was probably either neutral or beneficial in its habits, for Gilbert (in Gould, 1863, p. 46) found the remains of insects in the stomachs he examined.

No particular reason for its extinction seems to have been suggested, but the generally adverse conditions now facing the smaller marsupials of Australia are doubtless sufficient to account for it.

Large Brush-tailed Phascogale; Brush-tailed Pouched Mouse

PHASCOGALE TAPOATAFA TAPOATAFA (Meyer)

Viverra tapoatafa Meyer, Zool. Entdeck., p. 28, 1793. (Based upon "The Tapoa Tafa" of White, Jour. Voy. New South Wales, p. 281, pl. 58, 1790; type locality, Sydney, New South Wales.)

SYNONYM: *Didelphis penicillata* Shaw (1800).

FIGS.: Waterhouse, 1841, pl. 8; Gould, 1845, vol. 1, pl. 31; Lydekker, 1894, pl. 28; Jones, 1923, p. 99, fig. 60; Le Souef and Burrell, 1926, fig. 93; Fleay, 1934, pls. 19, 20.

Though very considerably reduced in numbers, this animal still maintains itself in various localities through its wide range over the southern parts of Australia.

Form stout and strong; general color finely grizzled pale gray; muzzle with indistinct darker stripe; ears very large, thin, nearly naked; under parts white or pale gray; pouch hairs dull rufous, tipped with white; terminal three-fifths of tail with a thick black brush. Head and body, 240 mm.; tail, 225 mm. (Thomas, 1888, pp. 295-296.)

The general range is "southern Australia, from south Queensland to Western Australia" (Iredale and Troughton, 1934, p. 7).

Though once a familiar animal to settlers whose homes were in the more wooded districts, *P. penicillata* is unknown to the rising generation of country people. . . . It seems astonishing that so small an animal could ever have been a real menace to the poultry run of the settler, and yet it is credited with being a determined slayer of chickens, and one which killed not merely to appease its appetite. Many of the older residents in South Australia have caught the animal red-handed, and as with the Native Cat, it seems a re-

markable thing that so well equipped a carnivore should have been reduced to a condition bordering on extinction in so comparatively short a time. What its range within the State may have been is difficult to determine. It was not met with by the Horn Expedition, but an animal which answers very much to its description, but of which no specimen is available, apparently exists over a wide area in the Centre. By the South Australian Murray River natives it was well known under the name of "Pundi" but it has not been seen in their district for very many years. (Jones, 1923, p. 101.)

Shortridge comments (1910, p. 839; map, p. 841) on its status in Western Australia as follows:

"Although not plentiful this species seems to have a more general range in South-Western Australia than the smaller Phascogales.

"Doubtfully recorded from as far inland as Kalgoorlie, where it would probably be only a straggler. . . .

"Occasionally frequenting the neighbourhood of farms, where according to natives they come after mice."

According to Glauert (1933, p. 19), it occurs in the southwest of Western Australia, from Fremantle to the south coast and inland to Merredin. Twenty specimens had been received at the Perth Museum in the preceding five years.

For many years since the ravages of disease during the years 1898-1900, that agile and courageous little killer, "the brush-tailed rat" of the bushman, has been very scarce in the majority of its old haunts in Victoria and New South Wales. . . .

The black "bottle-brush" tail and coat of 'possum-grey fur, combined with the amazingly agile movements of this lithe rat-sized marsupial, at once excite admiration. However, few people have enjoyed the spectacle of the nocturnal and arboreal creature making its lightning movements up and down the Eucalypt trunks—"corkscrewing" round the boles to elude observation, or else bounding lightly, like a squirrel, from tree to tree. (Fleay, 1934, p. 89.)

In Victoria, according to C. W. Brazenor (*in litt.*, March 3, 1937), the animal is "holding its own and common in timbered country."

Le Souef and Burrell (1926, pp. 333-336) give the following account: "Some species, notably the brush-tailed and the lesser brush-tailed phascogales, are now rather scarce over the greater part of their range, having been greatly reduced by disease, which swept off large numbers of native animals in 1898-9-1900. Cats have also been very destructive. . . .

"This species is more carnivorous than most members of the family. Moreover, it is very useful, in that it seems especially to catch rats and mice. There are instances of it following up plagues of these rodents and doing a good deal toward thinning them out."

E. Le G. Troughton (*in litt.*, April 16, 1937) regards it as an active and resourceful species, whose survival is apparently assured, at least in the mountainous regions of its range.

[A northern subspecies (*P. t. pirata* Thomas, 1904; type locality, "South Alligator River," Northern Australia) ranges across the

northern part of the continent, from the Dawson Valley, Queensland, to the Kimberley Division of Western Australia. It "appears to be very rare on the Dawson but still has a good hold on the wetter coastal country of the Fitzroy" (Finlayson, 1934, p. 226). It is reported as numerous in Arnhem Land, Northern Australia (Le Souef and Burrell, 1926, p. 336). Its range lies largely outside that of the introduced fox, and its chances of survival are probably better than those of the southern subspecies.]

Red-tailed Phascogale; Lesser Brush-tailed Pouched Mouse

PHASCOGALE CALURA Gould

Phascogale calurus Gould, Proc. Zool. Soc. London 1844, p. 104, 1844. ("In the interior of Western Australia" = the Military Station on Williams River, *vide* Gould, 1863, vol. 1, p. 39.)

Figs.: Gould, 1863, vol. 1, pl. 32; Waterhouse, 1846, pl. 14, fig. 2.

The Red-tailed Phascogale, of South, Central, and Western Australia, is so rare that few more than a dozen specimens seem to have been placed on record. It is evidently a vanishing species.

General color ashy gray; under parts creamy white; ears large, nearly naked except at base, where there are some yellow hairs; basal half of tail rusty red above, black below; terminal half bushy, black (Gould, 1844, p. 105). Head and body, 125 mm.; tail, 147 mm. (Thomas, 1888, p. 297.)

Shortridge writes (1910, p. 839; map, p. 840): "Very rare, seeming hitherto to have been recorded only four times from Western Australia; once from the Williams River, where it was originally obtained by Gilbert, and three times since from around Kojonup." Glauert (1933, p. 19) gives its range in Western Australia as "Lower South-West from Narrogin to Kojonup"; he adds that it "seems to be rather rare, six specimens only having reached the [Perth] Museum within the last five years."

For Central Australia Spencer (1896, p. 30) records only a single specimen, taken at Alice Springs, and remarks that it "is evidently not a common form in the central district."

"The measurements given in the British Museum Catalogue of 1888 are taken from an Adelaide specimen, but I have failed to trace any recent records of the animal in South Australia. . . . To-day it is impossible to define its former range in the State, or, unfortunately, even to attest to its present existence." (Jones, 1923, p. 102.)

Gould's statement of the range (1863, vol. 1, p. xxvii) as the "interior of New South Wales and the colony of Victoria" is obviously incomplete and supported by rather meager evidence. How-

ever, Krefft states (1871 [p. 40]) that the animal occurs in New South Wales, near the Darling River, and Iredale and Troughton (1934, p. 8) include Victoria in the range.

On Williams River, Gilbert (in Gould, 1863, vol. 1, p. 39) records the species as invading a storeroom. The type specimen was captured in that locality by a Domestic Cat.

"Some species, notably the brush-tailed and the lesser brush-tailed phascogales, are now rather scarce over the greater part of their range, having been greatly reduced by disease, which swept off large numbers of native animals in 1898-9-1900. Cats have also been very destructive." (Le Souef and Burrell, 1926, p. 333.)

Here we seem to have yet one more melancholy case of the virtual disappearance of a species before any adequate knowledge of its life history or even of its distribution was obtained.

**Slender-tailed Pouched Mouse; Gray Pouched Mouse;
"Common" Pouched Mouse; Slender
Mouse-Sminthopsis**

SMINTHOPSIS MURINA (Waterhouse)

This animal seems to have disappeared over considerable portions of its original wide range in Australia. It has been divided into the following four subspecies:

SMINTHOPSIS MURINA MURINA (Waterhouse)

Phascogale murina Waterhouse, Proc. Zool. Soc. London 1837, p. 76, 1838. ("North of Hunter's River, New South Wales.")

FIGS.: Waterhouse, 1841, pl. 10; Gould, 1863, vol. 1, pl. 43; Lydekker, 1894, pl. 29 (subsp.?); Le Souef and Burrell, 1926, fig. 94.

Fur short and soft; general color above gray, with a faint yellowish tint; feet, under parts, and face beneath eyes white; tail covered with minute silvery-white hairs. Head and body, 76 mm.; tail, 65 mm. (Waterhouse, 1838, p. 76.)

This form occurs in New South Wales and southern Queensland. Waterhouse reported it from north of Hunter's River, New South Wales, and Gilbert found it on the Severn River in the same state (Gould, 1863, vol. 1, p. 50). It was perhaps this form that Gould recorded (1863, vol. 1, p. 49—as *Antechinus albipes*) from the Darling Downs of New South Wales.

This little marsupial, if sufficiently abundant, would evidently act as a check on one of the introduced rodent pests. "Mr. A. C. V. Bligh, of Toowoomba, Queensland, reports *S. murina* as being numerous at the same time as the common mouse (*M. musculus*), and feeding upon the latter" (Le Souef and Burrell, 1926, p. 355).

SMINTHOPSIS MURINA ALBIPES (Waterhouse)

Phascogale albipes Waterhouse, Proc. Zool. Soc. London 1842, p. 48, 1842.
("Port Adelaide," South Australia.)

FIG.: Gould, 1852, vol. 1, pl. 42.

Upper parts brownish (the hairs being annulated with yellow near the tip and with black at the tip); hairs of under parts deep gray, tipped with white; feet white; tail dark, with very minute hairs. Head and body, 95 mm.; tail, 80 mm. (Waterhouse, 1842, p. 48.)

This subspecies occurs in South Australia and Victoria.

Gould gives it too wide a range in stating (1863, vol. 1, p. 49) that it "appears to be almost universally distributed over the whole of the southern coast of Australia, from Swan River to New South Wales."

"These little animals . . . are caught in large numbers by the aborigines of the Murray" (Kreffft, 1871, p. [41]).

"Although in books this little animal passes uniformly under the name of 'Common' Pouched Mouse, it is by no means a common species. In South Australia it is not nearly so frequently met with as is *S. crassicaudata*. . . . It is an animal which is very rarely seen except when it has fallen victim to a cat, and but little is known of its life history." (Jones, 1923, p. 118.)

C. W. Brazenor (*in litt.*, March 3, 1937) knows of no locality in Victoria in which this animal can be found at the present time.

SMINTHOPSIS MURINA FULIGINOSA (Gould)

Antechinus fuliginosus Gould, Mamm. Australia, vol. 1, pl. 41, 1852. ("At King George's Sound and in the vicinity of Perth," Western Australia. Thomas (1888, p. 305) lists the type specimen from "R. Avon, W. A.," which is in the general vicinity of Perth. Thus Iredale and Troughton (1934, p. 10) are evidently in error in giving, as the restricted type locality, "King George's Sound.")

FIG.: Gould, 1852, pl. 41.

Upper parts dark grayish brown, interspersed with longer black hairs; face lighter; a mark around the eyes black; chest sooty gray, with a narrow median line of buffy gray; rest of under parts pale grayish white; feet buffy white; tail dark reddish brown, grayish beneath. Head and body, 83 mm.; tail 83 mm. (Gould, 1863, vol. 1, p. 48.)

The range is "South-Western Australia, more or less coastal, but inland to Katanning, Broomehill, Gnowangerup, and Bulong, near Kalgoorlie" (Glauert, 1933, p. 20).

Gould (1863, vol. 1, p. 48) considered it "very abundant, both at King George's Sound and in the vicinity of Perth."

"These little animals . . . are caught in large numbers by the aborigines . . . of King George's Sound" (Kreffit, 1871, p. [41]).

Shortridge (1910, pp. 842-844; map, p. 843) speaks of it as "occurring throughout the South-West; appears to be more plentiful in the coastal districts wherever grass-trees (*Xanthorrhoea*) occur"

"On account of their habit of hiding among fallen timber or tree-stumps, the marsupial mice must invariably get exterminated wherever bush fires occur. This species, as well as *Dromicia* and the small Phascogales, has consequently become very scarce, especially in the agricultural and more thickly populated areas. In addition it is probably to a great extent killed off by the cats that have run wild in large numbers."

More recently, however, Glauert (1933, p. 20) considers it still "a very common species in the South-West."

Gilbert (in Gould, 1863, vol. 1, p. 48) found it insectivorous.

SMINTHOPSIS MURINA CONSTRICTA Spencer

Sminthopsis murina var. *constricta* Spencer, Rept. Horn Sci. Exped. Central Australia, pt. 2, zool., p. 33, 1896. ("Oodnadatta," South Australia.)

General coloration similar to that of *S. m. murina*; foot broader; a small tuft of white hairs on posterior face of forearm; tail in-crasated. Head and body, 71 mm.; tail, 80 mm. (Spencer, 1896, p. 33.)

In his original description of *constricta*, Spencer mentions only the single specimen from Oodnadatta, but on a previous page (1896, p. 32) he records a specimen of "*S. murina*" from Alice Springs, Central Australia, which perhaps belongs to the same form. He adds that the species "does not appear to be common in the central district."

No additional information concerning the present subspecies seems to have come to light since its discovery was announced more than 45 years ago.

Long-tailed Sminthopsis

SMINTHOPSIS LONGICAUDATA Spencer

Sminthopsis longicaudatus Spencer, Proc. Royal Soc. Victoria, n. s., vol. 21, pt. 2, p. 449, 1909. ("West Australia.")

This little animal is known from only a single specimen, from no more definite locality than "West Australia."

General body color gray, tinged with rufous in parts; a darkish line through the eye; lips, chin, and feet white; tail scaly, with

short stiff hairs. Head and body, 100 mm.; tail, 202 mm. (Spencer, 1909, pp. 449-450.)

"This species does not seem to have been recorded since its original discovery, and we have no information about the type locality beyond Spencer's vague 'West Australia'" (Glauert, 1933, p. 21).

The apparently total lack of additional information concerning the species, during 30 years past, does not augur well for its present status, although there is always a possibility that it may have survived in some out-of-the-way corner of Western Australia.

Common Eastern Native Cat; Viverrine Native Cat

DASYURUS VIVERRINUS (Shaw)

Didelphis Viverrina Shaw, Gen. Zool., vol. 1, pt. 2, p. 491, pl. 111, 1800. (A composite species, based in part upon "The Tapoa Tafa" of White (Jour. Voy. New South Wales, p. 281, pl. 58, 1790) and in part upon "The Spotted Opossum" of Phillip (Voy. Botany Bay, p. 147, pl. 15, 1789). The name has become restricted to the latter; type locality, Botany Bay, New South Wales. Cf. Harper, 1940, p. 191.)

Figs.: Waterhouse, 1841, pl. 7 (as *D. maugei*); Gould, 1863, vol. 1, pl. 50; Krefft, 1871, pl. 13; Lydekker, 1894, pl. 26; Le Souef and Burrell, 1926, figs. 87, 88; Fleay, 1932, pls. 3, 4; Pocock, 1937, p. 616, fig.

This species, like its larger relative, *Dasyurus maculatus*, was distributed through eastern Australia and Tasmania and has suffered a similar or perhaps even greater reduction in numbers.

There are two color phases, of which the black is the less common. Fur thick and soft; general color either pale olive-gray or deep black, profusely spotted with white; belly and limbs paler than back; tail bushy, without spots, tipped with white in the gray phase. Head and body, 400-440 mm.; tail, 210-290 mm. (Thomas, 1888, pp. 266-267.)

The range includes New South Wales, Victoria, South Australia, and Tasmania.

The history and status of the species are reviewed by Jones (1923, pp. 91-92):

It was abundant round, and even in the immediate precincts of, the larger Australian towns. Twenty years ago it was exceedingly common about Adelaide. Still more recently it lived close to Melbourne; and to-day it is not uncommon in the suburbs of Sydney. . . . Very early in the days of colonisation it was regarded with dislike because of the damage it did by killing poultry; but there are many settlers who would now welcome its return in order to keep the mice plagues within check. . . .

There is no doubt that as a destroyer of mice, rats, and young rabbits the Native Cat played an extremely useful part in Australian rural economy, and despite the fact that it was an occasional robber of hen roosts its presence was a real asset to the country.

Its range in South Australia was formerly very wide. On Kangaroo Island it appears to have been always more or less of a rarity. Thirty years ago it haunted the shores of the [Murray] river and lakes, being there very partial to a fish diet. To-day, if it exists at all in this State [South Australia], it must be an animal of the utmost rarity. Although there is no doubt that the influences which have been at work in the general process of the extermination of the Australian fauna have operated to the full on the Native Cat; it is possible that another factor has come into play during the final scene of its passing. The animal has been trapped, poisoned and persecuted throughout the country . . . The Native Cat, with its cunning and its activity, was

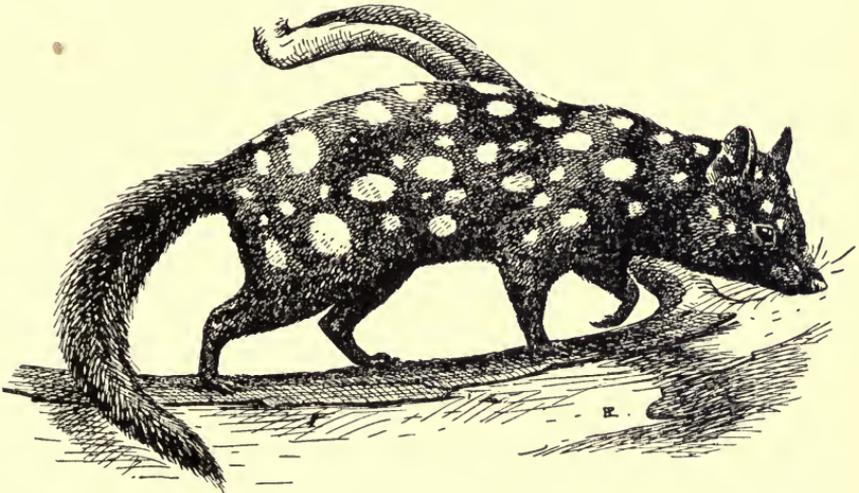


FIG. 1.—Common Eastern Native Cat (*Dasyurus viverrinus*)

well able to look after itself, despite the fact that it was an extremely easy animal to trap. Its rapid decrease started about the year 1900, and during that and the two following years the so-called "common" Native Cat practically disappeared from South Australia. Much the same thing happened in Victoria and in New South Wales, with the exception of the district immediately round Sydney. It would seem that some epidemic disease must have spread through the Dasyures, and that after a lapse of twenty years the remnant has not succeeded in re-establishing itself. In the Animal Protection Act of 1919 the Native Cat is not even mentioned. The evil or the good that it did has ceased to be a factor of any economic importance.

At the present time it "still haunts the coastal cliffs and mountains about Sydney, also parts of Tasmania, Victoria, and New South Wales, where survival seems assured" (E. Le G. Troughton, *in litt.*, April 16, 1937).

In Victoria, according to C. W. Brazenor (*in litt.*, March 3, 1937), it occurs in greatest numbers around Lake Corangamite but is also

seen occasionally in the eastern part of the state. Further information is supplied by Fleay (1932, pp. 63-66):

From accounts supplied by people of these localities [about Lake Corangamite], the animals were not affected by the mysterious disease which annihilated many marsupials in other parts of the country in the first years of this century. Though still well known, however, they are becoming scarce, with the continuous work of rabbiters' dogs and traps, and the increase in settlement. . . .

The adult males supported a host of parasites, and, when first brought to Melbourne, before being treated, they possessed numerous large ticks, sores infested with fly larvae, and the peculiar flea (*Stephanocercus dasyuri*); while investigations on Dasyures which had been caught in rabbit traps showed numerous nematode worms internally.

On Kangaroo Island, South Australia, the species seems to have disappeared (Waite and Jones, 1927, p. 322).

In Tasmania it has fared better than in Australia. "The common Dasyure . . . is to be met with in many localities in spite of the warfare waged against them in return for the toll they take of the settlers' poultry. In this respect, however, they cannot be considered so destructive as the 'Tiger Cat' [*D. maculatus*]." (Lord and Scott, 1924, p. 270.) "The Dasyure is scattered throughout Tasmania, and still is very plentiful. This marsupial does not seem to either increase or decrease." (R. Boswell, *in litt.*, May 13, 1937.)

Despite Jones's statement (1923, p. 92) that "the animal's skin is of no commercial value," there evidently was a demand for it in former years. Lydekker writes (1894, p. 164): "The fur being soft, the skins are suitable for linings; and from two to five thousand skins are annually imported into England. Formerly the grey skins fetched from about fivepence to sixpence each in the market, while the value of the black ones ranged from tenpence to a shilling. Of late years, however, there has been a fall in the price."

The species is now under complete legal protection in Victoria and in Tasmania.

Geoffroy's Native Cat; Black-tailed Native Cat

DASYURUS GEOFFROI GEOFFROI Gould

Dasyurus Geoffroi Gould, Proc. Zool. Soc. London 1840, p. 151, 1841. ("Liverpool Plains," New South Wales.)

FIGS.: Gould, 1851, vol. 1, pl. 51; Cabrera, 1919, pl. 4, fig. 2.

The typical subspecies of Geoffroy's Native Cat seems to have become extinct over the greater part of its range, but it may survive in parts of New South Wales and Queensland.

General color fuscous, washed with yellow; head, back, and sides with white spots, smaller than those in *D. viverrinus* and *D. macu-*

latus; tail long, terminal half black; under parts whitish. Head and body, 15 inches; tail, 11.5 inches. (Gould, 1841a, p. 151.)

The former range of this animal extended from Victoria and South Australia through New South Wales to Queensland but apparently did not include the coast region of the southeast or the extreme north.

According to Gould (1863, vol. 1, p. 58), the species (including both subspecies) "inhabits the whole of the southern portion of the country from Moreton Bay [Queensland] on the east to Swan River on the west." It "appears to be exclusively confined to the regions on the interior side of the hills, the specimens I have seen having been procured on the Liverpool Plains in New South Wales, the Murray Scrub in South Australia, and beyond the ranges of Swan River on the western coast."

In Victoria it was always confined to the northwestern corner. The last known record was in 1857, and the species is now extinct in that state. (C. W. Brazenor, *in litt.*, March 3, 1937.)

In South Australia there is no record other than that of Gould and a specimen listed in the British Museum Catalogue of 1888. "Men who have been professionally interested in the fauna of the State for a period of forty years are unaware of any examples being taken in South Australia proper. Unless it still lingers near to the northern limits of the State, it must probably be regarded as extinct in South Australia." (Jones, 1923, pp. 93-94.)

In the Dawson Valley of Queensland, in 1905, it "was noticed to be suddenly numerous, but it completely vanished by 1906" (Finlayson, 1934, p. 225). It is represented in the Queensland Museum merely by two specimens without precise localities (Longman, 1930, p. 62).

The eastern subspecies has very likely suffered in the same way as the western, which was "killed off as much as possible in the agricultural and more thickly populated districts on account of being so destructive to poultry" (Shortridge, 1910, pp. 838-839). Hoy (1923, p. 165) contributes information on an important enemy: "I . . . am told that domestic cats frequently kill and drag home adult native cats (*Dasyurus viverrinus*, *D. geoffroyi*, and *D. hallucatus*)." Other possible causes underlying the sudden fluctuations in numbers of the species and its general disappearance over most of its range, have not been definitely explained.

[The larger western subspecies (*D. g. fortis* Thomas) still occurs commonly in the southwest of Western Australia (Shortridge, 1910, pp. 837-839; Glauert, 1933, p. 18, and *in litt.*, March 17, 1937). Some representative of the species—perhaps *fortis*—is reported from Central Australia but as nowhere common there (Finlayson, 1935b,

pp. 60-61). If this is the western subspecies, the eastern part of Western Australia forms a great blank in its known distribution.]

Large Spotted-tailed Tiger-cat; Spotted-tailed Dasyure

DASYURUS MACULATUS (Kerr)

Viverra maculata Kerr, Anim. Kingdom of Linnaeus, p. 170, 1792. (Based upon the "Spotted Martin" of Phillip, Voy. Botany Bay, p. 276, pl. 46, 1789; type locality "the neighborhood of Port Jackson" [Sydney], New South Wales.)

FIGS.: Waterhouse, 1841, pl. 6 (as *D. macrourus*); Gould, 1851, vol. 1, pl. 49; Lydekker, 1894, pl. 25; Raven, 1924, p. 25; Le Souef and Burrell, 1926, fig. 86; Fleay, 1932, p. 66, fig. 4, and pl. 5.

This fierce and rather powerful animal, one of the largest of the carnivorous marsupials, is found in eastern Australia and in Tasmania. Its range and its numbers have been reduced by settlement, though evidently not yet to the danger point.

According to Phillip (1789, p. 276), the general color is black; body and tail irregularly blotched with white; tail tapering to a point; head and body, 18 inches; tail, nearly 18 inches. But Waterhouse (1846, pp. 440-441) and later authorities do not agree with Phillip and Kerr on the general color; it "varies from a very deep brown to a rich red-brown"; under parts "dirty yellow"; head and body, 17-24 inches; tail, 15-20 inches.

The range includes "south-eastern Queensland, eastern New South Wales, Victoria, south-eastern South Australia, Tasmania" (Iredale and Troughton, 1934, p. 14). Some of the earlier works extend the range into central or northern Queensland. According to Le Souef and Burrell (1926, p. 322), the species "is fairly common in Eastern Australia, from Cape York to Victoria." Half a century ago Thomas (1888, p. 265) considered it "approaching . . . complete extermination in Australia"; but Ogilby (1892, p. 18) replied that it "is by no means uncommon—nor seemingly has it any present intention of dying out—in the mountainous and coastal districts of eastern Australia." On the Comboyne Plateau of New South Wales "it appears to be rather uncommon" (Chisholm, 1925, p. 72).

In Victoria it was "common in heavily scrubbed country till about 1907, at which time an epidemic of disease almost completely destroyed the species. Has recovered somewhat in recent years and is found in some numbers in the Otway Ranges, and to a lesser extent scattered throughout the Dividing Range." (C. W. Brazenor, *in litt.*, March 3, 1937.) "With the advent of settlement, disease, dogs, guns, traps, and . . . the fox, which exterminates the simple marsupial game of the Dasyure, we have come to the time, in Victoria, of the almost complete disappearance of these

primitive carnivorous hunters" (Fleay, 1932, p. 68). The species now has complete legal protection in Victoria.

"Probably never abundant in South Australia, the stronghold of the species was in the south-eastern portion of the State. It is possible that some few still exist in the less closely settled areas of the South-East." (Jones, 1923, p. 88.)

In Tasmania it "is regarded as one of the settlers' greatest pests, owing to the toll it will take of his poultry" (Lord and Scott, 1924, p. 269). "The enemy of the settler's chickens, it is only natural that this species should be reduced in numbers, especially in the settled districts. Even so, this hardly accounts for the scarcity of this species in the more Southern Tasmanian localities in the last few years. In the North-West the species is still fairly common." (Lord, 1928, p. 22.)

There are additional records of nocturnal raids on poultry on the mainland of Australia, and this habit naturally reacts against the species. "All three dasyures are doomed to extinction, since they are killed whenever met with by the man on the land" (Jones and Manson, 1935, p. 34). "It is now being replaced by the domestic cat and the fox" (Raven, 1924, p. 25). However, "it is able to kill wallabies and fairly large birds," and "one succeeded, after a severe battle, in killing a large tom-cat" (Le Souef and Burrell, 1926, pp. 322-323). Although Lydekker wrote in 1894 (p. 160) that "its skin is but little valued by furriers," it must be remembered that many furs, formerly in little demand, now bring good prices.

While the Dingo is generally considered responsible for the extinction of the terrestrial Tasmanian Devil and Tasmanian Wolf in Australia, opinion seems divided as to whether it has seriously affected the status of the arboreal Spotted-tailed Tiger-cat on the mainland. E. Le G. Troughton (*in litt.*, April 16, 1937) believes that this species, by reason of its furtive and aggressive disposition, should survive indefinitely in the dividing ranges of the east coast.

Slender Native Cat; Slender Spotted-tailed Tiger-cat

DASYURUS GRACILIS Ramsay

Dasyurus gracilis Ramsay, Proc. Linn. Soc. New South Wales, ser. 2, vol. 3, p. 1296, 1888. ("Bellenden-Ker Ranges," northern Queensland.)

The Slender Native Cat is one of those species which, as far as known, has always been very rare. Apparently less than half a dozen specimens are on record—all from northern Queensland.

General color, above and below, deep blackish brown with white spots; tail spotted and closely furred, with a terminal tuft on the upper side. Total length, about 23 inches; tail, 9.3 inches. (Ramsay, *op. cit.*, p. 1296.)

The type specimen was collected by Robert Grant on the Belenden-Ker Ranges, apparently in 1887. The species was next found years later by C. M. Hoy on the Atherton Tableland (Le Souef and Burrell, 1926, p. 324). The late Henry C. Raven, of the American Museum of Natural History, informed me that he secured two or three specimens about 1922 in the same general region.

Whatever the factors may be that seem to restrict so decidedly the numbers of the Slender Native Cat, they have not been ascertained.

According to E. Le G. Troughton (*in litt.*, April 16, 1937), the species is rarely captured because of the density of its mountain rain-forest habitat, and should therefore survive in parts of coastal Queensland for all time.

Tasmanian Devil

SARCOPHILUS HARRISII (Boitard)

Didelphis ursina Harris, Trans. Linn. Soc. London, vol. 9, p. 176, pl. 19, fig. 2, 1808. ("Van Diemen's Land.") (Not *Didelphis ursina* Shaw (1800).)
Ursinus harrisii Boitard, Jardin des Plantes, p. 290, "1842" = 1841. (Tasmania.)
 FIGS.: Geoffroy and Cuvier, Hist. Nat. Mammif., vol. 7, pl. 113, 1842; Gould, 1851, vol. 1, pl. 48; Royal Nat. Hist., vol. 3, p. 271, fig., 1894-95; G. Smith, 1909, fig. 24; Raven, 1924, p. 25, fig., and 1929, p. 204, fig.; Le Souef and Burrell, 1926, fig. 85; Fleay, 1935, pl. 9; Pocock, 1937, p. 615, fig.; Reed and Lucas, 1937, p. 89, fig. 33.

This fierce little beast occurred in past ages on the Australian mainland, where it presumably succumbed to the advancing Dingo. In 1912 a specimen, probably an escaped captive, was taken in Victoria. It "is now confined to Tasmania, where it maintains a rather precarious foothold in the wilder parts of the country" (Jones, 1923, p. 85).

Whole body and upper part of tail covered with long coarse black hair; irregular blotches of white on shoulders, throat, or rump (G. P. Harris, 1808, p. 176). It is a thickset, powerful animal, and, except for its tail, resembles a miniature bear in outline. Head and body, 670-825 mm.; tail, 258-300 mm. (Lord and Scott, 1924, p. 267.)

"These animals were very common on our first settling at Hobart Town, and were particularly destructive to poultry, &c. They, however, furnished the convicts with a fresh meal, and the taste was said to be not unlike veal. As the settlement increased, and the ground became cleared, they were driven from their haunts near the town to the deeper recesses of the forests yet unexplored." (G. P. Harris, 1808, p. 177.)

"The *devil* is destructive to sheep all over the colony, and is

indeed the most destructive of our indigenous quadrupeds, the *Thylacinus* being much scarcer" (Gunn, 1838, p. 104).

"It has now become so scarce in all the cultivated districts, that it is rarely, if ever, seen there in a state of nature; there are yet, however, large districts in Van Diemen's Land untrodden by man; and such localities, particularly the rocky gullies and vast forests on the western side of the island, afford it a secure retreat. . . .

"In its disposition it is untameable and savage in the extreme, and is not only destructive to the smaller kangaroos and other native quadrupeds, but assails the sheep-folds and hen-roosts whenever an opportunity occurs." (Gould, 1863, vol. 1, p. 55.)

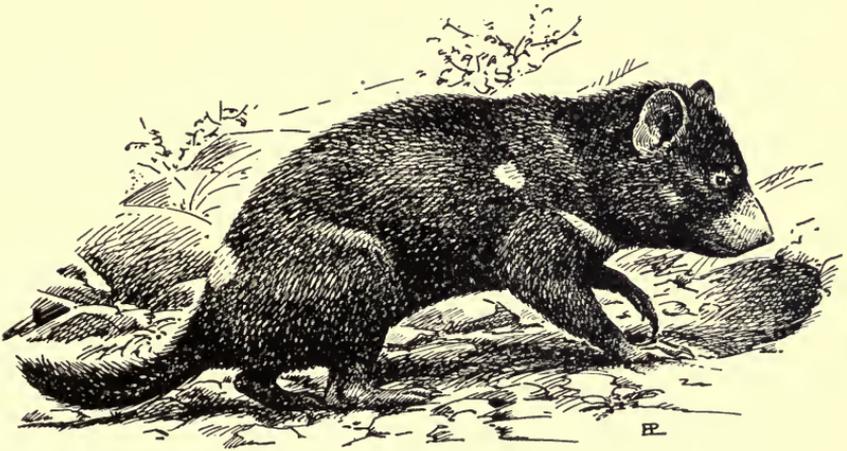


FIG. 2.—Tasmanian Devil (*Sarcophilus harrisi*)

"The Devil is far commoner than the Tiger and more widely distributed through the island Like the Tiger it destroys sheep, making a single meal off each capture." (G. Smith, 1909, p. 97.)

Lord (1928, p. 22) says of it:

The Tasmanian Devil will probably survive for many years. Its hardy nature both in captivity and in its wild state cause[s] one to wonder how it came about that this species became extinct on the mainland within comparatively recent geological times. It cannot be considered a pleasant animal to have much to do with, and numbers are killed by trappers in the course of their work. In the rougher sections of the country this species exists in fair numbers and there is every prospect of it remaining an inhabitant of such places for years to come.

One or more Tasmanian Devils will often follow a Thylacine on its hunting excursions. The Thylacine will kill a wallaby or other small animal, select a few choice morsels, and pass on. The Devils will carry on the feast and consume the remnants, and bones and all.

According to R. Boswell (*in litt.*, May 13, 1937), it still exists in large enough numbers to enable it to be out of immediate danger

of extinction. Civilization has been the great cause of its decreasing numbers. It has no legal protection.

"In spite of his ungainly, ugly appearance, his whining snarls and unpleasant smell, the Tasmanian Devil is a creature of many amusing antics and distinctly unusual ways. Moreover, his position as the second largest of living marsupial carnivores, soon, perhaps, to be the largest when the rare Thylacine finally disappears, invests him with a peculiar interest." (Fleay, 1935, p. 100.)

Tasmanian Wolf; Marsupial Wolf; Tasmanian Tiger; Thylacine

THYLACINUS CYNOCEPHALUS (Harris)

Didelphis cynocephala Harris, Trans. Linn. Soc. London, vol. 9, p. 174, pl. 19, fig. 1, 1808. ("Van Diemen's Land" [= Tasmania].)

FIGS.: Waterhouse, 1841, pl. 5; Gould, 1851, vol. 1, pls. 53, 54; Wolf, 1861, pl. 31; Krefft, 1871, pl. 12; Royal Nat. Hist., vol. 3, p. 270, fig., 1894-95; G. Smith, 1909, fig. 23; Cabrera, 1919, pl. 6; Australian Mus. Mag., vol. 1, no. 3, p. 62, frontisp., 1921; Le Souef and Burrell, 1926, fig. 84; Raven, 1929, p. 207, fig.; Pocock, 1937, p. 614, fig.; Reed and Lucas, 1937, p. 85, fig. 31; Sharland, 1939, p. 23, fig.

This largest and most formidable of living carnivorous marsupials is so seriously reduced in numbers that its fate seems to be hanging by a somewhat slender thread.

General build doglike, but hind end tapering gradually to the tail; upper parts tawny grayish brown, with 16-19 blackish brown bands across the back, chiefly developed on the hind quarters; under parts paler. Head and body, 1230-1300 mm.; tail, 525-650 mm.; height at shoulders, about 560 mm. (Chiefly from Lord and Scott, 1924, p. 264.)

While a fossil form of Thylacine has been recorded from the Australian mainland, the range of the living form is restricted to Tasmania. The mainland Thylacine is presumed to have succumbed as a consequence of the advent of the Dingo during the Pleistocene, for it probably could not compete successfully with that more highly organized animal.

The Thylacine "is common in the more remote parts of the colony, and they are accordingly often caught at Woolworth and the Hampshire hills. . . . They are usually nocturnal in their attacks on sheep." (Gunn, 1838, p. 101.)

It was with prophetic vision that Gould wrote long ago (1863, vol. 1, pp. 60-61):

When the comparatively small island of Tasmania becomes more densely populated, and its primitive forests are intersected with roads from the eastern to the western coast, the numbers of this singular animal will speedily diminish,

extermination will have its full sway, and it will then, like the Wolf in England and Scotland, be recorded as an animal of the past: although this will be a source of much regret, neither the shepherd nor the farmer can be blamed for wishing to rid the island of so troublesome a creature. A price is already put upon the head of the native Tiger, as it is called; but the fastnesses of the Tasmanian rocky gullies, clothed with impenetrable forests, will, for the present, preserve it from destruction.

. . . Although too feeble to make a successful attack on man, it commits sad havoc among the smaller quadrupeds of the country, and among the poultry, and other domestic animals of the settler; even sheep are not secure from its attacks

"The damage which it inflicts on the flocks of the settlers has . . . given rise to a relentless war of extermination, which has resulted in the almost complete extinction of this, the largest of the Australasian Carnivores, in the more settled portions of the country" (Lydekker, 1894, p. 152).

G. Smith (1909, pp. 96-97) wrote:

The destructiveness of these animals is greatly enhanced by the fact that a Tiger will make only one meal of a sheep, merely sucking the blood from the jugular vein or perhaps devouring the fat round the kidneys, but it never returns to the same carcass. . . . The shepherds wage incessant war on the creature, in the summer laying traps and hunting it with dogs, in the winter following up its tracks through the snow. A reward of a pound is given for the head by the Government, but the shepherd generally rides round with the head to several sheep-owners in the district, and takes toll from them all before depositing it at the police station. In consequence a large reward must be offered for the carcass of a Tiger, and an offer of £10 during a year for a live Tiger to be delivered in Launceston was unsuccessful. It pays the shepherd very much better just to hack off the head and take it round on his rides. Although the Tiger is by no means confined to the Lake District, it is more abundant here than anywhere else, though a stray individual may turn up on nearly all the big sheep stations throughout the island.

Lord (1928, pp. 20-21) says of the Thylacine:

The animal is confined practically to the rugged western portion of the island. From the more settled districts it has long since disappeared, and even in the more distant sheep runs it has been trapped out It is now also being killed out even in the rugged and more inaccessible parts of the country, which tends to reduce still further the remnants of this species. The explanation of this is that the Thylacine interferes with the trappers' snares. As a result, a powerful "springer" snare is set often in the vicinity of their "skinning yards," which are situated every quarter of a mile or so along the lines of snares. Thylacines or other animals caught in these powerful snares are, as a rule, too severely injured to be kept alive as specimens for zoological gardens, even if the trappers would take the trouble to bring them in. The extended trapping of recent years will tend, therefore, to restrict the Thylacine to the most rugged and unsettled portions of the West of the island. Here it may survive as a living species for years to come, but its eventual doom seems apparent unless such attempts as are being made at present by Mr. A. R. Reid (Curator of the Beaumaris Zoo, Hobart) to breed these animals in captivity are successful. . . .

It is doubtful if the shy animal will breed within the confines of a Zoo, and it would be in the interests of science if a reserve could be set aside and

netted in in order to prevent total extermination. . . . If funds were available an area in the National Park might well be considered for such a reserve.

"The Tasmanian Tiger is now only to be met with in a very few numbers. This animal is causing great concern in Tasmania at the present time. It is thought by many to be extinct, but this is not so. I have obtained authentic reports regarding its presence as having been seen as recently as January 1937 on the West Coast of Tasmania.

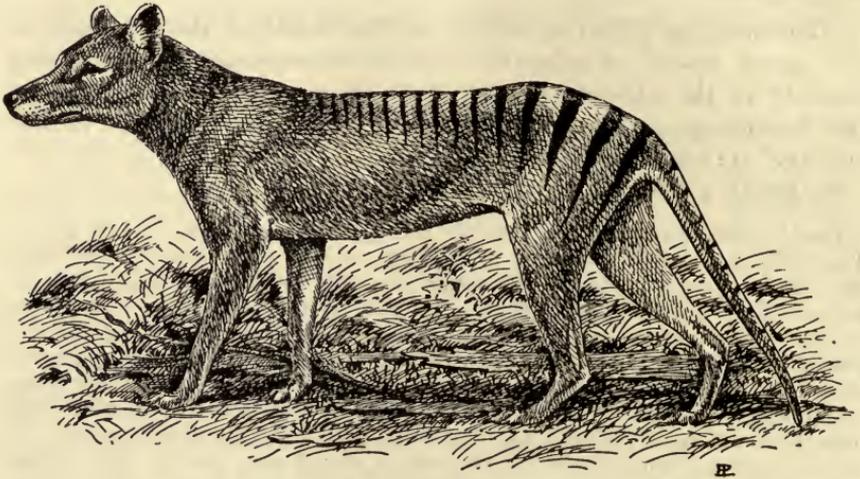


FIG. 3.—Tasmanian Wolf (*Thylacinus cynocephalus*)

"The former range of the Tasmanian Tiger must have been very great as I know of one Tasmanian, who with his brother, killed as many as twenty-four of these animals during one day, and received a reward of £1. 0. 0 per head for each animal.

"The Tasmanian Tiger is now wholly Protected." (R. Boswell, *in litt.*, May 13, 1937.)

"The significance of the mainland elimination, prior to settlement, of the largest living marsupial carnivore (*Thylacinus*) has already been noted, and latest reports from Tasmanian authorities indicate grave doubts for the insular survival of this unique example of parallelism" (Troughton, 1938, p. 408).

However, the latest news from Tasmania is distinctly encouraging. It comes in the form of a paper by Sharland (1939), which gives an account of several recent expeditions that have been sent to mountainous areas in the western part of the state by the Tasmanian Animals and Birds' Protection Board. From this account the following information is derived:

"The Thylacine exists to-day as but a remnant of the numbers

which, 50 or 60 years ago, roamed the countryside, feeding on small marsupials and sheep. . . . Nowadays, certainly, it is rarely seen. . . . When the game season is opened every few years the animal is often caught in snares. But it is in no part specially common, and there are extensive areas in this region where it does not occur at all, or but sparsely, its distribution depending almost wholly on the presence of smaller 'game.'" (P. 20.)

"The Thylacine has been known to attack dogs when cornered, but so far as I can determine there is no record of its ever having attacked man" (p. 32).

In a great amphitheatre about 25 to 40 miles in diameter, bounded by the King William, Prince of Wales, Norway, and other ranges, "we came upon many tracks made by Thylacine, indicating that the animal was fairly common and well distributed" (p. 34).

"The area enclosed by the mountains would make a splendid game sanctuary The Thylacine is probably as common here as in any other part of the West Coast." (P. 34.)

Additional tracks were found in the Jane River region, where "the animal had apparently been trailing Wallaby" (p. 34).

"No longer a menace to sheep-owners since its isolation in the remote parts of the State, the animal possesses a unique scientific value which is appreciated by the Board. While, up to half a century ago, it was fairly plentiful in the grazing country of the central plateau, and was known also to inhabit parts of the eastern tiers and other mountain forest areas adjacent to settlement, it has now practically disappeared from these districts, to make its last stand in the western section of the State." (P. 36.) The recent opening of a road through this remote region has had an adverse effect upon the Thylacine's prospects for survival.

A mountainous area situated about Frenchman's Gap, east of Macquarie Harbor, and comprising approximately 300,000 acres, is suggested as a suitable sanctuary for the Thylacine and other animals (p. 38).

Family MYRMECOBIIDAE: Marsupial Anteaters

The single genus of this family consists of two forms, both of which are treated here. They occur in the southern half of Australia.

Banded Anteater; West Australian Numbat

MYRMECOBIUS FASCIATUS FASCIATUS Waterhouse

Myrmecobius fasciatus Waterhouse, Proc. Zool. Soc. London 1836, p. 69, 1836. ("In the interior of the Swan River Settlement, about 90 miles to the S.E. of the mouth of that river," Western Australia.)

FIGS.: Waterhouse, 1838a, pl. 27, and 1841, pl. 11; Gould, 1845, vol. 1, pl. 4; Lydekker, 1894, pl. 30; Royal Nat. Hist., vol. 3, p. 275, lower fig., 1894-95; Cabrera, 1919, pl. 7; Le Souef and Burrell, 1926, fig. 96.

This beautiful little animal, representing a special family related to the dasyures, has been undergoing shrinkage of range and reduction in numbers in Western Australia for a considerable period and is perhaps approaching extinction.

Color above reddish ochre, interspersed with white hairs; posterior half of body with alternate black and white bands; tail long-haired, mixed with black, white, and reddish ochre; legs chiefly pale buff; under parts yellowish white (Waterhouse, 1836, pp. 69-70). Form graceful, squirrellike; a black stripe through the eye, and a white stripe above it. Head and body, 220-240 mm.; tail, 160-175 mm. (Thomas, 1888, pp. 311-314.)

In earlier days its range extended west to the Darling Range, northwest to the vicinity of Moore's River, northeast to Laverton, east to Kalgoorlie and possibly to South Australia near the coast, and south to the vicinity of Albany (Shortridge, 1910, p. 846, map; Glauert, 1933, p. 22). Forty years ago it was "fairly numerous throughout the South-west, especially where the prevailing timbers are the white gum (*Eucalyptus redunca*) and the jam (*Acacia acuminata*), getting less plentiful outside that area" (Shortridge, in Thomas, 1907, p. 772). "The Western Australian animal is now excessively rare, and it is probable that before many years are passed it will follow its South Australian neighbour [*M. f. rufus*] into extinction" (Jones, 1923, p. 126). Troughton writes (1923, p. 155) that "this animal . . . can now only be found in a greatly restricted area"; he secured three specimens about 1921. It seems to survive chiefly in the southwestern corner of the state, between Perth and Albany.

"The beautiful little Banded ant-eater is much sought after on account of its skin" (W. H. D. Le Souëf, 1907, p. 406).

Le Souef and Burrell (1926, pp. 365-366) write:

Quiet, inoffensive, without means of defence or offence, it is remarkable that the marsupial ant-eater has survived through the ages. This could happen only in Australia, where it did not come into competition with the more advanced forms of life. . . .

It is abroad both by day and by night, and, being conspicuous and not at all speedy, it makes a fairly easy mark for predacious animals and birds, more especially the introduced cat and fox; to say nothing of the settlers' dogs. Consequently, it is one of the first animals to disappear before the inevitable opening up of the country, and it is now scarce over the greater part of its range.

"The typical race . . . is endangered by clearing, fires, and introduced pests, the advent of the fox alone probably spelling the ulti-

mate doom of the terrestrial and non-burrowing highly specialized creature. . . . *Myrmecobius* may be regarded as one of the marsupials within sight of extermination, in this instance not due to exploitation by man, but as the result of settlement and introduced enemies. Hope for ultimate survival may rest with the introduction of a healthy colony to an island providing adequate supplies of favoured diet, and absence of enemies." (E. Le G. Troughton, *in litt.*, April 16, 1937.)

Its "very existence . . . is threatened by both fox and cat" (Troughton, 1938, p. 404).

South Australian Numbat; Rusty Numbat

MYRMECOBIUS FASCIATUS RUFUS Jones

Myrmecobius rufus Jones, Mammals S. Australia, pt. 1, p. 123, figs. 79, 83, and 84, 1923. ("South Australia.")

FIG.: Jones, 1923, fig. 79.

This form of Numbat, apparently extinct in New South Wales and coastal South Australia, still lingers in northwestern South Australia and in southwestern Central Australia.

It differs from the West Australian Numbat in having the darker part of the lower back "a fine bright brown" instead of blackish; tail "a uniform grizzle of rust red and dark brown." Head and body, 175 mm.; tail, 135 mm. (Jones, 1923, pp. 124-126.) Finlayson states (1933c, p. 204) that the outer surface of the ear is bright rufous instead of yellow and black, and he gives the following measurements for specimens from northwestern South Australia: head and body, 200-270 mm.; tail, 130-170 mm.

"The New South Wales animal, reported fairly plentiful about the plains of the Murray and Darling Rivers in 1862, . . . is apparently extinct" (E. Le G. Troughton, *in litt.*, April 16, 1937).

It is perhaps the present form to which Helms refers (1896, p. 255) in reporting the observations of the Elder Expedition somewhere in South or Western Australia: "A more exciting piece of work [by the natives] than digging for lizards is the excavating for the quick, little, banded anteater, *Myrmecobius fasciatus*, which animal often makes its lair over three feet below the surface." This expedition brought back a dried skin from the Everard Range, South Australia (Stirling and Zietz, 1893, p. 154).

Jones (1923, pp. 126-127) says of this Numbat:

The Numbat was probably never a very abundant animal, but its distribution was comparatively wide. Only twenty years ago it was met with along the scrub lands of the Murray, and earlier than that it existed quite near to Adelaide. Enquiries as to its present existence have produced negative replies from all those parts of the State in which there are schools, and the circulation

of its picture and description to more remote districts have proved equally unavailing. The aborigines who are attracted to civilisation, as it is represented by the East-West railway, know the animal, but so far have failed to supply any evidence as to its actual existence at the present time. If the Numbat still exists in South Australia it is probably towards the Western Australian border, and here it is probably the Western Australian form. The characteristic South Australian type has probably gone for ever. . . . The extermination of the Numbat is a tragedy in which man has probably played very little conscious part; it is no tale of ruthless slaughter for gain, such as is being rehearsed to-day in regard to the Australian fur-bearing animals, nor is it a case of determined persecution as is the case with the Tasmanian Devil. *Myrmecobius* is an animal which is probably phylogenetically senile, which



FIG. 4.—South Australian Numbat (*Myrmecobius fasciatus rufus*).
After Jones, 1923.

has become highly specialised in function and degenerate in some details of structure. Added to this is the fact that its home is invariably made in the hollow of a fallen tree or a rotting log. Accidental bush fires and the intentional burning off of country seem to have found the Numbat an easy victim, and they have exterminated it as they are exterminating other small terrestrial Marsupials. There is no escape from a bush fire for the Numbat. It does not excavate deep burrows, it does not climb, it is not fleet of foot—as its log home burns, it perishes. . . .

It is surely a tragedy that this most interesting animal has probably passed out of existence in our State, and is rapidly repeating the process in a neighbouring one without any representative collection having been made of its remains. It will not be long before *Myrmecobius* will be as extinct as those Mesozoic Marsupials of the English Jurassic beds of which it has been said to be “actually an unmodified survivor.”

Since the publication of Jones’s account, investigation by Finlayson has shown that the species still survives in the arid center of the continent. He writes (1933c, p. 203):

“Its presence in the centre [in the Everard Range] was first established by the work of the Elder Expedition

"Recent field work . . . in the far north-west of this State [South Australia] (in a typical eremian environment) has shown . . . that *Myrmecobius* still has a wide distribution in the south-west parts of the centre beyond the limits of pastoral settlement, and in some localities is by no means uncommon. It is possible that these colonies actually link up with the far south-western ones in Western Australia in a continuous band of distribution."

Finlayson here proposes (1933c, p. 203) to separate the central animal from that of Western Australia under the name of *Myrmecobius fasciatus* var. *rufus* and gives (p. 204) as type locality "mulga sand dunes, south and south-west of the Everard Range, far north-west of State of South Australia." This name, however, is antedated by *Myrmecobius rufus* Jones (1923), which was introduced without any formal designation of type locality, but which was based upon "South Australian specimens, from the Murray and from near Adelaide" (Finlayson, 1933c, p. 205). The range, according to Finlayson (p. 204), is "at present apparently not north of about 25° S. lat., nor east of 132° 30' E. long. To the south and west as yet undetermined. Formerly as far south as Adelaide, and probably ranging east into the Victorian and New South Wales mallee areas."

Family PERAMELIDAE: Bandicoots

The range of the bandicoots extends over Australia, Tasmania, New Guinea, and certain adjacent islands. There are about 9 genera, represented by about 44 forms. Of the latter, accounts of 12 appear in the following pages.

Eastern Barred Bandicoot; New South Wales Barred Bandicoot

PERAMELES FASCIATA J. E. Gray

Perameles fasciata J. E. Gray, in Grey, Two Expeditions Australia, vol. 2, appendix, pp. 401, 407, 1841. ("Liverpool Plains and South Australia"; type locality restricted by Thomas (1922, p. 144) to "Liverpool Plains," New South Wales.)

FIG.: Gould, 1849, vol. 1, pl. 8.

This bandicoot occurred formerly in New South Wales and Victoria. It has not been recorded for many years, however, and is probably extinct (A. S. Le Souef, *in litt.*, February 15, 1937).

This species has been more or less confused in descriptions with *P. myosura notina*. "Grey brown, rump with three black bands; tail white, with a black streak along the upper side. . . . Smaller than *P. Gunnii*." (J. E. Gray, in Grey, 1841, p. 407.) Upper parts penciled with black and yellow; sides yellow; under parts and feet

white (Gould, 1863, vol. 1, p. 12). Outer surface of ears flesh color basally, darker terminally; sides of rump with four pale vertical bands running downward from near the middle line, the spaces between them brown or black (Thomas, 1888, p. 248).

"This elegant species . . . enjoys a wide range over the eastern . . . portions of Australia, but is more frequently met with in the country within the ranges . . . than in the districts lying between the mountains and the sea. In New South Wales, the stony ridges which branch off from the ranges towards the rivers Darling and Namoi, are localities in which it may always be found." (Gould, 1863, vol. 1, p. 12.)

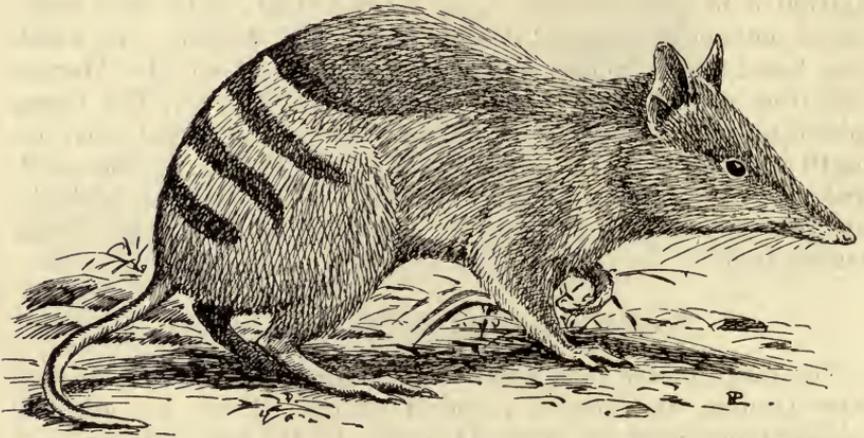


FIG. 5.—Eastern Barred Bandicoot (*Perameles fasciata*). After Gould, 1849.

The animal is "now believed extinct though once well distributed over western Victoria and N. S. Wales. The ultimate fate of these small non-burrowing forms is most uncertain." (E. Le G. Troughton, *in litt.*, April 16, 1937.)

Tasmanian Barred Bandicoot; Gunn's Striped Bandicoot

PERAMELES GUNNII J. E. Gray

Perameles Gunnii J. E. Gray, Ann. Nat. Hist., ser. 1, vol. 1, p. 107, 1838.
("Van Diemen's Land" [= Tasmania].)

FIGS.: Waterhouse, 1841, pl. 15; Gould, 1859, vol. 1, pl. 9; Lydekker, 1894, pl. 21.

While this species still occurs in numbers in Tasmania, it is "bordering on extinction in Victoria" (David H. Fleay, *in litt.*, June 1, 1937).

Muzzle tapering, gray-brown; under parts, feet, tail, and four

broad bands on each side of the rump white (J. E. Gray, in Gunn, 1838, pp. 107-108). General color grizzled yellowish brown; outer surface of ears yellowish brown, with a darker terminal blotch; sides of rump with four more or less distinct pale vertical bands running downward from near the middle line, the spaces between them brown or black. Head and body, 380-400 mm.; tail, 80-90 mm. (Thomas, 1888, pp. 245-246.)

Its known range includes Tasmania and Victoria. In the former state "the bandicoots are very numerous everywhere; they . . . live principally on roots. I knew one gentleman's entire collection of Cape bulbs, principally *Babianae*, eaten by them, and I suffered considerably myself, having lost some entire species of bulbs through these animals." (Gunn, 1838, pp. 102-103.) Gray (in Gunn, 1838, p. 108) records insect remains found in the stomach of one specimen.

This species is to be met with throughout Tasmania, but it appears to be less commonly and evenly distributed than the Short-nosed Bandicoot (Lord, 1928, p. 20).

"At one time distributed through western and central Victoria, this species is now restricted to a single locality near Hamilton and its numbers are few" (C. W. Brazenor, *in litt.*, March 3, 1937).

Western Barred Bandicoot; Marl

PERAMELES MYOSURA MYOSURA Wagner

Perameles myosuros Wagner, Archiv für Naturg. (Wiegmann), 7th yr., vol. 1, p. 293, 1841. (The type locality, not stated in the original description, is Swan River, according to Glauert (1933, p. 23), or King George's Sound, West Australia, according to Iredale and Troughton (1934, p. 19).)

FIGS.: Schreber, Säugthiere, suppl. 3, pl. 155 Ad, 1842; Gould, 1845, vol. 1, pl. 10.

"No specimens have reached the [Perth] Museum since 1900. It is therefore assumed that the animal is extinct." (Glauert, 1933, p. 23.)

Above mixed with blackish and yellowish brown; below dirty yellowish white; ears pale dusky, with a rusty-red spot at external base; a dark band extending across sides in front of thighs; feet whitish; tail scaly, short-haired, dusky above, dirty white below. Head and body, 11 inches; tail, 3 inches. (Wagner, 1841, pp. 293-295.)

The former range was the southwestern portion of Western Australia. According to Gould (1863, vol. 1, p. 14), it "inhabits the whole line of coast of the Swan River colony, but, so far as I can learn, is not found to the westward of the Darling range of hills." He adds that "its food consists of insects, seeds, and grain."

“Apparently not plentiful in the South-west, although described by natives as being fairly numerous in the Salt River district. A species of Bandicoot, probably this species, is said to have formerly extended as far north on the mainland as Sharks Bay.” Specimens are recorded from the vicinity of Pinjelly and Kojonup. (Short-ridge, 1910, pp. 833-834; map, p. 835.)

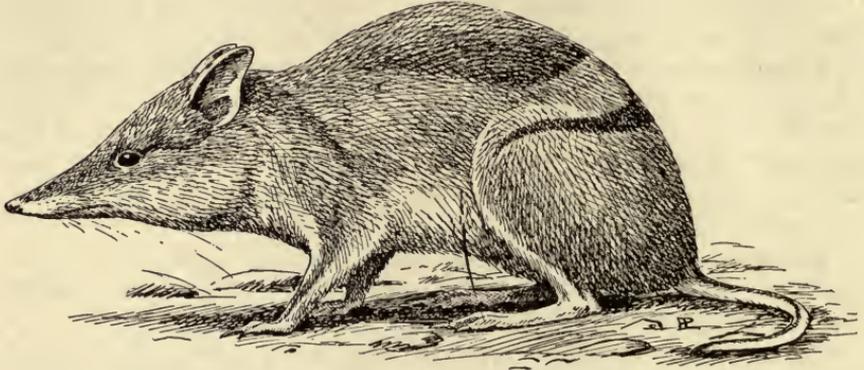


FIG. 6.—Western Barred Bandicoot (*Perameles myosura myosura*).
After Gould, 1845.

South Australian Barred Bandicoot

PERAMELES MYOSURA NOTINA Thomas

Perameles myosura notina Thomas, Ann. Mag. Nat. Hist., ser. 9, vol. 10, p. 144, 1922. (“Plains near the head of the St. Vincent Gulf,” South Australia.)

Figs.: Jones, 1924, p. 147, fig. 102; Le Souef and Burrell, 1926, fig. 83.

This subspecies is apparently extinct in southeastern South Australia but is “probably holding its own in the semi-arid Nullarbor Plain” in the west (A. S. Le Souef, *in litt.*, February 15, 1937).

It closely resembles *P. fasciata* in coloration, with three distinct black bands on the hind quarters; skull with more slender muzzle and smaller teeth than in *P. fasciata*. Head and body, 280 mm.; tail, 90 mm. (Thomas, 1922, p. 144.)

Formerly it seems to have ranged across the entire east-west extent of South Australia, in the more southern parts. According to Jones (1924, pp. 149-150), “this beautiful little Bandicoot had at one time a fairly wide distribution in this State. In addition to the animals from the head of St. Vincent Gulf, are others from the River Murray in South Australia, and from Adelaide itself. As far as can be ascertained it has now disappeared from all these localities, and remains only in the wastes of the western portion of the Centre. . . .

"Barred Bandicoots become very tame and familiar in captivity, but . . . they are desperately pugnacious among themselves. On one occasion eight live specimens were sent from Ooldea. All eight were dead . . . when they arrived in Adelaide. . . . But among the corpses were four pouch young, which were uninjured. . . . In the end they all recovered." A female from this lot eventually bred freely in captivity. Two young were generally found in a litter.

Rabbit-eared Bandicoot; Rabbit-bandicoot; Bilby; Dalgite; Pinkie

MACROTIS LAGOTIS LAGOTIS (Reid)

Perameles Lagotis Reid, Proc. Zool. Soc. London 1836, p. 129, 1837. ("In Australia Occidentali et in Terra Van Diemen." Thomas (1888, p. 225) lists the type specimen from "Swan R., W. A.")

FIGS.: Waterhouse, 1841, pl. 12, and 1846, vol. 1, pl. 13, fig. 1; Gould, 1845, vol. 1, pl. 7; Le Souef and Burrell, 1926, fig. 79; Pocock, 1937, p. 617, fig. (subsp.?).

The several subspecies of this Australian animal (*lagotis*, *cambrica*, *grandis*, *interjecta*, *nigripes*, and *sagitta*) seem to be more or less seriously reduced in numbers; one is apparently on the verge of extinction, and another quite extinct. They will be treated in turn.

Concerning the group as a whole, Jones says (1924, pp. 164-167):

By the early colonists the Bilby was not only regarded as an animal against which the methods of the exterminator need not be employed; it was even accorded a certain amount of protection, and was at times kept as a pet about the house. The tolerance with which it was regarded by people whose hands may be justly said to have been against all animals was due to the fact that it was recognised that, in the destruction of mice and insects, it played an extremely useful part. Unfortunately this regard for the Bilby seems to have been forgotten by a later generation, and in more recent days but little mercy has been shown to them by any section of the community. . . .

The reason for the rapid decrease in numbers of the Bilby is not quite obvious. Certainly these useful animals have been ruthlessly slaughtered in all districts within reach of the more settled areas. Their pelts have been marketed in the skin sales in Adelaide in very large numbers; and they have been more wantonly killed for "sport." Large numbers have been killed or maimed in steel traps set for rabbits, and possibly many have fallen victims to poison baits. As with all the more defenceless marsupials, the introduced fox has probably played its sinister part. But in the Centre, where the fox is still absent, or rare, and where the Bilby is but little molested by man, it seems that some other factor must be invoked; and this is probably the extraordinary abundance of rabbits, and the consequent struggle for breeding burrows. There is certainly no part of this State [South Australia] where the Bilby is not a rapidly disappearing animal.

Troughton remarks (1932, p. 221): "According to Wood Jones, one or two constitutes the usual litter [in members of this genus], although there are eight teats, and it seems possible that a reduced

rate of breeding, in the less hospitable regions to which settlement is forcing them, where the cunning introduced enemy [the fox] probably now abounds, must ultimately lead to the extinction of this harmless, picturesque, and pest-destroying marsupial."

In the typical subspecies, *M. l. lagotis*, the general color is gray; head, neck, and back washed with chestnut; sides of body and base of tail pale chestnut; ears long, broad, ovate; outer, upper surfaces of limbs grayish; under parts white; middle part of tail black; terminal part white, with a crest of stiff hairs. Head and body, 18½ inches; tail, 10 inches. (Reid, 1837, pp. 129-130.) This is a large race, with a long, silky coat; the black portion of the tail usually longer than, or equaling, the crested white part (Troughton, 1932, p. 227).

Its range includes south and central Western Australia and extends to Central Australia.

Gould (1863, vol. 1, p. 11) considers it "tolerably abundant over the whole extent of the grassy districts of the interior of the Swan River colony." By retreating into its deep, long burrows, "it frequently eludes the pursuit of the natives, who hunt it for the sake of its flesh." He speaks of its flesh as "sweet and delicate," resembling "that of the rabbit."

Its status in Western Australia is summed up by Shortridge (1910, pp. 832-833; map, p. 832):

"Although widely distributed throughout the South-West (except near the coast), North-West, and Centre, it has within recent years become extremely rare in the far interior. Most plentiful in the inland districts of the South-West, rather frequently caught in traps set for rabbits along the rabbit-proof fence. In the dry North-Western and South-Eastern divisions, where it is rare, it extends to the coast."

The same author states (1907, pp. 770-771) that in the interior "it seems to have almost left parts of the country where it was once well known—perhaps on account of the succession of droughts inland of late years."

Troughton (1932, p. 227) mentions specimens from Gracefield, Coorigan, and Teuterden, Western Australia.

Glauert (1933, p. 24) records it in Western Australia as "widely distributed . . . south of the Kimberley Division. The western limit seems to be the Darling Range, although the Museum has odd specimens from Perth and Upper Swan on the Coastal Plain. The animal occurs as far south as Cranbrook and Jerramungup, near the Stirling Range, and as far east as Gnawlbart, 126 degrees 15 minutes east, 26 degrees 21 minutes south." He writes (*in litt.*,

March 17, 1937) that it is "affected by fumigation of rabbit burrows in agricultural areas."

Finlayson (1930, p. 178; 1931, p. 161) records specimens from north of the Musgrave Ranges, in the extreme north of South Australia, and from two localities north of the Macdonnell Ranges in Central Australia.

E. Le G. Troughton writes (*in litt.*, April 16, 1937) that it "may survive always in parts of the Centre, but should be given total protection in the south-west as its destruction of rats and mice far outweighs any slight damage it may do."

New South Wales Bilby

MACROTIS LAGOTIS CAMBRICA Troughton

Macrotis lagotis cambrica Troughton, Australian Zool., vol. 7, pt. 3, p. 230, 1932. ("Bathurst," New South Wales.)

This eastern subspecies, extinct in Victoria and last recorded from New South Wales in 1912, apparently survives in uncertain numbers in southern Queensland.

It is about equal in size to the large western subspecies (*lagotis*); the fur is shorter and more woolly; upper parts more fuscous; under parts yellowish. Head and body, 390-500 mm.; tail, 248-278 mm. (Troughton, 1932, p. 230.)

According to Troughton (1932, p. 230; map, p. 231), it was "originally distributed over inland New South Wales from the Darling River (Bourke) in the west, across to near the Great Dividing Range in the east (Bathurst and Ghoulburn), south to the Murray River and north to the Queensland border (Moree); probably extending into southern Queensland."

Since 1892, fifteen specimens reached the Museum, making in all at least twenty-two, of which the last was received from Moree in June, 1908; though several are not definitely localised, there is no doubt that the entire series came from within New South Wales. . . . Probably never very plentiful, the rabbit-bandicoot was apparently distributed fairly evenly west of the dividing range in the early days, and, unless mere coincidence, appears to have been more abundant in some years as three specimens reached the Museum in August, 1897, and again in 1903. There seems no doubt, however, that the local race has vanished from the more settled areas, and that . . . the Bilby is rapidly disappearing from New South Wales, or is at least faced with a precarious existence in more desert regions. I am not aware of pelts ever having been marketed to any extent in Sydney, . . . but no doubt numbers have been killed in rabbit traps, and wantonly for so-called sport, while foxes must be contributing to the apparent annihilation within New South Wales.

The last record of the Bilby's occurrence in New South Wales, so far as I am aware, is [that of] a pair under close observation in the rocky hills on the Wagga Experimental Farm for about five years prior to 1912, when

they were unfortunately slaughtered by shooters from the town. (Troughton, 1932, p. 220.)

In Victoria this Bilby was always confined to the northwestern corner of the state, and the last record was in 1860 (C. W. Brazenor, *in litt.*, March 3, 1937).

Jones (1923*a*, p. 342) speaks of examining a living specimen from Queensland. Finlayson states (1934, p. 229) that it is apparently absent from the Dawson Valley, Queensland, but that it occurs at Epping in the Clermont district, 150 miles northwestward.

Nalpa Bilby

MACROTIS LAGOTIS GRANDIS Troughton

Macrotis lagotis grandis Troughton, Australian Zool., vol. 7, pt. 3, p. 229, 1932. ("Nalpa, in the Lake Alexandrina District, south of Adelaide, South Australia.")

FIG.: Jones, 1923*a*, p. 333, fig. 352.

This subspecies is apparently extinct (Troughton, 1932, p. 230).

It is the largest subspecies; its ear, however, is proportionately shorter than in the other subspecies. Head and body, 550 mm.; tail, 260 mm.; ear, 77 mm.

It is known only from the "South-east of South Australia" (Iredale and Troughton, 1934, p. 20).

Before this form was distinguished from the typical *lagotis*, Jones (1924, pp. 156-157) wrote of it as follows:

Thalacomys lagotis, though formerly abundant in South Australia, is now either extinct or on the verge of extinction. It was the familiar species of Bilby in the more fertile portions of South Australia only a comparatively short time ago. Not more than thirty years since it was usual for rabbit trappers, even in the immediate neighbourhood of Adelaide, to take more Bilbies of this type than rabbits in their traps. This race . . . apparently had its last South Australian stronghold at Nalpa and in the wide tract of country about Lake Alexandrina; but from Nalpa it has long since disappeared, and it seems most probable that the animal is now extinct in this State.

Rawlinna Bilby

MACROTIS LAGOTIS INTERJECTA Troughton

Macrotis lagotis interjecta Troughton, Australian Zool., vol. 7, pt. 3, p. 227, 1932. ("Rawlinna, Trans-Australian Railway, Western Australia.")

This subspecies seems to be known definitely from only two specimens, both taken at the type locality.

Smaller than the western *lagotis*; fur shorter and more woolly; general color more drab-gray and less contrasting; under parts whitish; black portion of tail equaling, or shorter than, the white

terminal portion. Head and body, 303-318 mm.; tail, 207-232 mm.; ear, 80-82 mm. (Troughton, 1932, pp. 227-228.)

"It is possible that the Musgrave Ranges specimen recorded by Finlayson [as *lagotis*] is an aged female of this race" (Troughton, 1932, p. 228).

Black-footed Bilby

MACROTIS LAGOTIS NIGRIPES (Jones)

Thalacomys nigripes Jones, Rec. S. Australian Mus., vol. 2, no. 3, p. 347, figs. 358-360, 1923. ("Ooldea Soak," Trans-Australian Railway, South Australia.)

FIGS.: Jones, 1923a, p. 347, fig. 358, and 1924, p. 152, figs. 106, 107.

"This animal is, so far, only known from the district round Ooldea Soak, on the railway from Port Augusta to Perth. In that district it appears to be by no means uncommon." (Jones, 1924, p. 163.)

Smaller than *M. l. lagotis* but much like it in general color; distinguished from all other members of the genus by its black feet; under parts pure white; black portion of tail shorter than terminal white portion. Head and body, 365-390 mm.; tail, 200-220 mm.; ear, 105-110 mm. (Jones, 1923a, pp. 347-350.)

The half-dozen known specimens were all collected by aboriginals (Jones, 1923a, p. 349).

"On the Nullarbor Plain, in the state of South Australia, occasional holes would be met with, the animals numbering, in 1921, about 21 to the square mile" (Le Souef and Burrell, 1926, p. 299). Although these authors add that the form was probably *sagitta*, there would seem to be equal or greater likelihood of its being *nigripes*, since the type locality of the latter borders on the Nullarbor Plain.

Barcoo Bilby

MACROTIS LAGOTIS SAGITTA (Thomas)

Thalacomys sagitta Thomas, Ann. Mag. Nat. Hist., ser. 7, vol. 16, p. 426, 1905. ("Killalpanima [= Killalpaninna], east of Lake Eyre," South Australia.)

Although still considered "by no means uncommon" (Finlayson, 1935c, p. 233), this Bilby, like other members of the genus, is probably seriously menaced by the predatory fox and the competing rabbit.

This is smaller than any subspecies except *interjecta*, and a little paler than *lagotis*. Head and body, 316-385 mm.; tail, 215-245 mm.; ear, 79-84 mm. (Thomas, 1905b, p. 426; Troughton, 1932, p. 229; Finlayson, 1935c, pp. 234-236.)

The Barcoo Bilby has been recorded in northeastern South Australia, from Miller's Creek and Coward Springs, southwest of Lake Eyre, to the Goyder's Lagoon area toward the northeastern corner of the state. It also seems to range northward to the region about Charlotte Waters, Central Australia. (Jones, 1923a, p. 344; Finlayson, 1935c, p. 233.)

Jones writes (1924, p. 160): "This Bilby is a northern form living in the region of the great drainage system of Lake Eyre. It is probable that it is still fairly abundant in those portions of this region where foxes have not yet become plentiful, and where it can still compete with rabbits for nesting burrows."

On this subject Troughton says (1932, p. 221): "My own experience when collecting in the very dry country about Farina [south of Lake Eyre], South Australia, in 1919, was that foxes were very numerous and already tending towards a small lean desert type capable of entering the larger rabbit burrows without difficulty, and doubtless those of the Bilbies as well."

Six specimens obtained in the Goyder's Lagoon area about 1932 were, according to Finlayson (1935c, p. 233), the first ones to be examined in the flesh since the type specimen was taken in 1903.

Certain notes on "*Peragale lagotis*" from the Charlotte Waters region of Central Australia, published by Spencer (1896, p. 17, and 1897, p. 9) before *sagitta* was recognized, actually refer, it seems, to the latter form (*cf.* Troughton, 1932, p. 233). "This is not uncommon, judging by the number of tails used by the natives as ornaments. They tie the white terminal tufts together in bundles of from twelve to twenty." The animal occupies the inner end of its burrow, and the natives secure it by digging it out.

White-tailed Bilby; White-tailed Rabbit-bandicoot

MACROTIS LEUCURA LEUCURA (Thomas)

Peragale leucura Thomas, Ann. Mag. Nat. Hist., ser. 5, vol. 19, p. 397, 1887.

("Exact locality . . . not . . . recorded.")

SYNONYM: *Thalacomys minor miselius* Finlayson (1932).

FIGS.: Thomas, 1888, pl. 2; Finlayson, 1935a, pl. opp. p. 63.

According to Finlayson (1935c, p. 232), the probability of the identity of *M. l. leucura* and *T. m. miselius* is very great, and the latter name is here considered, at least provisionally, as a synonym.

Proportions and fur of *leucura* as in *M. lagotis*; general color pale yellowish fawn; under parts pure white or yellowish white; limbs pure white; tail slender, wholly white-haired, with a terminal dorsal crest. Measurements of the very young type: head and body, 142 mm.; tail, 116 mm. (Thomas, 1887, pp. 397-398.) In *miselius* the central two-fifths of the tail has a median dorsal line

of pale slate, bordered by fawn; head and body, 250 mm.; tail, 155 mm.; ear, 72 mm. (Finlayson, 1932, pp. 168-169).

The type of *leucura*, from an unknown Australian locality, was described in 1887. A second specimen was taken at Mungerani, east of Lake Eyre, in 1924. The 12 specimens on which the name *miselius* was founded were taken in 1931 near Cooncherie on the lower Diamantina River, in northeastern South Australia, at about latitude 26° 32'. In this area the animal was plentiful (Finlayson, 1935c, p. 227). It appears to be known, however, from a total of only 14 specimens.

A Wonkonguroo boy, who obtained most of the specimens near Cooncherie, was adept at locating the burrows in sand hills, although the entrances were blocked with loose sand. The animal is evidently used as food by the natives. (Finlayson, 1935c, p. 227.)

"It now appears . . . that the . . . composite species [*M. l. leucura* and *M. l. minor*] has a wide central distribution in which it may survive indefinitely, though the advent of the fox and rabbit are considered by Professor Wood Jones to have already exercised a marked influence on sub-desert populations, in association with prolonged dry seasons" (E. Le G. Troughton, *in litt.*, April 16, 1937).

Lesser Bilby; Lesser Rabbit-bandicoot

MACROTIS LEUCURA MINOR (Spencer)

Peragale minor Spencer, Proc. Royal Soc. Victoria, n. s., vol. 9, p. 6, pl. 2, figs. 1-4, 1897. ("Sand-hills about forty miles to the north-east of Charlotte Waters," Central Australia.)

This animal seems to be definitely known only from a small series taken at the type locality in Central Australia more than 45 years ago.

Fur long and silky; general color fawn-gray; chin and inner side of forelimbs white; rest of limbs and under parts gray; feet white above; basal two-thirds of tail dark above; final third white, crested; sides and ventral surface of tail white. Head and body, 200-270 mm.; tail, 118-160 mm.; ear, 68-92 mm. (Spencer, 1897, pp. 6-7.)

"The 'Urpila' (*P. minor*) during the winter months lies within a foot or so of the entrance of his [burrow]. . . . This peculiarity is taken advantage of by the natives who jump on the surface of the ground behind the 'Urpila' breaking it in and so cutting off his retreat to the inner chamber. He is thus compelled to rush out through the entrance where a native is waiting to give him his *quietus*." (Byrne, in Spencer, 1897, p. 9.)

The fox and the rabbit have probably been decisive factors in the depletion or disappearance of this animal.

Eastern Pig-footed Bandicoot

CHAEROPUS ECAUDATUS ECAUDATUS (Ogilby)

Perameles ecaudatus Ogilby, Proc. Zool. Soc. London 1838, p. 25, 1838. (Left (south) bank of the Murray River, near the junction with the Murrumbidgee River, in Victoria. Not New South Wales, as stated by Iredale and Troughton (1934, p. 21). Cf. Mitchell, 1838, vol. 2, p. 131.)

FIGS.: Gould, 1845, vol. 1, pl. 6 (central fig.); Jones, 1924, p. 167, fig. 124.

This unique little animal has apparently vanished from eastern Australia and southern South Australia; possibly it maintains a slight foothold (as one subspecies or the other) in Central Australia.

Ears long, elliptical, and nearly naked; muzzle much attenuated; body about the size of a small rabbit, and the fur very much of the same quality and color as in that animal; two toes on forefeet, similar to those of a pig; tail [accidentally] wanting (Ogilby, 1838, pp. 25-26). General color coarsely grizzled gray, with a tinge of fawn; under parts white; limbs long and slender; tail black above, gray below and on sides. Head and body, 250 mm.; tail, about 100 mm. (Thomas, 1888, pp. 251-252.)

The former range included the interior parts of Queensland, New South Wales, and Victoria; also South Australia. The systematic status of the Central Australian animal is apparently not settled, but in coloration it is said by Spencer (1896, p. 17) to resemble the western subspecies, *C. e. occidentalis*.

"The quaint and singularly gentle Pig-footed Bandicoot which had been discovered by Mitchell in 1836 was reported by Krefft twenty years later as exceedingly rare and disappearing as fast as the native population" (Troughton, 1932, p. 188). This was due to the increase of cattle and sheep (Lydekker, 1894, p. 148).

The species is recorded from western Queensland by Longman (1930, p. 64).

There were a few records from extreme northwestern Victoria (the last one in 1857), and the animal is now extinct in that state (C. W. Brazenor, *in litt.*, March 3, 1937).

Jones writes (1924, p. 171) concerning the species in South Australia:

Specimens in the South Australian Museum come from Cooper's Creek, from near Ooldea, and from the Gawler Ranges. Probably it still lives in the neighbourhood of Ooldea, but specimens have not been met with in that district for some years. . . . In 1920 one was killed between Miller's Creek and Coward Springs to the south and west of Lake Eyre. . . . Although its distribution in the Centre is wide, it has always been a very rare animal, and now must be regarded as a disappearing one. . . .

Pig-footed Bandicoots are said . . . when chased by dogs, to seek the shelter of hollow logs or hollow trees. In the districts to which they are now confined they would be hard put to find a log, let alone a tree Once open country of this type has been invaded by the fox, the fate of *Choeropus* is sealed. . . . The name by which it is known to the Kukata blacks is Wilalya, and they regard it as an animal which has always been rare and which is now extinct in their country.

Reporting on the Horn Expedition to Central Australia, Spencer says (1896, pp. 17-18):

"At the present time this is one of the most difficult of the smaller marsupials to secure. . . . During the expedition we were unable to secure a single specimen. On a subsequent visit to Charlotte Waters I was fortunate enough to obtain one secured by the blacks. . . .

"There is no doubt but that the range of the animal extends widely over the central area. In the Adelaide Museum is a specimen from Barrow Creek, which lies well within the tropics, and throughout the whole of our expedition all the natives were well acquainted with it. . . . It . . . is evidently rapidly becoming extinct, except perhaps in the more central districts."

"Said to still have a wide but sparse distribution in the central region, there has been little proof of late, and its terrestrial, non-burrowing, specialized habits and frail constitution render its ultimate extinction certain" (E. Le G. Troughton, *in litt.*, April 16, 1937).

Western Pig-footed Bandicoot

CHAEROPUS ECAUDATUS OCCIDENTALIS Gould

[*Choeropus*] *occidentalis* Gould, Mamm. Australia, vol. 1, p. 10, pl. 6, 1845. ("The interior" of "Western Australia"; type locality shown by Thomas (1888, p. 252) to be "Boorda, Kirltana, W. A.")

Figs.: Gould, 1845, vol. 1, pl. 6 (right and left figs.); Waterhouse, 1846, vol. 1, pl. 13, fig. 2.

This animal is extinct, at least in Western Australia (L. Glauert, *in litt.*, March 17, 1937). The form that once occurred in Central Australia (see discussion under *C. e. ecaudatus*) does not seem to have been recorded for some years and may have suffered the same fate.

The western subspecies differs from the eastern one chiefly in its orange-brown rather than gray coloration.

Gould states (1863, vol. 1, p. 10) that Gilbert sent two specimens from Western Australia and that the animal is confined to the interior. According to Waterhouse (1846, vol. 1, p. 392), one of the specimens came from the Swan River district.

"I was not able to find out anything definite about the dis-

tribution of this species in Western Australia. It is evidently very rare. The specimen obtained by Gilbert in 1843 seems to have been the only one ever secured in this State." (Shortridge, 1910, p. 835; map, p. 836.)

"Mr. A. Le Souef states in a letter 2/12/1927 that he has seen a dried skin at Rawlinna. This is the only recent record known to me." (Glauert, 1933, p. 24.)

Family PHALANGERIDAE: Phalangers, etc.

This family consists of approximately 14 Recent genera and 110 forms. Its range extends from Tasmania and Australia to New Guinea and the Admiralty and Solomon Islands on the north and to Celebes and Timor on the west. Three Australian species are discussed herein.

Honey Mouse; Honey Possum; Long-snouted Pouched Mouse

TARSIPES SPENSERAE J. E. Gray

Tarsipes Spenserae J. E. Gray, Ann. Mag. Nat. Hist., ser. 1, vol. 9, p. 40, 1842.

("King George's Sound," Western Australia.)

FIGS.: Gould, 1845, vol. 1, pl. 5; Waterhouse, 1846, vol. 1, pl. 11, fig. 1; Cabrera, 1919, pl. 13, fig. 5; Troughton, 1923, pl. 23, and p. 152, fig.; Troughton, 1924, pp. 128, 129, figs.

This rare, local, and unique little animal of Western Australia is "becoming rarer" (L. Glauert, *in litt.*, March 17, 1937).

Body mouselike; head elongate, tapering; general color blackish gray; back with a median black streak, bordered by a brown stripe on each side; under parts pale bay; tail elongate, tapering, short-haired, scaly. Head and body, 3½ inches; tail, 3 inches. (J. E. Gray, 1842, p. 40.) Tongue slender, protrusile, and brushlike, specialized for thrusting into flowers for nectar. Head and body, 71 (male) to 86 mm. (female); tail, 95 (male) to 101 mm. (female). (Troughton, 1923, pp. 153-154.)

The range, according to Glauert (1933, p. 25), is "South-Western Australia from the Irwin River south of Geraldton to the south coast as far east as Esperance.

"Usually more or less coastal, but has been found along the Great Southern as far north as Wagin, and at Nyabing east of Katanning. The animal still occurs close to Perth in suitable localities. . . . King George's Sound . . . is still the headquarters of the species."

Gould (1863, vol. 1, p. 9) recorded it "from Swan River to King George's Sound, but from its rarity and the difficulty with which it is procured, notwithstanding the high rewards I offered, the natives only brought me four specimens."

Shortridge (1910, p. 826; map, p. 827) records eight specimens from Albany. "The small marsupial mice are very difficult to secure on account of their rarity, and their nocturnal, arboreal, and to a great extent insectivorous habits, being known chiefly from cats killing and bringing them into houses."

Troughton, who has contributed most of the recent information on the species, writes (1924, pp. 127-132):

Alas, as settlement increases, the time seems near when there may be no living representatives of these unique creatures to occupy the queer niche which the process of evolution has fashioned for them within its fabric. . . .

Failure [to secure specimens on a collecting trip near Albany in 1922] was not surprising, all accounts confirming Mr. Morgan's statement that the mice visit areas periodically according to the flowery food supply, and that they are but rarely seen except when brought in by cats as trophies of the chase. . . .

A few months after my return . . . , the Honey Mice visited Mr. Morgan's home once more and he has since sent over twenty adult mice to the Museum, all of which were caught by his cat. . . .

As they are dependent upon the native flowers, the advance of settlement with its periodical burning off, and the introduction of cats and other enemies, in addition to native ones, must seriously threaten the future of these marsupials. . . .

It is reassuring to hear from Mr. Glauert that the mice are still fairly plentiful over an area of about 12,000 square miles, and that at the end of 1923 the West Australian Government was about to proclaim the Stirling Ranges a sanctuary for the native fauna. Let us hope that these ranges may prove a veritable stronghold for the Honey Mice, and that the flowers may not miss their spring-cleaning from the brushy tongues for many generations to come.

Troughton also says (1923, p. 155): "*Tarsipes* is dependent upon the flowers and foliage of its native districts, and as paddocks have to be burnt off about every third year, the tiny marsupials are literally hunted from paddock to post and prevented from settling in any one area. Before the rapid advance of Western Australia's settlement schemes, . . . fire and other enemies will send the Honey Mice to join their fossil forbears in comparative oblivion, leaving them represented only by a few museum skins and stray skeletons."

Leadbeater's Opossum

GYMNOBELIDEUS LEADBEATERI M'COY

Gymnobelideus Leadbeateri M'Coy, Ann. Mag. Nat. Hist., ser. 3, vol. 20, p. 287, pl. 6, 1867. ("Banks of the Bass River, in Victoria.")

Figs.: M'Coy, 1867, pl. 6; McCoy, 1883, pl. 91; Lucas and Le Souëf, 1909, p. 107, fig.; Brazenor, 1932, pl. 6.

This rare species, the only known member of its genus, was based upon two specimens collected in 1867 along the Bass River, South Gippsland, Victoria. In 1900 another specimen, reputed to have

come from the same locality, was secured from a Melbourne dealer. In 1909 the fourth known specimen was presented to the National Museum of Victoria by A. G. Wilson; it came from Mount Wills in East Gippsland, some 160 miles from the Bass River habitat. A fifth specimen was presented to the same institution by F. V. Mason, who had taken it many years previously at the edge of the Koo-



FIG. 7.—Leadbeater's Opossum (*Gymnobelideus leadbeateri*)

Wee-Rup Swamp, about 3 miles due south from Tynong Railway Station and only a few miles from Bass River. (Brazenor, 1932, pp. 106, 108.)

Practically our entire knowledge of the species is based upon these five specimens, which are in the National Museum of Victoria.

Its general appearance is much like that of the Sugar Glider (*Petaurus breviceps*), but it has no flying membrane. Color above brownish gray to fawn-gray, with a dark brown to black median stripe from head to sacrum; dark patches above and below ear and about eye; ears large, nearly naked toward tip; chin and throat dull buff; rest of ventral surface light yellowish gray; tail long, bushy, colored like body (in one specimen the terminal half is black). Head and body, 169-200 mm.; tail, 168-203 mm. (Brazenor, 1932, pp. 106-108.)

"There is much virgin scrubland in Gippsland in which the small creature could survive. It is nocturnal in habits, and its general resemblance to *Petaurus breviceps* is close enough to make its recognition by evening light very difficult. When these facts are considered, the possibility of its survival is greater than might at first be realised, and it is probable that a systematic search would re-establish this small creature among the living animals of Victoria." (Brazenor, 1932, p. 109.) More recently Mr. Brazenor has come to the conclusion (*in litt.*, March 3, 1937) that it is "probably extinct."

"The risk of extermination for small unexploitable opossum forms of restricted range is indicated by the fate of Leadbeater's opossum . . . , an important phalangerid link, originally restricted to a small area of Victoria where denudation of its limited scrub habitat has apparently led to the animals' extinction. This unique marsupial is represented by barely a dozen specimens in state museums." (Troughton, 1938, p. 408.)

Presumably Leadbeater's Opossum has been subject to attack by the Domestic Cat and perhaps other introduced enemies. It is also quite possible that many specimens have fallen victims to opossum trappers who did not differentiate them or at any rate did not realize their exceptional value.

Some of the numerous government reserves that have been established in Victoria might provide sanctuary for this unique animal if it were still extant.

Western Ringtail; Western Ring-tailed Opossum

PSEUDOCHEIRUS OCCIDENTALIS (Thomas)

Pseudochirus occidentalis Thomas, Cat. Marsupialia and Monotremata Brit. Mus., p. 174, 1888. ("King George's Sound, W. A.")

This animal, confined to the extreme southwest of Western Australia, is feared to be on the verge of extinction.

Color above deep smoky gray; limbs like back, but hands and feet darker; under parts white; basal part of tail dark brown, terminal two-fifths white, naked part below tip smooth. Head and body, 335 mm.; tail, 310 mm. (Thomas, 1888, pp. 174-175.)

Nearly a hundred years ago Gould's collector, John Gilbert, obtained specimens at Perth, Swan River, and King George's Sound. More recently Shortridge (1910, pp. 827-829) collected 22 specimens at Margaret River and Busselton, remarking that it is "chiefly confined to the banks of rivers and swamps in the South-West; local, and apparently disappearing in many places." Yet he considered it "fairly plentiful near the Margaret River." These few

records suggest that the animal was practically confined to the South-West Division of Western Australia, from Perth southward. (See map, Shortridge, 1910, p. 829.)

Glauert (1933, p. 24) gives its range as "lower South-Western Australia in small isolated colonies, which suggest that the animal is on the verge of extinction through natural causes."

No particular information is at hand concerning its enemies, aside from Gilbert's remark (in Gould, 1863, vol. 1, p. 25): "It . . . is often found in holes in the ground, . . . from which it is often hunted out by the Kangaroo dogs."

Family PHASCOLARCTIDAE: Koalas

The Koalas, consisting of a single genus and species, with three subspecies, are restricted to eastern Australia. All forms come within the scope of the present work.

New South Wales Koala; Native Bear

PHASCOLARCTOS CINEREUS CINEREUS (Goldfuss)

Lipurus cinereus Goldfuss, in Schreber, Säugthiere, pls. 155 Aa, Ab, 1817; Isis (Oken), 1819, Heft 2, p. 271. ("The forests of New Holland, about 50-60 English miles [southwest] from Port Jackson [Sydney]," New South Wales.)

FIGS.: Waterhouse, 1841, pl. 31; Gould, 1854, vol. 1, pls. 13, 14; Lydekker, 1894, pl. 10; Nat. Geog. Mag., vol. 70, no. 6, p. 715, right-hand fig., 1936; Pocock, 1937, p. 626, fig. (subsp.?).

Once numerous in the timbered areas of New South Wales, the typical subspecies of this unique animal has been reduced almost to the verge of extinction, although many thousands of the Queensland subspecies (*P. c. adustus*) and perhaps a thousand of the Victorian subspecies (*P. c. victor*) still exist.

The fur is dense and woolly; general color gray, either light or dark, sometimes mottled, with whitish patches on hind quarters; under parts, hands, and feet more or less whitish; ears large, thickly haired; tail rudimentary. Head and body, 700-820 mm. (Le Souef and Burrell, 1926, pp. 291-292.) Auburn groin patches separated by a creamy-white median area (Troughton, 1935, p. 139).

The Koala feeds almost entirely on the foliage of a few trees of the genus *Eucalyptus*: *E. viminalis*, *E. melliodora*, *E. rostrata*, *E. microcorys*, and *E. maculata* (Sutton, 1934, p. 78). Thus the ranges of the three subspecies are pretty definitely restricted to those areas in which some or all of these eucalypts occur. The species as a whole formerly ranged from extreme southeastern South Australia through Victoria and the eastern half of New South Wales into Queensland (see map, Victorian Nat., vol. 51,

no. 3, p. 80, 1934). While the exact geographical limits of the several subspecies have not been fully determined, we may provisionally consider the range of *cinereus* to be New South Wales; of *adustus*, Queensland; and of *victor*, Victoria and southeastern South Australia.

In New South Wales Gould (1863, vol. 1, pp. 18-19) considered the animal "nowhere very abundant" but most numerous "in the brushes which skirt the sea side of the mountain-ranges between the district of Illawarra and the River Clarence." He recorded it also "among the cedar brushes of the mountain ranges of the interior, particularly those bordering the well-known Liverpool Plains." He prophesied that it "is certain to become gradually more scarce, and to be ultimately extirpated."

"Though at one time extremely numerous, the koala is now, over the greater part of its range, very scarce. This is largely due to a disease which swept it off in millions in the years 1887-8-9, and from 1900 to 1903. This disease took the form of ophthalmia and periostitis of the skull. Bears are generally heavily infected with intestinal parasites." (Le Souef and Burrell, 1926, p. 292.)

At Marrangaroo, County of Cook, N. S. W., "the native bear was quite common then [1884-5], but quite extinct there now" (Chisholm, 1923, p. 60). On the Comboyne Plateau, N. S. W., it is "very rare here now and only inhabiting the Eucalypt timber at the edge of the Plateau" (Chisholm, 1925, p. 72).

In the fox-free eastern coastal area "there are also a few Koalas, but these never get a chance, as the temptation to shoot or catch the defenceless little animals as they sit exposed on a bough, is more than the so-called sportsmen of the community can resist, and even in our National Parks they are destroyed" (Le Souef, 1923, p. 110).

Barry writes (1928, p. 163) of the Koala's status on Kuringai Chase, near Sydney: "Native Bears were also common here years ago, but now, as in most places in New South Wales, they are rarely seen."

"The typical N. S. Wales animal has been reduced to a state verging upon extinction, in which the setting aside of adequate areas with assured supply of favoured eucalypt diet trees presents the only hope of survival. It is notable that any attempt to breed them in captivity is dependent for ultimate success on the provision of such reserves." (E. Le G. Troughton, *in litt.*, April 16, 1937.)

Lydekker remarks (1894, p. 80) in regard to the Koala's economic status:

The flesh is considered a great delicacy by the natives, and is regarded as not unpalatable even by Europeans. Of its pursuit by the natives in the neighbourhood of Port Jackson, Colonel Patterson writes as follows: "The natives

examine . . . the branches of the loftiest gum-trees, and upon discovering a Koala, they climb the tree in which it is seen with as much ease and expedition as a European would mount a tolerably high ladder. . . . They follow the animal to the extremity of a bough, and either kill it with the tomahawk or take it alive. . . ."

The Koala must be an abundant animal, since from 10,000 to 30,000 skins are annually imported into London, while in 1889 the enormous total of 300,000 was reached. The value of these skins now ranges, according to Poland, from five-pence to a shilling each; and they are mainly used in the manufacture of those articles for which a cheap and durable fur is required.

Concerning the Koala's decline, persecution, and need of protection, Jones writes (1924, pp. 184-186):

It may be said to spend its whole life clinging to, and feeding upon, the great eucalyptus trees. In just so much as it is a perfected specialisation to its environment, so it is a slave to its environment. It has adapted itself to the gum tree, and has become dependent upon the gum tree. It must be regarded as an animal which has become phylogenetically senile as the outcome of complete specialisation

Probably no animal has been so ruthlessly slaughtered in order to satisfy the demands of the fur trade. . . . In the year 1908, no less than 57,933 Koala pelts passed through the markets of Sydney alone. That this deplorable slaughter still goes on is evidenced by the fact that in the two years 1920 and 1921 Osborn and Anthony have ascertained that the huge total of 205,679 Koalas were killed for the fur market. Since in the fur trade Koala pelts pass under the name of "Wombat," many people assume that the Native Bear has ceased to be persecuted.

The complete extermination of the Native Bear would be a disgrace to Australia, and yet, from its dependence upon a particular diet and a particular mode of life, its tenure of continued existence must always be regarded as precarious. . . .

Horrible cruelties have been committed and recounted by those who have slaughtered them wholesale for the sake of their pelts. Indeed, one may say, on humanitarian grounds, that not only should the slaughter of the Koala for the fur trade be prohibited because the animal is eminently one to protect and not to exterminate, but it should be prohibited because, like the slaying of seals, it is the most brutalising occupation that a human being can undertake.

Le Souef and Burrell say (1926, pp. 291-292): "The quaint koala . . . , perhaps, holds the affection of Australians more than any other of their wild animals—a fact for which its innocent, babyish expression and quiet and inoffensive ways are largely responsible. It has been portrayed in caricature and verse, and its hold on the public is used effectively by advertisers. . . .

"The skin forms a thick, serviceable fur that will stand any amount of hard usage. Only the most callous of shooters, however, can bring themselves to shoot such a childlike animal."

"In each of the States of Victoria, Queensland and New South Wales, the animal is protected by law" (Stead, 1934, p. 18). Importation into the United States of America was prohibited about 1930-31 by the United States Government. "So long as the United

States market remains closed there will be but little local incentive for destruction—quite apart from any Australian protective laws” (Wild Life Preservation Society of Australia, 22d Ann. Rept., 1931).

Hobley calls attention (1934, p. 79) to private sanctuaries for

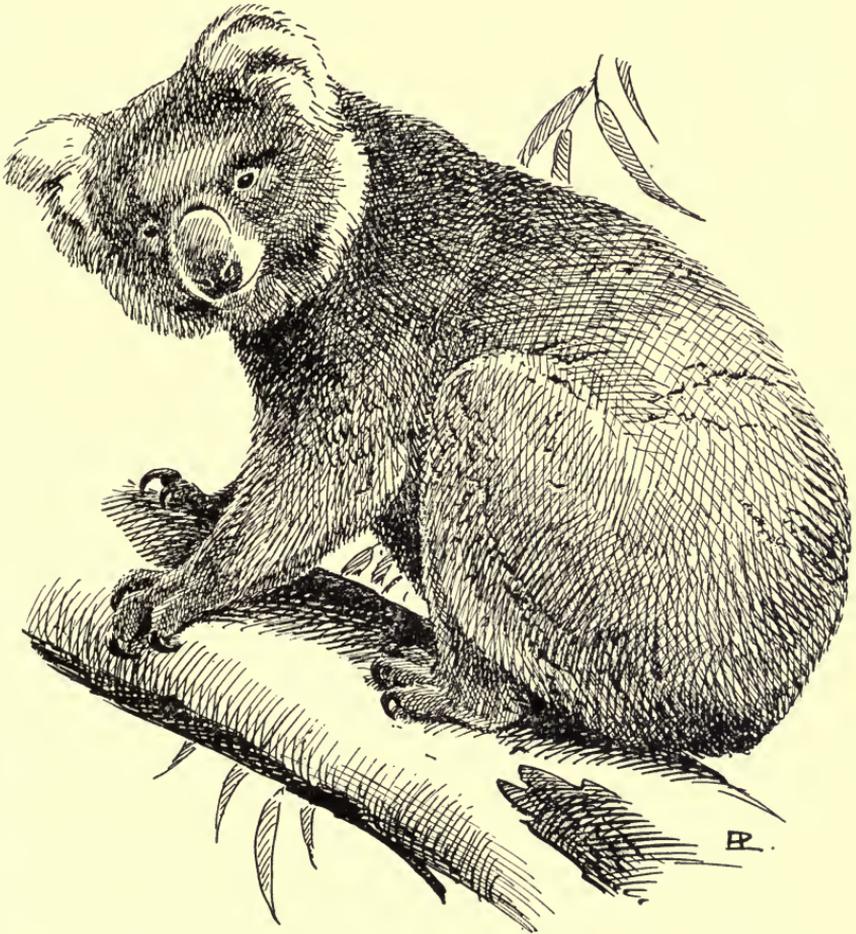


FIG. 8.—New South Wales Koala (*Phascolarctos cinereus cinereus*)

the Koala established by Noel Burnet in the Pennant Hills, near Sydney, and by C. A. M. Reid at Lone Pine, near Brisbane. (The latter is presumably stocked with the Queensland subspecies.) He adds:

“Great credit is due to the founders of these sanctuaries who have been public-spirited enough to secure the safety of a number of these creatures without any Government support. . . .

"The Wild Life Preservation Society of Australia is also wisely working away with the object of establishing Koala Colonies in such places as the Jenolan Caves Sanctuary, Lindfield Park, and Davidson Park in New South Wales—the State authorities must, however, be persuaded to guarantee some security for the animals established therein."

The cause of the Koala is eloquently pleaded by Troughton (1932*a*, p. 192):

"The Koala . . . is utterly harmless everywhere, and what a delight it would be for both young and old if they were plentiful enough to haunt the suburbs and homesteads as possums often do. They seek only the freedom of the trees, and if the continued slaughter of such innocents leads to their extermination, it must inevitably appear to later generations as an indictment of the cultural degradation of our time."

Queensland Koala

PHASCOLARCTOS CINEREUS ADUSTUS Thomas

Phascolarctos cinereus adustus Thomas, Ann. Mag. Nat. Hist., ser. 9, vol. 11, p. 246, 1923. ("O Bil Bil, near Mundubbera," Eidsvold, South Queensland.) FIGS.: Faulkner, Australian Zool., vol. 3, pt. 3, pl. 16, 1923; Le Souef and Burrell, 1926, fig. 77.

Up to 15 or 20 years ago, the Queensland Koala must have numbered well over a million individuals; quite possibly there were several millions. But disease and more especially the fur trade have reduced it to a remnant of its former numbers.

It is smaller than *P. c. cinereus*; fur shorter; anterior back suffused with dull rufous or tawny; ears far less thickly hairy, the inner surface almost naked; under parts lighter; the prominent groin patches rather browner and less rufous. Head and body, 600 mm. (Thomas, 1923, p. 246.)

In former times it seems to have ranged over practically all the more southerly and easterly parts of Queensland, north to Inkerman (lat. 19° 30') and west to the Diamantina and Cooper River basins (about long. 143°). (See map, Victorian Nat., vol. 51, no. 3, p. 80, 1934.)

"The Queensland Minister for Agriculture has said that in 1919-1930 no fewer than . . . a million native bears were slaughtered in Queensland. If this slaughter continues these poor animals will be exterminated." (Gregory, 1921, p. 65.)

"Koalas . . . are now getting numerous again in Southern Queensland" (Le Souef, 1923, p. 109).

"In 1924, the colossal total of over two million skins of the Koala or Native Bear were exported and mainly sold under the

name of 'wombat' to mask the wholesale slaughter. In the Queensland open season of 1927, approximately 600,000 Koala were massacred by 10,000 licensed trappers." (Troughton, 1932, p. 193.)

"In Queensland Native Bears are still to be found in fair numbers, and no doubt the Queensland Government was influenced by this fact when it removed the protection which the animals have enjoyed since 1919. But it is certain that even in one month their numbers will be seriously depleted. . . . Fur and skin brokers in Brisbane considered that before the season closed 300,000 skins would have been disposed of. It is doubtful whether this estimated total will have been reached, but it has to be remembered that many young will perish when deprived of the parental care of their mothers, which carry the little ones 'pick-a-back' from June until towards the close of the year." (Anonymous, 1927, p. 112.)

Stead (1934, pp. 16-17) writes:

Only in a few places in Queensland are large numbers of the Koala to be found, but only the most careful protection by the Government and by the Australian people will prevent them from being exterminated in these places. . . . Telling of the terrible destruction which has gone on in Queensland . . . makes a very unhappy story, and makes one rather ashamed to think that his own people should so cruelly destroy one of the most fascinating, harmless and most interesting living things in the whole of the world of Nature. . . .

Very few people have any idea of the immense number of these harmless animals killed in the one State of Queensland in only a few years before the present season of protection was introduced. In 1927, about 600,000 were killed during one month's open season (August), and, for the whole year, including a so-called close season, not less than one million were slain. Altogether, several millions of the poor little Koalas were killed in a space of a few years in Queensland, until a great wave of public indignation put a stop to it for the time being.

"The tenure of the koala in the Dawson Valley [Queensland] seems to have been a waning one for many years, and the last open season reduced it to such an extent that it is now a rare animal in many parts of the valley where it was formerly very plentiful. The process has been hastened, too, in some places, by an epidemic, and on Coomoboolaroo in the summer of 1929 several were seen in comatose condition at the base of feeding trees. The single example in this condition which was examined closely was an aged male, and though emaciated was not heavily infested with endoparasites, nor obviously diseased organically. . . .

"It was observed and collected at Thangool on the Cariboe, at Coomoboolaroo, and near Mount Hedlow, on the Fitzroy." (Finlayson, 1934, p. 220.)

The animal now has complete legal protection in Queensland (Stead, 1934, p. 18).

"Perpetual universal protection is essential to its ultimate sur-

vival, not alone in New South Wales and Victoria where exploitation, denudation of habitat, and disease have brought this unique animal to the verge of extinction. It is in Queensland especially, where coastal forests of the south-east provide the last stronghold and hope of survival, that total protection should never again be withdrawn." (Troughton, 1938, p. 408.)

Victorian Koala

PHASCOLARCTOS CINEREUS VICTOR Troughton

Phascolarctos cinereus victor Troughton, Australian Nat., vol. 9, pt. 6, p. 139, 1935. ("French Island," Western Port Bay, Victoria.)

FIGS.: Victorian Nat., vol. 51, no. 3, pls. 11-15, 1934.

Once very common over most of Victoria and in southeastern South Australia, this subspecies had become reduced by 1934 to about 1,000 individuals in Victoria.

Body more robust than in *P. c. cinereus*; coat longer, sparser, and hairier, especially on rump and ears; coloration richer, decidedly brown; ears brownish outside, white inside; auburn groin patches extending across the inguinal region; belly brown (Troughton, 1935, p. 139). White area on throat and chest frequently prolonged to nape, forming a complete collar. Head and body: three males, 800-830 mm.; one female, 730 mm. (Finlayson, 1935*b*, pp. 223-224.)

The Koala's status in Victoria is thus reviewed by Lewis (1934, pp. 73-74):

There is very good evidence that forty or fifty years ago "Native Bears" were exceedingly common over almost the whole of Victoria. Now the species is almost extinct on the mainland, a very few Koalas surviving in the Inverloch district and in South Gippsland around Welshpool, Toora, Foster, etc. Others are living—and, I am glad to say, thriving—on the islands in Western Port Bay. I estimate that there are now not more than 1,000 Koalas in this State.

On the mainland of Victoria, I feel certain, the Koala is doomed to early extinction, and will never be re-established, excepting perhaps in some reserves which may be specially set apart for its protection and conservation, such as the Badger Creek Sanctuary, near Healesville. . . .

From inquiries I have made among well informed people, it appears that the favourite "sport" of the young men and boys of thirty or forty years ago was shooting Native Bears. Their ideas of "sport" must have been very primitive, because no more inoffensive and easily-destroyed animal than the Koala lives in any part of the world. . . .

Immense numbers of Koalas must have been destroyed by those young "sportsmen" of an earlier generation than ours, but there seems never to have been any regular hunting with a view to marketing the skins. Yet the fur is very thick and warm, and, I am told, is in great demand by men living in Northern Canada and Europe

Apart from the shooting which so greatly reduced their numbers, I firmly believe that the next most important factor was the bush fires which, during the last twenty or thirty years have ravaged practically the whole of this State. . . . The Koala falls an easy victim. . . .

Between twenty and thirty years ago, some fishermen living at Corinella took a few Native Bears across to French Island, where . . . they thrived and multiplied. From this island they were introduced to Phillip Island where they are now one of the principal attractions to tourists.

Despite the drawback of practically annual fires in the scrub, the Koalas "were holding their own on French Island until rabbits were introduced." Cats were then liberated to cope with the latter, but attacked the bird life, and consequently insect pests multiplied amazingly.

"The residents, noticing the trees dying, blamed the Koalas," quite without justification.

"It became necessary then, in order to preserve the Koala, to select some other place for it, and the Fisheries and Game Department chose Quail Island, a Government reserve and sanctuary . . . in . . . Western Port Bay. To this retreat some two or three hundred Koalas have now been transferred. . . . It is hoped that on the three islands in Western Port the Koalas will have a safe home." (Lewis, 1934, p. 75.)

Kershaw (1934, pp. 76-77) writes as follows concerning the sanctuary on Wilson's Promontory in southern Victoria:

Totally unsettled, densely timbered, and, until recent years, rarely visited except by cattle musterers, this area has always been an ideal sanctuary. Thirty years ago the Koala was fairly numerous in spite of the periodical raids of skin-hunters. . . .

Following the permanent reservation of the Promontory in 1908 as a National Park and Sanctuary for the preservation of the native fauna and flora, these interesting animals were no longer molested As a result Koalas gradually increased in numbers

Their immunity from interference of any kind . . . resulted in their multiplying to such an extent as seriously to threaten the existence of their natural food plant [Manna Gum, *Eucalyptus viminalis*]. . . . Quite a number of the trees had died. . . .

Action was at once taken to reduce their numbers. Where it was possible, many were transferred to other parts of the Park, but in remote localities, such as Oberon Bay, transport was out of the question so that it became necessary, in order to save the remaining trees, to have a number destroyed. [Yet] in certain localities, this particular Eucalypt was practically exterminated.

Their food-plant gone, many of the animals died, others worked back into the more heavily timbered ranges of the interior where they found suitable food among the Blue Gums. With a view to their acclimatization in some of the other States several Koalas were forwarded to New South Wales, South Australia, and Western Australia.

Native Bears are still fairly numerous in the timbered country on the northern and eastern coasts of the Promontory and among the big timber in the vicinity of Sealer's Cove.

The slight information available concerning the species in South Australia is summarized by Jones (1924, p. 187) :

At one time the Koala was without doubt an inhabitant of South Australia, and many men now living can remember the time when it was by no means uncommon in certain districts of the South-eastern portion of the State. No more than ten years ago Koalas have been killed well within the geographical limits of South Australia. If it inhabits South Australia to-day is rather doubtful, although reliable information would point to the fact that a remnant of the stock may still linger not far from the Victorian border. So far as I know no example of the South Australian race has been examined scientifically, and no specimens seem to have been preserved. Victorian animals were liberated on Flinders Chase, Kangaroo Island, in November, 1923, and it is hoped that they will become established in that faunal sanctuary.

The Koala is completely protected by law in Victoria.

Family VOMBATIDAE: Wombats

The two currently recognized genera of wombats, represented by six forms, are confined to eastern and southern Australia, Tasmania, and islands of Bass Strait. Four subspecies are treated here.

Island Wombat; Flinders Island Wombat

VOMBATUS URSINUS URSINUS (Shaw)

Didelphis Ursina Shaw, Gen. Zool., vol. 1, pt. 2, p. 504, 1800. (Presumed by Spencer and Kershaw (1910b, p. 39) to be based upon the "Wombach" of Hunter, in Bewick, Hist. Quadrupeds, ed. 4, p. 522, 1800. Type locality "New Holland" = Clarke Island, Bass Strait, according to Spencer and Kershaw (1910b, pp. 37-39); but Cape Barren Island, Bass Strait, according to Iredale and Troughton (1934, p. 34).)

FIGS.: Péron and Freycinet, Voyage Terres Australes, atlas, ed. 1, pl. 28, 1811, and ed. 2, pl. 58, 1824; Cabrera, 1919, pl. 17, fig. 1.

Formerly an inhabitant of several of the larger islands of Bass Strait, this Wombat has been exterminated on all of them except perhaps Flinders Island. It is also represented by a small colony introduced at Eddystone Point, Tasmania.

This is the smallest of the Wombats; hair coarse, varying from light sandy brown to blackish; rhinarium naked. Head and body, 775 mm. Weight, 25-30 pounds (Spencer and Kershaw, 1910a, p. 29).

This species was originally known from King, Deal, Cape Barren, Clarke, and Flinders Islands in Bass Strait. At the time of its discovery, about 1798, its numbers were evidently considerable. Flinders (1814, vol. 1, p. cxxxv) found it more numerous on Cape Barren Island than on Clarke Island; he reports it as "commonly seen foraging amongst the sea refuse on the shore."

Home (1808, p. 304) gives an entertaining description of an

individual secured on Flinders' voyage and kept for two years as a pet in a house in England. It appeared intelligent as well as attached to its human friends.

In their account of King Island, Péron and Freycinet (1816, vol. 2, p. 14) describe the local Wombat as a gentle and stupid animal, valuable for its delicate flesh. They also give an interesting picture of its tractability. They say it had been reduced to a domestic state by some English fishermen, going by day into the forests to seek its food, and returning in the evening to the cabin which served as its retreat.

Spencer and Kershaw (1910*b*, p. 48) write as follows:

It is many years ago since the King Island wombat was exterminated. When the island was visited by a party of the Victorian Field Naturalists Club in 1887, no trace of it was discovered nor, during the process of clearing the land that has been vigorously carried on during recent years, has any record of a living wombat been made.

Flinders Island afforded the only prospect of securing a living specimen of the Bass Strait species. [In 1908] a considerable part of the north, north-east, and north-west coast line was examined, and abundant evidence was obtained to prove that the animal, though very rare and difficult to obtain, was not extinct. In the deserted hut of a half-caste native at Killiecrankie two skins were found. . . . On the island there are, in addition to a few settlers, a number of half-castes The existence of the wombat is well-known to them, but it is by no means easy to secure. . . . On Cape Barren Island . . . the animal was found to be quite extinct, though well-known under the name of "badger"

The animal is now extinct everywhere except on Flinders Island.

An animal as large as a Wombat, always limited in numbers by an island habitat, could scarcely be expected to survive indefinitely, when confronted by deforestation as well as by the presence of settlers and half-castes who evidently prized its flesh.

It is "now believed to be represented by small colonies on Flinders Island. Observation and careful provision for their safety may be necessary to avoid extinction." (E. Le G. Troughton, *in litt.*, April 16, 1937.)

"The Flinders Island wombat has been introduced, and there is a small colony . . . at Eddystone Point, North-East Tasmania. They were liberated there by the lighthouse-keepers." (Lord, 1928, p. 20.)

[The Tasmanian subspecies, *Vombatus ursinus tasmaniensis* (Spencer and Kershaw), "has always and still does exist in large numbers in Tasmania" (R. Boswell, *in litt.*, May 13, 1937).]

[The common Wombat (*Vombatus hirsutus hirsutus* (Perry)) is still more or less numerous in wild and rugged portions of south-eastern Queensland, New South Wales, and Victoria. In southeastern South Australia another subspecies, *Vombatus hirsutus niger* (Gould), has been recognized; but no information concerning its numerical status is at hand.]

Hairy-nosed Wombat

LASIORHINUS LATIFRONS LATIFRONS (Owen)

Phascolomys latifrons Owen, Proc. Zool. Soc. London 1845, p. 82, 1845. ("Continental (South) Australia.")

FIGS.: Gould, 1863, vol. 1, pls. 59, 60; Wolf, 1867, vol. 2, pl. 27; Royal Nat. Hist., vol. 3, p. 266, fig., 1894-95; Jones, 1924, p. 267, fig. 189.

This Wombat is now practically restricted to coastal South Australia, though once extending a little farther east and west; its numbers have evidently been severely reduced.

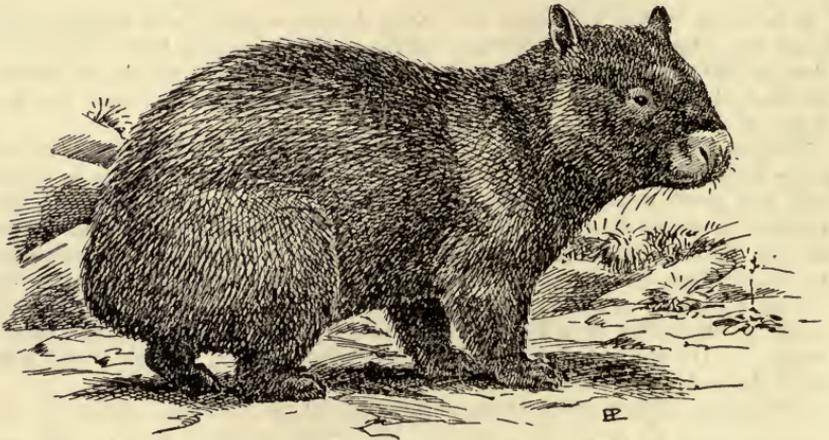


FIG. 9.—Hairy-nosed Wombat (*Lasiiorhinus latifrons latifrons*).
After Wolf, 1867.

The fur is soft and silky; general color grizzled gray, somewhat dappled; chin dark; cheeks, throat, and chest white; belly gray; ears long and narrow; rhinarium hairy; tail rudimentary. Head and body, 900 mm. (Jones, 1924, pp. 266-267.)

In South Australia the species has been recorded from Mount Gambier, Port Augusta, Port Lincoln, River Murray, River Light, Fowler's Bay, Yorke Peninsula, Blanchetown, Blyth, 30 miles north of Adelaide, and Nullarbor Plain. "Apparently its distribution does not extend into the more northern parts of South Australia" (Spencer, 1896, p. 3). Specimens are recorded from Eucla, in the extreme southeast of Western Australia (Jones, 1924, p. 268). E. Le G. Troughton writes (*in litt.*, April 16, 1937) that it was once plentiful, according to early observers, in southwestern New South Wales and Victoria, but now is apparently restricted to coastal South Australia, the inference being that survival is not assured. A number of specimens were

recorded by Kershaw (1909, p. 118) from Deniliquin, N. S. W., close to the Victorian border.

"Although in some parts of the colony [South Australia], especially on Yorke's Peninsula and about Port Lincoln, the holes of these Wombats are very numerous, yet the animals are but rarely seen. Many of the oldest colonists have informed me that they never saw a Wombat alive. . . . The flesh they [the blacks] describe as being like pork, and excellent eating." (Gould, 1863, vol. 1, p. 68.)

"It could probably hold its own under present day conditions, and with existing introduced enemies, if only it had adequate protection from man. That Wombats are harmless to small holders is not contended. So bulky an animal which drives tunnels with such ease is not, of course, desirable in closely settled or intensively worked agricultural areas. But South Australia possesses vast tracts where Wombats might burrow and live without detriment to any human enterprise. In these areas they need protection from man alone." (Jones, 1924, p. 270.)

"Being in grave danger of extermination, and having a distribution restricted to South Australia, it is the intention of the [Fauna and Flora] Board to attempt to acclimatise the wombat on Kangaroo Island; the sending of a single specimen to the Chase on October 1, 1926, may therefore be recorded; others will be forwarded as soon as obtained" (Waite and Jones, 1927, pp. 323-324).

On the other hand, H. H. Finlayson (*in litt.*, March 20, 1937) considers the species still "plentiful in a restricted habitat."

Le Souef and Burrell (1926, pp. 293, 295) write as follows:

The . . . hairy-nosed wombat is found in the drier inland areas; it also lives along the coast of the Great Australian Bight

The hairy-nosed wombat has been killed out over a large part of its range. In the Riverina, where at one time it was fairly plentiful, the settlers had to get rid of it as part of the campaign against the rabbits, which pests had a very secure harbour in wombat burrows.

The skin is not put to any commercial use, though the aborigines use the fur of *Ph. latifrons* for making string, coils of which are wound round their hair.

On its economic status E. Le G. Troughton remarks (*in litt.*, April 16, 1937): "Colonies were exterminated near settlement because of damage to fencing and crops, and risk of injury to stock in the burrows."

Southern Queensland Hairy-nosed Wombat

LASIORHINUS LATIFRONS GILLESPIEI (De Vis)¹

Phascolomys gillespiei De Vis, Annals Queensland Mus., no. 5, p. 14, pls. 9, 10, 1900. (Moonie River, southeastern Queensland.)

FIG.: De Vis, 1900, pl. 10.

¹ For the use of this combination, see Longman, 1939, p. 286.

This Wombat is "apparently now extremely rare and restricted to remote parts of large properties." Its extinction is "apparently imminent." (E. Le G. Troughton, *in litt.*, April 16, 1937.)

General color gray, mixed with black, and washed with fawn (especially on rump and back); inner surface of ears, throat, and chest white; a broad curved blotch before and a spot behind the eye, black; forearm and feet dark brown; rhinarium hairy; skull relatively broader than in other Wombats. Head and body, 1,020 mm. (De Vis, 1900.)

The existence of a Wombat in Queensland was regarded as more or less mythical until three specimens of the present form were secured at the type locality and vicinity in the last decade of the nineteenth century. The subsequent record of the animal seems very meager.

In 1923 Wilkins (1928, pp. 25-27) made a search for it in the Moonie River district, near Hollymount, finding "ancient tunnelings of many wombats" but not encountering any of the animals. He concluded that "there is no doubt that it is almost, if not quite, extinct in this district."

Its range would appear to be restricted to southeastern Queensland.

Central Queensland Hairy-nosed Wombat

LASIORHINUS LATIFRONS BARNARDI Longman

Lasiiorhinus latifrons barnardi Longman, Mem. Queensland Mus., vol. 11, pt. 3, p. 283, 1939. ("Epping Forest Station, 75 miles west of Clermont," east-central Queensland.)

This recently described Wombat is known from four specimens (three of which are only skulls), and it is considered on "the verge of extinction" (Longman, 1939, p. 287).

General dorsal color brown, mottled with gray, and interspersed with black hairs; rhinarium completely clothed with short brown hairs; ears elongate, well haired outside, with white tufts; under parts dirty gray. Total length, 3 feet 4 inches; tail, 2 $\frac{1}{4}$ inches. (Longman, 1939, pp. 283, 286.)

Although Wombats "were widely distributed in Queensland in the Pleistocene and two present-day species were known to occur sparingly in southern parts of the State, it was somewhat surprising to have definite evidence of living wombats in a locality in central Queensland. This extends their range by over 400 miles. . . .

"Mr. Charles Barnard reports that there were many burrows in the district, but very few tracks of the animals were seen. . . .

"Only three animals were seen, one of which was shot. As sug-

gested by Messrs. Barnard, it is probable that these wombats were much more numerous in earlier years, but successive periods of drought have brought them to the verge of extinction. . . . The specimen shot . . . has been feeding on . . . stems and leaves, including awns of the Comet River Grass, *Perotis rara*." (Longman, 1939, pp. 283, 286-287.)

Longman adds a report of Wombats seen distinctly about 1917 in the Tambo district, south-central Queensland.

Family MACROPODIDAE: Kangaroos, Wallabies, etc.

This largest of marsupial families contains approximately 19 genera and 125 forms. It ranges through Australia, Tasmania, New Guinea, and neighboring islands. Accounts of 27 forms appear in the following pages.

St. Francis Island Rat-kangaroo

BETTONGIA sp.

This extinct animal, a former inhabitant of one of the islands in the Great Australian Bight, does not seem to be represented in the museums by so much as a skeletal fragment upon which a technical name might be based. Its brief and tragic history is recounted by Jones (1924, pp. 214-215):

Upon St. Francis Island in Nuyts' Archipelago there lived, during the time of the present occupiers, large numbers of what was evidently a species of *Bettongia*. Since the mammalian fauna of the islands of the Bight has proved, in so many instances, to exhibit distinctions from the types inhabiting the mainland, it is worth while recording what can still be ascertained concerning this interesting and recently exterminated animal.

When the island was first settled, some forty years ago, "Rat-Kangaroos," or "Tungoos" were swarming. The animals do not seem to have formed burrows, but they lived in the undergrowth, and used frequently to hop into the homestead to take bread or other eatables thrown to them from the table. They do not appear to have been nocturnal; they do not seem even to have been afraid of the human invaders of the island. Their only offence seems to have been that they had a liking for the garden produce of the family who settled on the island.

Cats were introduced in order to exterminate the Tungoos, and their work has been done completely. To what species the animal belonged can never be known and the fact of its extermination in this manner is much to be regretted.

There are many islands in the vicinity of St. Francis to which some members of the original colony could have been transported, and so given a chance to survive.

The story is one of importance from the point of view of legislation for the protection of insular faunas, since it demonstrates clearly how rapidly and how completely an interesting island fauna may be destroyed and lost to science for ever.

It is much to be hoped that *Isoodon nauticus*, *Petrogale pearsoni*, *Thylogale flindersi*, *Leporillus jonesi*, and *Rattus murrayi* are not permitted to follow the Tunggoo of St. Francis Island into the ranks of recently exterminated animals.

Gaimard's Rat-kangaroo

BETTONGIA GAIMARDI (Desmarest)

Kangurus Gaimardi Desmarest, Mammalogie, vol. 2, suppl., p. 542, 1822.
(Vicinity of Port Jackson, New South Wales.)

FIG.: Quoy and Gaimard, Voy. Uranie et Phys., Zool., atlas, pl. 10, 1824
(as *Hypsiprymnus white*).

This rat-kangaroo of eastern Australia is apparently extinct.

The general color is grizzled gray, with a yellowish tinge; tail colored like body for the basal third, then darkening and the hair lengthening until there is a distinct black crest on the terminal third; under side of tail white. Head and body, 390 mm.; tail, 280 mm. (Thomas, 1888, p. 109.)

Le Souef remarks (1923, p. 110) that this is one of three mammals that "are entirely confined to the fox area of Eastern Australia" and "require our immediate attention if the remnants are to be saved. . . . I cannot locate any Gaimard's Rat-Kangaroos; they used to live on the Mountains and western plains of New South Wales."

Le Souef and Burrell say (1926, p. 233): "We have noted Gaimard's rat-kangaroo in the open forest on the Blue Mountains . . ." They add, in regard to the group of rat-kangaroos in general: "Before the advent of the fox the rat-kangaroos were extremely numerous, so much so that special measures had to be taken by settlers to protect crops and haystacks, but now many species throughout a large part of their range are very rare, and presumably in a short time they will be a thing of the past—wherever the fox can penetrate."

"I think that this species is definitely extinct. I have not seen or heard of it for upwards of 20 years." (A. S. Le Souef, *in litt.*, February 15, 1937.)

E. Le G. Troughton writes (*in litt.*, April 16, 1937) that it once inhabited coastal New South Wales, but it is now apparently extinct, possibly since the advent of the fox.

According to C. W. Brazenor (*in litt.*, March 3, 1937), there are few Victorian specimens, and the last record was in 1877.

Longman (1930, p. 59) includes southern Queensland in the range of the species.

Gray's Rat-kangaroo

BETTONGIA LESUEUR GRAII (Gould)

Hypsiprymnus Graii Gould, Proc. Zool. Soc. London 1840, p. 178, 1841.
("Swan River," Western Australia.)

FIGS.: Gould, 1855, vol. 2, pl. 64; Cabrera, 1919, pl. 14.

This subspecies of the Western Australian mainland has suffered pronounced restriction of range and reduction in numbers.

Fur long and soft; general color above (including back of ears) ashy brown; sides of head and body very faintly tinged with yellowish; under parts dirty white; feet very pale brown; tail brown, except the terminal third, which is covered with longish white hairs. Head and body, 457 mm.; tail, 292 mm. (Gould, 1841c, pp. 178-179.)

Gray's Rat-kangaroo is apparently now confined to a comparatively small area in the southwest of Western Australia. Shortridge (1910, p. 823, map) indicates a former distribution covering almost the entire southern half of that state. The line of demarcation or intergradation between this subspecies and *B. l. harveyi* remains undetermined.

Gould (1863, vol. 2, p. 74) "received examples of this animal from various parts of the south-western coasts of Australia, and it appears to be . . . abundant in the plains . . . in the neighbourhood of Perth in Western Australia." He quotes Gilbert to the effect that "it is one of the most destructive animals to the garden of the settler that occurs in Western Australia, almost every kind of vegetable being attacked by it, but especially peas and beans."

Thirty-five years ago it was "very abundant in many parts of the South-West, differing curiously from the insular form in not occurring near the coast." It did not then appear "to exist on the mainland to the north of the Swan River." Specimens were recorded from Arthur River, Woyaline Wells, Boyadine-Dale River, and Dwala-dine. (Shortridge, 1910, pp. 822-823, fig. 258.)

More recently "this species, which was once very common in the interior, is now confined to the Great Southern area between Beverley in the north and Kojonup in the South" (Glauert, 1933, p. 26).

The reduction in range suggests little hope for survival unless there exists a suitable reserve from which foxes can be excluded (E. Le G. Troughton, *in litt.*, April 16, 1937).

[On the islands of Sharks Bay, Western Australia, occurs the typical subspecies, Lesueur's Rat-kangaroo (*B. l. lesueur* (Quoy and Gaimard)), which has survived in considerable numbers, probably owing to the protection afforded by an insular habitat. Glauert (1933, p. 26) extends the range of this form far north along the coast of Western Australia: "Years ago the animal was common

near Roebuck Bay (Broome), where K. Dahl obtained numerous specimens.”]

Harvey's Rat-kangaroo

BETTONGIA LESUEUR HARVEYI (Waterhouse)

Perameles Harveyi Waterhouse, Proc. Zool. Soc. London 1842, p. 47, 1842.
 (“Port Adelaide, South Australia.”)

FIG.: Jones, 1924, p. 207, fig. 153.

“In certain districts it is still by no means rare, but its decrease in numbers has been so rapid during the past twenty years that probably the remnant still existing must not be regarded as a very long lived one” (Jones, 1924, p. 207).

Fur dense and soft; general color above brown, penciled with white; sides of head and body tinged with yellowish; under parts impure white; tail rich brown above, dirty white below, the hairs becoming longer and white toward the tip (Waterhouse, 1842, p. 47). The animal is shaped like a little stoutly built kangaroo and is about the size of a rabbit, with a short blunt head and little round ears. Head and body, 370 mm.; tail, 300 mm. (Jones, 1924, pp. 207, 210.)

The exact distribution of this subspecies does not seem to have been determined. It originally ranged widely through South Australia, having been recorded from Adelaide, Port Lincoln, Gawler Plains, Lake Phillipson, the vicinity of McDouall's Peak, and the northwest (Thomas, 1888, p. 113; Jones, 1924, pp. 210-211). It may be this form that extends also into Central Australia, but the area where it approaches or intergrades with *B. l. gravi* apparently remains to be ascertained.

Gould (1863, vol. 2, p. 74) recorded it as “abundant in the plains around Adelaide.”

Spencer records “*Bettongia lesueuri*” from Central Australia, but he lists no specimens and gives it the native name of “Mäl-lä,” whereas Finlayson (1935, p. 62) applies the native name “maala” to *Lagorchestes hirsutus* of the same general region.

Spencer's account (1896, p. 16) is as follows:

“This is the common sand-hill rat-kangaroo of Central Australia, and is perhaps . . . the most common form of marsupial amongst the sandy plains and sand-hills

“We found it during the whole course of the [Horn] expedition, and there can be no doubt but that it is distributed right across South, Central and West Australia.”

As with so many other Australian species, we owe the chief account of this animal's status and life history to Jones (1924, pp. 210-211):

This Rat Kangaroo, which is probably the only living representative of the Sub-family left in South Australia, is still existing in some numbers in

certain districts in the North-West. Here it lives in company with the rabbits, sharing the larger warrens with them The choice of a warren seems largely to be determined by the quantity and nature of the herbage in the neighbourhood, for in these waterless districts Rat Kangaroos are dependent on the succulent sand hill vegetation. Rabbits are so universally spread over the country that there probably does not exist to-day a *Bettongia* colony living in its own burrows. It has thrown in its lot with the rabbit, and although it appears to have its own appartments [*sic*] in the complicated system of the large warrens, it is merely a tenant, forming a part of a community in a manner which is rather remarkable when its exceedingly pugnacious character is considered. Nevertheless, though it lives in apparent harmony with the rabbits, and avails itself of the shelter of their burrows, it is suffering for the partnership. The remnant of the Tungoos is living in an environment in which there is a severe competition for succulent food. In good seasons there is enough juicy herbage for cattle and rabbits as well as Rat Kangaroos but in bad seasons the rabbits and the marsupials perish in large numbers. Such losses among the rabbits are soon made good, but with the marsupials this is not the case, and probably the end of the Tungoo is not far off. When times are bad, and when the cattle and rabbits have eaten all the herbage of the sand hills, the Tungoos become extremely bold, and will enter a homestead in their search for anything to eat. They will come into a room and boldly face a cat in order to obtain some potato peelings; they will scramble over a paling fence four or five feet high in order to get at the vegetable garden. They are bold and enterprising little animals which have made, and are making, a brave struggle against what seems an almost inevitable extermination. In the more cultivated districts of the South, where food is in plenty, the wholesale scattering of poisoned pollard has led to their complete extinction. The poison cart has done its deadly work on the slowly-breeding Tungoo, although the rapidly-breeding Rabbit has survived the ordeal. In the North they are steadily being pressed out of existence by the competition for food.

When we remember that their numbers in rabbit warrens, even near to towns, was a source of constant annoyance to rabbiters less than twenty years ago, we can realise how destructive to the native herbivorous fauna the wholesale spreading of poisoned grain has proved to be. Nor must we forget that the remnant which still struggles on in the North is now exposed to the ravages of the fox.

Concerning the introduction of this rat-kangaroo on Kangaroo Island, South Australia, Waite and Jones say (1927, p. 323): "Specimens bred and reared in captivity in Adelaide were liberated within the observation enclosure on the reserve and seem to be doing well. If, when they are turned out into the larger world, they can avoid the goana (*Varanus*) they should prosper."

H. H. Finlayson (*in litt.*, March 20, 1937) regards the species as a whole as common in Western Australia, the Center, and north-western South Australia.

Brush-tailed Rat-kangaroo

BETTONGIA PENICILLATA PENICILLATA J. E. Gray

Bettongia penicillata J. E. Gray, Mag. Nat. Hist. (Charlesworth), vol. 1, p. 584, 1837. (No type locality was stated in the original description, but Thomas (1888, p. 111) lists the type specimen from "New South Wales.")

FIGS.: Gould, 1841, pl. 14; Waterhouse, 1846, vol. 1, pl. 7, fig. 1; Gould, 1852, vol. 2, pl. 61; Lydekker, 1894, pl. 9 (ssp.?).

This eastern Australian subspecies is either very rare or extinct. (The two other recognized subspecies likewise come within the scope of the present report.)

The general color is ashy brown, penciled with white and brownish black; cheeks and throat faintly tinged with yellowish; under parts dirty white; hands and feet pale brown; tail brown above, pale brown below, the apical third with a black dorsal crest. Head and body, 343 mm.; tail, 285 mm. (Waterhouse, 1846, vol. 1, p. 213.)

The former range extended from the Dawson Valley, Queensland, to Victoria, but apparently only on the inner side of the coastal ranges.

Most of the information on this animal comes from Gould (1863, vol. 2, p. 71), who had opportunities of studying it while it was still abundant. "The eastern parts of Australia, particularly the districts on the interior side of the ranges of New South Wales, constitute the true habitat of the species I observed it to be very abundant on the Liverpool Plains, and on the banks of the river Namoi, from its source to its junction with the Gwydyr; but between the ranges and the coast I did not meet with it." He adds that the natives rarely pass without detecting its grassy nest on the ground, and almost invariably kill the sleeping inmates by dashing their tomahawks or heavy clubs at it.

It is "apparently not now found in Eastern Australia" (A. S. Le Souef, *in litt.*, February 15, 1937). "It is now very rare or extinct in New South Wales and Victoria" (E. Le G. Troughton, *in litt.*, April 16, 1937).

C. W. Brazenor (*in litt.*, March 3, 1937) considers the animal extinct in Victoria, where the last record dates from 1857. There are few Victorian examples in the National Museum of Melbourne.

According to Finlayson (1931, p. 89), "*Bettongia penicillata* was taken by Lumholtz on Coomooboolaroo [in the Dawson Valley, Queensland], but has now apparently quite disappeared from there, and is not known elsewhere in the valley."

While no specific information concerning the causes of the disappearance of this rat-kangaroo seems to have been offered, probably the fox is largely responsible.

Gould's Rat-kangaroo

BETTONGIA PENICILLATA GOULDII Waterhouse

Bettongia Gouldii J. E. Gray, List Specimens Mammalia Brit. Mus., p. 94, 1843 (*nomen nudum*). ("Head of Gulph St. Vincent," South Australia.)

Bettongia Gouldii Waterhouse, Nat. Hist. Mammalia, vol. 1, p. 219, 1846. ("South Australia.")

"As far as can be ascertained at present, this animal seems to have disappeared from South Australia" (Jones, 1924, p. 212). As far as known, it was confined to this state.

The type specimen, a very immature animal, is the only one of this subspecies that seems to have been described in detail. The fur is brownish, penciled with black and yellowish white; under parts white, more or less suffused with yellow; tail rusty brown at base, the terminal half black both above and below (Waterhouse, 1846, vol. 1, p. 219). Head and body, 390 mm.; tail, 310 mm. (Thomas, 1888, p. 111).

Jones (1924, pp. 212-214) furnishes practically all the available information on the former and present status of this rat-kangaroo:

It is possible that it may prove to be still living somewhere in this State, and if there is any hope of such a survival it would seem that the South-East or the extreme North-East holds out the greatest promise.

Not only does it appear to have died out completely over the greater portion of the State, but no specimen of the South Australian form seems to have been preserved in the zoological collections in Australia. At present, so far as this State is concerned, the race is represented only by some half-dozen skulls. . . .

Only a few years ago this animal was extremely common over the greater part of South Australia. Twenty years ago the dealers in Adelaide did a great trade in selling them by the dozen at about ninepence a head for coursing on Sunday afternoons. It may surprise people who remember those days to know that there is not a preserved specimen, not even a skin of the animal, available for scientific study in South Australia to-day. In the same way it will one day surprise the rising generation when they realise that the few native animals they are now familiar with are gone for ever. . . .

It is much to be hoped that, should some remnant of the South Australian race be found still living in the more bush-covered portions of the South or of the North-East, steps will be at once taken that it may be preserved and protected by every possible means.

Ogilby's Rat-kangaroo

BETTONGIA PENICILLATA OGILBYI (Waterhouse)

Hypsiprymnus Ogilbyi Waterhouse, Naturalists' Library (Jardine), vol. 11, Marsupialia, p. 185, 1841. ("Western Australia in the neighbourhood of Swan River"; Thomas (1888, p. 111) lists the type specimen from "York, W. A.")

FIG.: Gould, 1852, vol. 2, pl. 62.

Although very plentiful in the southwest of Western Australia a generation ago, this subspecies is now "reduced in numbers" (L.

Glauert, *in litt.*, March 17, 1937), and concern may well be felt as to the possibility of its following the other two subspecies on the road to extinction.

It differs from *B. p. penicillata* in its generally darker coloration; in the rusty red of the base and sides of the tail; in the rufous coloring of the feet; in the terminal half of the tail being black both above and below; and in the longer ears and more slender tarsi (Waterhouse, 1841, p. 186; Gould, 1863, vol. 2, p. 72). Head and body, 360 mm.; tail, 310 mm. (Thomas, 1888, p. 111).

Gould (1863, vol. 2, p. 72) quotes Gilbert's notes from Western Australia: "This species appears to be equally abundant in all parts of the colony, but to evince a preference, perhaps, for the white-gum forests. . . . This animal is one of the favourite articles of food of the natives, who are very quick in detecting the nest, and generally capture the little inmate by throwing a spear through the nest and transfixing it to the ground, or by placing the foot upon and crushing it to death."

Shortridge (1910, pp. 821-822, map) found it "very plentiful in the South-West, where, unlike *Bettongia lesueuri*, it occurs near the coast, extending as far north as the Moore River, becoming very rare at its northern limit. Formerly recorded from Sharks Bay, as so many of the other South-Western marsupials have been.

"Although getting scarce in the more settled districts, both species of *Bettongia* are sufficiently numerous in many places to be rather destructive to crops, on which account they are often trapped and poisoned off in large numbers."

Shortridge records specimens from King River, Dwaladine, Woyaline Wells, Yallingup, and Burnside. From Perth southward, according to Glauert (1933, p. 26), it "is found in the coastal area as well as inland to the Great Southern and beyond." E. Le G. Troughton remarks (*in litt.*, April 16, 1937) that "survival there may be significant of the influence of the fox not yet being fully asserted."

Rufous Rat-kangaroo

AEPPYRMYNUS RUFESCENS (J. E. Gray)

Bettongia rufescens J. E. Gray, Mag. Nat. Hist. (Charlesworth), vol. 1, p. 584, 1837. (Type locality not stated in original description, but Thomas (1888, p. 104) lists the type specimen from "New South Wales.")

FIGS.: Gould, 1841, pl. 13; Gould, 1855, vol. 2, pl. 65; Le Souef and Burrell, 1926, fig. 51.

Once common over much of eastern Australia, this species has largely or entirely disappeared from Victoria and New South Wales, but it remains common in the Dawson and Fitzroy Valleys, Queensland.

The fur is long and coarse; color above grizzled rufescent gray; an indistinct white stripe crossing the sides just in front of hips; under parts grayish white; ears rather long, black on outer surface; tail thickly haired, pale gray above, white below. Head and body, 520 mm.; tail, 380 mm. (Thomas, 1888, pp. 103-104.)

Gould writes (1863, vol. 2, p. 75): "The south-eastern portion of the continent is its true habitat; and it is almost universally dis-

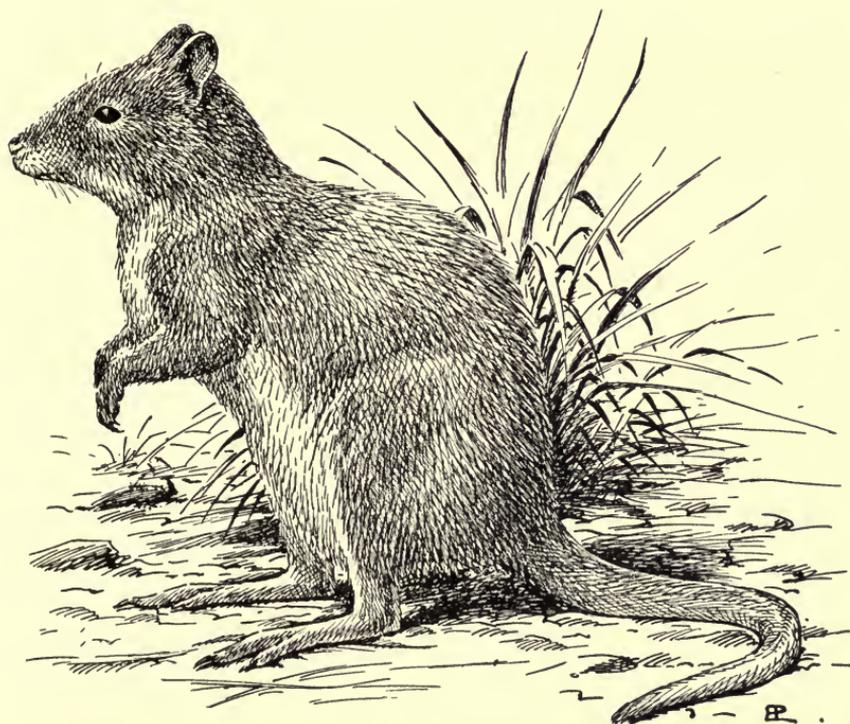


FIG. 10.—Rufous Rat-kangaroo (*Aepyprymnus rufescens*)

persed over New South Wales, both on the sea and interior side of the mountain ranges. I found it very abundant on the stony sterile ridges bordering the grassy flats of the Upper Hunter, and in all similar situations. . . . From its invariably seeking shelter in the hollow logs" when startled from its nest, it "easily falls a prey to the natives, who hunt it for food."

Of its status on the Comboyne Plateau, New South Wales, Chisholm says (1925, p. 73): "Not here now, but I am informed by an early settler that years ago they were a great pest to the farmers, and had to be persistently poisoned. This animal appears to be fast becoming extinct, probably largely due to the depredations of the

fox, as living their daylight hours in a nest on the ground they become an easy prey for this animal."

In Victoria, according to C. W. Brazenor (*in litt.*, March 3, 1937), the Rufous Rat-kangaroo was "once fairly common. Now rare but probably survives in more inaccessible parts of eastern Victoria. Last record 1905." It is completely protected by law in that state.

Finlayson writes (1931, pp. 85-86) of its status in Queensland:

This interesting animal, though highly characteristic of coastal Queensland, has received very little mention in recent years, and there has been no published data from which one might estimate its position in the fauna of that State.

Strangely enough it was not taken by Lumholtz, though it must have occurred in many of the districts in which he worked It has been twice recorded from North Queensland by O. Thomas . . . , and by Lönberg and Mjöberg from Carrington . . . , but without comment, and as each record was based on a single individual, it might be inferred to be comparatively rare.

In the Dawson and Fitzroy Valleys, however, this is far from being the case, and it is widely spread over the whole area from sea level to the tops of the plateaus. It occurs in almost all types of country, both open and forested The banks of creeks and river flats are favourite resorts, and there are few such places which by systematic beating cannot be made to yield up a few. . . .

Like most of the coastal species it has little resistance to drought, and will go to great lengths in excavating holes in dry creek beds to get down to water level. In January, 1929, the Cariboe Creek ceased to run at Thangool, and for miles the sandy bed thus exposed was criss-crossed with the pads of *Aepyprymnus* coming down at night to drink at pot holes of their own making.

In the cattle country it is stated by squatters to have diminished considerably in recent years, and by them it is regarded with indifference. But round many of the newly-formed cotton settlements in The Callide Valley it is plentiful, and at Thangool and Biloela and other points on The Cariboe has become an unmitigated nuisance and is cordially detested by the struggling settlers. Its raids on the crops are determined and resourceful, and as no ordinary fence will bar them for long, poisoning is the only effective check. Scores of thousands have been killed in this way, and skeletons (few and far between in Museums) are littered thickly round the cotton plots.

On the outlook for the preservation of the Rufous Rat-kangaroo, E. Le G. Troughton writes (*in litt.*, April 16, 1937): "There has been a marked shrinkage of the once abundant species in coastal N. S. Wales and Queensland, suggesting that this small, specialized, and rather open country species is unlikely to survive, except possibly in northern coastal Queensland where it may favour less open country, and the fox may not become established."

Gilbert's Rat-kangaroo

POTOROUS GILBERTII (Gould)

Hypsiprymnus Gilbertii Gould, Mon. Macropodidae, pt. 1, text to pl. 15, 1841.

("King George's Sound," Western Australia.)

FIGS.: Gould, 1841, pl. 15; Gould, 1854, vol. 2, pl. 69.

The annals of this species are brief and tragic. It was discovered in Western Australia in 1840 by John Gilbert and is represented by his two specimens in the British Museum, but it has never since been encountered in the flesh by a zoölogist and is undoubtedly extinct.

General color above mingled gray, brown, and black; central and lower part of back washed with reddish brown; a blackish median line from nose to forehead; under parts grayish white; tail black, thinly clothed with short hairs. Total length, 558 mm.; tail, 158 mm. (Gould, 1841, pt. 1, text to pl. 15.)



FIG. 11.—Gilbert's Rat-kangaroo (*Potorous gilbertii*)

Gould (1863, vol. 2, p. 79) quotes Gilbert's field notes as follows:

This little animal may be said to be the constant companion of *Halmaturus brachyurus*, as they are always found together amidst the dense thickets and rank vegetation bordering swamps and running streams. The natives capture it by breaking down a long, narrow passage in the thicket, in which a number of them remain stationed, while others, particularly old men and women, walk through the thicket, and by beating the bushes and making a yelling noise, drive the affrighted animals before them into the cleared space, where they are immediately speared by those on the watch: in this way a tribe of natives will often kill an immense number of both species in a few hours. I have not heard of the *Hypsiprymnus Gilberti* being found in any other part of the colony than King George's Sound.

Shortridge (1910, pp. 824-826, map) gives the following account:

"It is quite possible that they [*P. gilbertii* and *P. platyops*] are now entirely extinct, although I picked up six old skulls of *Potorous*

gilberti near the entrances of some caves in the Margaret River district, and they may still exist sparingly in that and other localities, as they are very liable to be overlooked on account of their great external resemblance to *Macropus brachyurus*.

"The animal known to natives as 'Wurrark' around the Margaret River is probably *Potorous gilberti*, said to frequent marshy country, and although formerly numerous, it is thought to have almost, if not entirely, died out. A few may still occur towards Cape Leeuwin."

L. Glauert (*in litt.*, March 17, 1937) considers the species extinct.

Broad-faced Rat-kangaroo

POTOROUS PLATYOPS (Gould)

Hypsiprymnus platyops Gould, Proc. Zool. Soc. London 1844, p. 103, 1844. ("Swan River," Western Australia; the type, according to Waterhouse (1846, vol. 1, p. 232), is labeled as coming from "Walyema Swamps, about forty miles north-east of Northam, Western Australia.")

FIGS.: Gould, 1851, vol. 2, pl. 70; Le Souef and Burrell, 1926, fig. 55.

This Western Australian species, regarded as rare at the time of its discovery a century ago, and represented by apparently no more than three specimens all told, is evidently extinct.

Face extremely broad and, with sides of body, brownish gray; back reddish brown; face and upper surface beset with numerous long yellowish-white hairs; under parts and limbs buffy gray; tail brown above, paler beneath. Total length, 482 mm.; tail, 177 mm. (Gould, 1844*b*, p. 103.)

"This species . . . is so rare that an adult male in my own collection and another in that of the British Museum, both procured [in 1840] by Mr. Gilbert in Western Australia, one in the Walyema Swamps, near Northam in the interior, and the other at King George's Sound, are all the examples that have yet been seen" (Gould, 1863, vol. 2, p. 80).

"A single specimen from the Margaret River was sent to the London Zoological Society in 1908. This suggests that the species still exists in that area" (Glauert, 1933, p. 26).

Shortridge wrote in 1910 (p. 826): "A small gregarious wallaby is said to have been at one time plentiful in the coastal scrub to the east of Albany; from the description it was probably one of these species [*P. platyops* and *P. gilbertii*]. It was known to the natives as 'Moort,' and according to them has entirely disappeared there. Described as being rather similar to *Macropus brachyurus* in habits, but more sluggish in its movements, on which account cats and bush-fires have probably caused its disappearance."

A possible clue to the identity of the above-mentioned species appears in Gould's original description of *platyops* (1844*b*, p. 103), wherein he cites the native name of "Mor-da," presumably current

in the Walyema Swamps area. This bears a plausible similarity to the "Moort" of Shortridge, whereas the native name of *gilbertii* was "Grul-gyte" (Gould, 1841, text to pl. 15) or "Ngil-gyte" (Gould, 1863, vol. 2, p. 79).

For some years past the Broad-faced Rat-kangaroo has been considered possibly or probably extinct (Shortridge, 1910, p. 825; Le Souef and Burrell, 1926, p. 237; A. S. Le Souef, *in litt.*, February 15, 1937; E. Le G. Troughton, *in litt.*, April 16, 1937). Finally, L. Glauert (*in litt.*, March 17, 1937) definitely lists it as extinct.

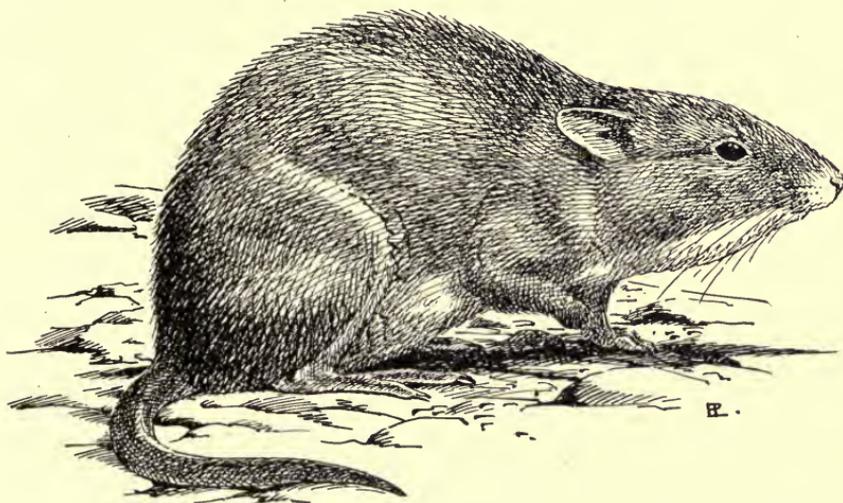


FIG. 12.—Broad-faced Rat-kangaroo (*Potorous platyops*). After Gould, 1851.

“Common” Rat-kangaroo; Long-nosed Rat-kangaroo; Dark Rat-kangaroo; Potoroo

POTOROUS TRIDACTYLUS TRIDACTYLUS (Kerr)

Didelphis tridactyla Kerr, Anim. Kingdom of Linnaeus, p. 198, 1792. (Based upon the “Kangaroo Rat” of Phillip, Voy. Botany Bay, p. 277, pl. 47, 1789; type locality, “New South Walès.”)

FIGS.: Waterhouse, 1841, pl. 16, and Gould, 1854, vol. 2, pl. 67 (as *Hypsiprymnus murinus*); Lydekker, 1894, pl. 8; Le Souef and Burrell, 1926, figs. 53, 54; Finlayson, 1935a, pl. facing p. 99.

Formerly ranging from South Australia through Victoria and New South Wales to southern Queensland, the Potoroo has become extinct in South Australia and possibly in New South Wales. Its status in Queensland does not seem to be very definitely known, but it survives in some numbers in certain districts of Victoria.

The Potoroo is distinguished from other species of its genus by its elongated head and short tarsus; the fur is long, loose, and slightly

glossy; general color dusky brown, penciled above with black and pale brownish yellow; naked part of rhinarium extending farther back than in *P. platyops*; under parts dirty yellowish white; tail clothed with short, stiff, black hairs, extreme tip white. Head and body, 393 mm.; tail, 235 mm. (Waterhouse, 1846, vol. 1, pp. 224-225.)

The brief history of the species in South Australia is discussed by Jones (1924, pp. 217-218):

The name "common" Rat-Kangaroo although that used in all books dealing with the marsupials, is a sadly inappropriate one. . . .

Of the former distribution of this animal in South Australia no details can now be obtained. Save the bare record of its existence in this State [on the Murray River], which is given in the British Museum catalogue of 1888 and which has been copied into all subsequent works, I know no other reference to the creature as a South Australian animal. . . . The remaining Potoroos should be carefully protected in those places where they still survive, and efforts should be made for turning them down in properly safeguarded sanctuaries. If this is not done there seems to be no doubt that the remnant of the stock will share the fate of the South Australian form and rapidly become extinct.

Finlayson writes (1935*b*, p. 221) concerning its status in Victoria:

Few animals have been so obscure as to their status on the mainland as the Potoroo. Its former presence in the south-eastern district of this State [South Australia] is attested . . . by the accounts of settlers, and by occasional bone fragments in cave deposits, but it does not seem to have been a common form west of the Glenelg [a river of southwestern Victoria], at the time of settlement.

In Victoria, though better known than here, there have been few explicit references to it in the literature, which would enable one to judge as to how it was faring in the struggle for survival, until Mr. Brazenor, in 1933 stated that "though very uncommon it still persists . . . in the north-eastern district, in the Grampians, and probably in the Otway Ranges," and he has since confirmed its presence in the last locality by personally collecting it there.

I am able to add two other localities to these, *viz.*, French Island in Western Port, and the Portland area in the western district, and to state that in the latter, at least, it is still plentiful. Its apparent scarcity is due, I believe, largely to its choice of dense undergrowth In 1927 a rabbit trapper, near Gorae, stated that he took over twenty of these "bandicoots" in a short season, and this I was able subsequently to prove, by overhauling the skulls at his dumps In the summer of the following year I took it myself near Heywood and had further reports of it, and again in the winter of the same year on French Island, and that no disaster has overtaken it since then is vouched for by several correspondents, and very recently (for the western district) by Professor Wood-Jones (*in litt.*).

C. W. Brazenor writes (*in litt.*, March 3, 1937) that it was once common in eastern and southern Victoria but is now confined to small numbers in southwestern Victoria. He adds that it is completely protected by law.

Gould (1863, vol. 2, p. 77) gives an account of it under the name *Hypsiprymnus murinus*: "It is only in the swampy and damp parts

of the brushes of New South Wales that the *H. Murinus* is to be found in any abundance. The district of Illawarra, Botany Bay, the low scrubs bordering the rivers Hunter, Manning, and Clarence, are the principal localities in which it may be successfully sought for."

E. Le G. Troughton (*in litt.*, April 16, 1937) refers to the mainland race as once common in the damp coastal regions of New South Wales, Victoria, and South Australia, but as now rare, no specimens having been received at the Australian Museum since 1913.

Le Souef and Burrell remark (1926, p. 233) that the Potoroo, like all the members of the subfamily Potoroinae, makes for a hollow log when disturbed, and thus is often easily captured.

Longman (1930, p. 59) records the species from southern Queensland. Finlayson (1931, p. 89) did not find it in the Dawson Valley in that state.

[The Tasmanian subspecies, *P. t. apicalis* (Gould), remains common in many localities (Lord, 1928, p. 19). Absence of the fox in Tasmania may render that country the only hope for the survival of any representative of the genus (E. Le G. Troughton, *in litt.*, April 16, 1937).]

Desert Rat-kangaroo; Plain Rat-kangaroo

CALOPRYMNUS CAMPESTRIS (Gould)

Bettongia campestris Gould, Proc. Zool. Soc. London 1843, p. 81, 1843. ("South Australia.")

FIGS.: Gould, 1851, vol. 2, pl. 66; Finlayson, 1932, pls. 7, 8, and 1935, pls. facing pp. 97, 98.

"His [Finlayson's] rediscovery of the living *Caloprymnus* was a romance of modern zoology. The great John Gould had received three specimens from somewhere in South Australia in 1843. These three specimens in the British Museum remained unique. *Caloprymnus* seemed to be as dead as the Dodo: and then Finlayson, with the assistance of Mr Reese of Appamunna, produced [in 1931], as a conjurer from his hat, living specimens of the long lost Plain Rat-kangaroo." (Jones, in Finlayson, 1935a, p. 8.)

Under fur dense and soft, very pale yellowish brown, the hairs tipped with sooty brown; interspersed with the under fur (especially on the back) are many long brownish white hairs, tipped with blackish; sides dirty yellowish; under parts dirty white; feet and tail very pale yellowish brown. Head and body, 400 mm.; tail, 355 mm. (Gould, 1843, p. 81.)

"Imagine a little animal about the bulk of a rabbit, but built like a kangaroo, with long spindly hind legs, tiny forelegs folded

tight on its chest, and a tail half as long again as the body but not much thicker than a lead pencil, and you have it in the rough. But its head, short and blunt and wide, is very different from that of any kangaroo or wallaby, and its coat is uniformly coloured a clear pale yellowish ochre—exactly like the great clay-pans and flood plains." (Finlayson, 1935*a*, p. 102.) Head and body, 254-282 mm.; tail, 307-377 mm. (Finlayson, 1932, p. 165).

The exact locality from which Gould's original specimens came (through Sir George Grey) is not now ascertainable; he merely stated (1863, vol. 2, p. 76) that "the stony and sandy plains of the interior of South Australia partially clothed with scrub are its native habitat." Only the recent range of the animal can be given with any precision. "Its proved distribution may be extended over a large area of the eastern portion of the Lake Eyre Basin, specimens and reliable records from observers personally known to the author having been obtained from as far south as Lake Harry and as far north as Coorabulka in South-West Queensland. The north and south limits of its range, as at present ascertained, are, therefore, approximately, lats. 23° 40' and 29° 21' south. No records have so far been obtained west of Lake Eyre and the Kallakoopah, and the furthest easterly occurrence is at Innamincka, on the Barcoo, in long. 140° 49' east." (Finlayson, 1932, p. 148; map, p. 149.)

The recent history of the species may be summarized in Finlayson's own words (1932, pp. 150-165):

In ordinary years the Lake Eyre Basin is a most unattractive area from the point of view of the mammal collector, and the disappearance of *Caloprymnus* from scientific ken must be attributed rather to lack of systematic collecting than to any sudden change in the status of the animal in the fauna, following Grey's discovery. All the evidence obtained by questioning blacks goes to show that in all probability it has had an uninterrupted tenure of the country, but it is equally certain that in normal times its numbers are small, since men like Mr. Reese, whose opportunities for observation are practically continuous throughout the year, affirm that in thirty-five years they have seen no more than twenty specimens. . . .

At the time of my passage through the area, conditions as they bear upon animal life were very favourable and quite supernormal as compared with average conditions over a series of years. A period of seven years of drought had been broken, and vegetation had been restored on a comparatively lavish scale. All species of mammals were undergoing a quick increase in numbers, and rodents especially had assumed plague proportions. Most of the specimens of *Caloprymnus* were obtained, and the bulk of the observations upon it were made, on two flats lying east and west of Cooncherie Sandhill. . . .

The numbers occurring in this particular locality were very considerable. In the course of a week's riding on the two flats over an area of perhaps 20 square miles, 17 *Oolacuntas* were sighted. . . . All the evidence obtained so far goes to show that its distribution at present is highly discontinuous but that it follows in a general way the fringes of the gibber plains. . . .

The accounts of its feeding habits given by the blacks, and several other

items of evidence, however, would point to its being largely phytophagous, or at least less rhizophagous than *Bettongia*, *Potoröus*, and *Aepyprymnus*. . . .

Where *Diprotodon* failed [to survive], *Caloprymnus* may yet succeed, but all the evidence of its physical structure is not more eloquent of changed conditions [from relatively humid to an arid climate] than its pathetic clinging to its flimsy grass nest, in a fiery land where a fossorial habit has become the main factor in survival.

The first specimen flushed by Finlayson's party was run down with a relay of horses after a chase of 12 miles. Others were taken in the same way, while a native captured two by hand after stealing up to their grass nests.

E. Le G. Troughton writes (*in litt.*, April 16, 1937): "The fact that the otherwise defenceless animal is peculiarly suited to extremely barren and remote desert areas may ensure survival and prevent exploitation as a rarity, but the spread of the fox, seen personally near Marree in 1920, use as food by the blacks, and variable seasons may continue range shrinkage to extinction."

"Common" Hare-wallaby; Brown Hare-wallaby

LAGORCHESTES LEPORIDES (Gould)

Macropus Leporides Gould, Proc. Zool. Soc. London 1840, p. 93, 1841. ("Interior of Australia"; according to Thomas (1888, p. 84), the cotypes are from the "interior of New South Wales.")

FIGS.: Gould, 1841*d*, pl. 12; Gould, 1859, vol. 2, pl. 57; Royal Nat. Hist., vol. 3, p. 246, fig., 1894-95.

This species is "apparently doomed to extinction" in its last stronghold in New South Wales (E. Le G. Troughton, *in litt.*, April 16, 1937).

It resembles the Common Hare of Europe in size and in texture of fur; forelimbs very small; above variegated with black, brown, and yellow; pale yellow on sides and about eyes; belly grayish white; forelimbs black on upper part. Head and body, 495 mm.; tail, 330 mm. (Gould, 1841*a*, pp. 93-94.)

The former range included the interior of New South Wales and Victoria, and the Murray River region of South Australia.

Gould writes (1863, vol. 2, p. 67): "I have but little doubt that this animal enjoys a wide range over the interior of New South Wales; it certainly inhabits the Liverpool Plains as well as those in the neighbourhood of the Namoi and the Gwydyr, from all of which localities I have received numerous examples." He adds: "I usually found it solitary, and sitting close in a well-formed seat under the shelter of a tuft of grass on the open plains."

"According to Krefft, this species is common in the level country between the Murray and Darling rivers" (Lydekker, 1894, p. 54).

E. Le G. Troughton (*in litt.*, April 16, 1937) considers it "now

very rare, and apparently doomed to extinction in New South Wales owing to denudation in over-stocked country, also populated by rabbits, and the fox." In 1938 (p. 407) he refers to it as "either extinct or nearly so."

In Victoria, according to C. W. Brazenor (*in litt.*, March 3, 1937), there were two records, the last in 1869. He considers the species extinct in that state.

"It is tolerably abundant in all the plains of South Australia, particularly those situated between the Belts of the Murray and the mountain ranges" (Gould, 1841*d*, text to pl. 12).

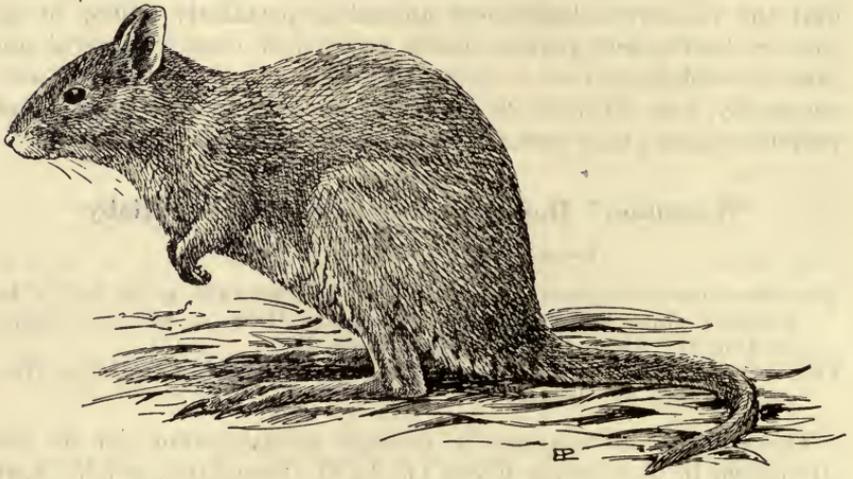


FIG. 13.—Brown Hare-wallaby (*Lagorchestes leporides*). After Gould.

Jones writes (1924, pp. 222-223) of its status in South Australia: "I know of no preserved specimens of this formerly common animal from which a description may be written of the actual form which inhabited this State. . . ."

"In the British Museum catalogue of 1888 five specimens in the collection are recorded as being from South Australia I have been unable to obtain any evidence of its present existence in the State, and in all probability it is completely exterminated."

Rufous Hare-wallaby; Western Hare-wallaby; "Whistler"; "Spinifex Rat"

LAGORCHESTES HIRSUTUS HIRSUTUS Gould

Lagorchestes hirsutus Gould, Proc. Zool. Soc. London 1844, p. 32, 1844.
("York District of Western Australia.")

FIG.: Gould, 1849, vol. 2, pl. 58.

This animal has long since disappeared from a large part of its former range in the west of Western Australia but survives in

indefinite numbers in the east along the South Australian border and likewise in the northwestern part of the latter state.

General color of fur, especially on hind quarters and under parts, rich sandy buff; head and back grizzled with grayish white; body beset, especially posteriorly, with numerous long, rich rufous hairs; space about eye reddish buff; ears large, grayish brown externally; feet yellowish buff. Total length, 698 mm.; tail, 266 mm. (Gould, 1844a, p. 32.)

Stirling and Zietz (1893, pp. 154-155) record four specimens from Western Australia; they were taken during the Elder Expedition "in the Porcupine grass (*Triodia irritans*) country, south of the Barrow Range, before the exploring party entered the Victoria Desert. . . .

"Mr. Streich informs us that this animal appears to be numerous in the northern parts of the Victoria Desert, where it often falls the prey to the Wedge-tailed Eagle."

In an anthropological report on the same expedition, Helms says (1896, pp. 240, 255-256):

The Blyth Range, Barrow Range, and Victoria Desert tribes inhabit "spinifex country," where subsistence is difficult to maintain, and but for the numerously occurring *Largochestes* [*sic*] *hirsutus* . . . and some other small marsupials, it would probably be impossible for them to live in such desolate districts. It can scarcely be wondered at that the majority of them appeared lean and starvation-stricken. . . .

The *Largochestes* is almost, if not totally, absent here [in the vicinity of Victoria Spring]; and some 150 to 200 miles to the north, the eagle-nests, which we had previously noticed daily, disappeared, which at once proved the decrease of these small marsupials. . . .

Throughout the greater part of the interior, as far as the Expedition went, their [the blacks'] principal flesh-food is supplied by the small marsupials that harbor under the *triodia*-tussocks, and are commonly called "spinifex wallabies" (*Largochestes hirsutus*), occurring abundantly in many places in the *triodia*-region. . . . The blacks are very expert at killing the animals with the "turtimbo," or short throwing-stick To enable them better to get at this game they constantly burn large patches of the "spinifex" grass.

Shortridge (1910, p. 819; map, p. 820) considers the "mainland form almost, if not entirely, extinct. Said possibly to still occur very sparingly on sand-plains to the east of Beverley and York—where within quite recent times it was fairly plentiful.

"A single specimen was recorded from Hastings, near Kojonup, in 1896, by the Perth Museum."

Glauert states (1933, p. 27): "It has long disappeared from the York district, where the first specimens were collected by Gilbert, but survives in the desert country near the South Australian border, and along the Canning Stock Route."

Finlayson (1935, pp. 63-67) gained experience with the species in the northwest of South Australia. "The maala [*L. hirsutus*], though common in the more westerly spinifex tracts, is not often taken east of the [Aboriginal] Reserves." Much time was spent in

1932 in an unsuccessful search for it. "A year later, . . . on the south side of the Musgraves, we learned from the blacks that there was a small colony of maalas in a spinifex patch ten miles south of Koonapandi."

Finlayson then gives an account of hunting in this spinifex patch, about 10 miles square, with some blacks. Their favorite method of firing the country was utilized. As the fire drove the maalas out of the tussocks, their chance of dodging the throwing-sticks was slender. Those that escaped the fire by remaining in their burrows were hunted out after the fire had passed. A satisfactory series of specimens was secured.

The Rufous Hare-wallaby "requires observation and close protection wherever possible" (E. Le G. Troughton, *in litt.*, April 16, 1937).

[It is represented by doubtfully distinct insular subspecies on Dorre and Bernier Islands in Sharks Bay, Western Australia—*L. h. dorrae* Thomas and *L. h. bernieri* Thomas. Evidently both are protected by their insular environment, and at least the latter is reported as plentiful (Shortridge, 1910, p. 819).]

Banded Hare-wallaby; Banded Wallaby

LAGOSTROPHUS FASCIATUS (Péron and Lesueur)

Kangurus Fasciatus Péron and Lesueur, in Péron and Freycinet, Voyage Terres Australes, vol. 1, p. 114, atlas, ed. 1, pl. 27, 1807. (Bernier Island, Sharks Bay, Western Australia.)

FIGS.: Péron and Freycinet, Voyage Terres Australes, atlas, ed. 1, pl. 27, 1807, ed. 2, pl. 57, 1824; Gould, 1842, pl. 30; Waterhouse, 1846, vol. 1, pl. 4, fig. 2; Gould, 1849, vol. 2, pl. 56.

Although Shortridge says (in Thomas, 1907, p. 772) that he had never seen any animal, not even rabbits, in such numbers as this species on Bernier Island, it now seems a melancholy necessity to include it among the vanishing mammals of Australia. It is no longer common on the islands in Sharks Bay where it once swarmed, and it occurs in only a few isolated localities on the mainland of Western Australia. (The mainland form, sometimes recognized as *L. f. albipilis* (Gould), is doubtfully distinct, and will not be treated separately here.)

The animal is about the size of the Common Hare of Europe; fur very long and soft, brown-gray, variegated with rusty, black, and white; space about eye bright rusty; numerous narrow dark cross bands on the back, most conspicuous posteriorly; on the upper parts and sides are very long interspersed white hairs; under parts dirty white; hind feet with long, harsh, brownish-white hairs spring-

ing from sides of two larger toes. Head and body, 444 mm.; tail, 279-305 mm. (Waterhouse, 1846, vol. 1, pp. 87, 90.)

At the time of its discovery by Péron in 1801, the species occurred in great numbers on the islands in Sharks Bay (Bernier, Dirk Hartog's, and Dorre). A little more than a century later Shortridge (in Thomas, 1907, p. 772) found the animals swarming on Bernier Island. "It has been a particularly dry season, and they were very thin. Food was evidently insufficient for them all, and dead specimens were lying about in all directions. It would seem that they have no natural enemies on the island; and they breed to such an extent that the island will carry no more, and in times of drought a number have to die." He adds (1910, p. 818): "It may be noted that sheep had been temporarily introduced there, while in the south of Dirk Hartog there is a large sheep station, and the wallabies are said to have entirely left that end of the island."

Glauert (1933, p. 27) reports the species as "not common" on the islands in Sharks Bay.

On the mainland of Western Australia Gilbert found it in densely thick scrubs, where "the only possible means of obtaining it is by having a number of natives to clear the spot, and two or three with dogs and guns to watch for it. . . . The natives are in the habit of burning these thickets at intervals of three years, and by this means destroy very great numbers." (Gould, 1863, vol. 2, p. 65.)

Thomas (1888, p. 182) recorded specimens from Wongar Hills, York, and Perth.

Shortridge (1910, p. 818; map, p. 817) found it "existing in a few isolated localities to the east of Pinjelly and Wagin, and according to natives the Pellinup and Salt River districts in the neighbourhood of the Stirling Ranges.

"Plentiful enough in the restricted areas in which they occur, frequenting thick prickly scrub."

He also remarks (pp. 818-819) on the "most sudden and unaccountable" disappearance of this and a number of other mammals in the Western, South-Eastern, and Central districts of Western Australia; it "is said to have been first noticed about 1880." Shortridge continues:

The above areas are now, with a few exceptions, entirely devoid of indigenous mammals. This is said partly to account for the way in which the natives have been disappearing from the Western and Central districts of late years. . . .

The entire disappearance of so many species, over such large tracts of country, is generally considered to be due to some epidemic or disease It may be noted, however, that they have died out chiefly in the drier parts of the country, where, except for the introduction of sheep, there has been very little alteration in the natural conditions. Rabbits, although already very numerous in the Centre and South-East, have not yet found their way to the North-West.

The mammals of the South-West, to about as far north as the Moore River, . . . are rapidly retreating before civilisation. . . . The burning of forests

and general clearing of the country, together with constant raids of dogs and domestic cats, are among the chief causes.

Glauert (1933, p. 27) records the mainland form as rare, occurring "in a few isolated localities to the east of the Great Southern Railway."

E. Le G. Troughton (*in litt.*, April 16, 1937) regards the extinction of the mainland form as probable and states that suitable reservations must be made if the fauna is to survive on islands large enough for commercial use.

Bridled Nail-tailed Wallaby

ONYCHOGALEA FRAENATA (Gould)

Macropus fraenatus Gould, Proc. Zool. Soc. London 1840, p. 92, 1841. ("Interior of New South Wales.")

Figs.: Gould, 1841*d*, pl. 3; Waterhouse, 1846, vol. 1, pl. 4, fig. 1; Gould, 1849, vol. 2, pl. 54; Le Souef, 1923, pl. 15; Australian Zoologist, vol. 3, pt. 4, pl. 20, 1923; Le Souef and Burrell, 1926, fig. 48.

This beautiful wallaby, perhaps never very common, is threatened with extinction in its ancient home in eastern Australia.

Form slender; fur soft and short; general color gray; a white cheek stripe; sides of neck washed with cream; a white stripe on each side extending from occiput over the shoulder to join the white of the under parts behind the arm insertion; space between these stripes blackish brown; tail black above and below toward tip, with a small terminal nail; limbs whitish, darker on hands and feet. Total length, 825 (female) to 1,104 mm. (male); tail, 380 (female) to 482 (male). (Gould, 1841*a*, p. 92, and 1841*d*, text to pl. 3.)

Its former range extended from southern Queensland to Victoria.

"*O. fraenata* inhabits the brigaloe-scrubs of the interior of New South Wales and Queensland, and probably South Australia" (Gould, 1863, vol. 1, p. xxi). Gould (1863, vol. 2, p. 62) writes further of its occurrence:

It is a native of the south-eastern portions of Australia, and the locality nearest to the colony of New South Wales in which I observed it was Brezi, on the river Mokai, whence it extended into the interior as far as I had an opportunity of proceeding; Mr. Gilbert subsequently discovered that it was common in the thick patches of scrub which are dispersed over all parts of the Darling Downs. It inhabits all the low mountain ranges, the elevation of which varies from one to six hundred feet, and which are of a sterile character—hot, dry, stony, and thickly covered with shrub-like stunted trees. . . .

In the neighbourhood of Brezi the natives hunt this species with dogs, and often kill it with spears, bommerengs and other weapons; at Gundermein on the Lower Namoi I found myself among a tribe of natives who succeed in capturing them with nets. . . .

Its flesh, like that of the other small Kangaroos, is excellent, and when procurable was eaten by me in preference to other meat.

“There are probably only three species of animals that are entirely confined to the fox area of Eastern Australia. These require our immediate attention if the remnants are to be saved. They are the Bridle Nail-tailed Kangaroo . . . , the Brush-tailed Rock-Wallaby . . . , and Gaimard’s Rat-Kangaroo. . . .

“The only Bridle Nail-tailed Kangaroos that exist as far as I know, are a few on Mr. Charles Baldwin’s farm, near Manila, and some in Taronga Park. Attempts to get this species to live in a wild state in Taronga Park have failed, as they apparently cannot live in the tick area, their proper home being the foot hills of the Dividing Range of Eastern Australia.” (Le Souef, 1923, p. 110.)

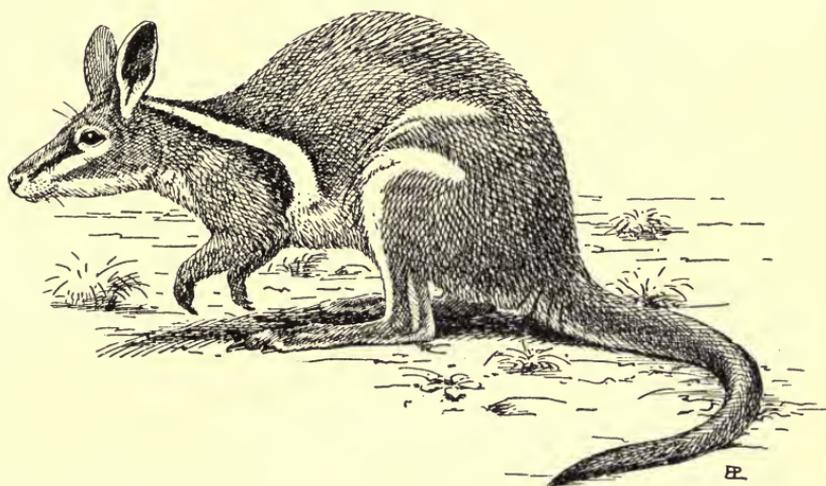


FIG. 14.—Bridled Nail-tailed Wallaby (*Onychogalea fraenata*). After Gould and photo by Berridge.

“Occasionally one . . . will be picked up by the great wedge-tailed eagle. Remains of the animal have been found in the bird’s aerie. . . .

“This species, like so many other animals found in the more closely settled parts of Eastern Australia, is now becoming very scarce, and will probably soon be extinct. With the occupation of the land by sheep and cattle, and the competition of the rabbit, the food and shelter to which the wallabies were accustomed are decreasing. At the same time, their enemies are increasing as their possible living-grounds are becoming more and more restricted. But it is the imported fox that is making the wholesale clearance, threatening early extinction.” (Le Souef and Burrell, 1926, pp. 210-211.)

“It is not uncommon in some parts of Southern Queensland, and its pelts were frequently seen in the sales two or three years ago

under the name of 'padmelon.' It is now a protected species." (Longman, 1930, p. 59.)

Finlayson reports (1931, p. 85) on its status in the Dawson Valley, Queensland: "Observed twice only, and no specimens obtained. It was obtained by Lumholtz in the Rockhampton district in 1880-1884, and recently Longman has stated that it is not uncommon in South Queensland. Over the greater part of the Dawson country, however, it is either absent or rare, as few reliable accounts of it could be obtained."

"This gentle and beautiful species was once plentiful in inland N. S. W. south to the Murray River, and in coastal parts as far as Rockhampton in Queensland, but is now quite rare, or absent, over entire range. A colony has been established on a small river island, and such sanctuaries, free from foxes, probably represent the only means of preventing extermination." (E. Le G. Troughton, *in litt.*, April 16, 1937.)

In Victoria there are a few records only, the last in 1867. The animal is now extinct in that state. (C. W. Brazenor, *in litt.*, March 3, 1937.)

"As an illustration of the rapid breeding of marsupials, the experience of Mr. Chas. Baldwin, of Durham Court, Manilla, New South Wales, is illuminating. In eighteen months Mr. Baldwin, from five adults, bred seventy young of the bridled wallaby." (Hoy, 1923, p. 166.)

Crescent Nail-tailed Wallaby

ONYCHOGALEA LUNATA (Gould)

Macropus lunatus Gould, Proc. Zool. Soc. London 1840, p. 93, 1841. ("West coast of Australia"; Thomas (1888, p. 78) lists the type specimen from "Swan R., W. A.")

Figs.: Gould, 1849, vol. 2, pl. 55; Lucas and Le Souëf, 1909, p. 78, fig.

This wallaby is on the verge of extinction in the settled districts of Western Australia but survives farther east toward the Great Victoria Desert.

In general appearance it is very similar to the Bridled Nail-tailed Wallaby but is slightly smaller; general color dark gray; face gray, a mark over eye and cheek stripe slightly paler; a prominent white crescent-shaped shoulder stripe, not encroaching on the neck; back and sides of neck rich rufous; a whitish hip stripe and another stripe just above it; under parts whitish; tail uniform gray, its terminal nail as in *O. fraenata*. Male: head and body, 500 mm.; tail, 332 mm. (Thomas, 1888, pp. 77-78.)

The former range of this species included the southern parts of Western Australia and Central and South Australia.

“Mr. Gilbert’s notes inform me that ‘the Waurong . . . is found in the gum forests of the interior of Western Australia, where there are patches of thick scrub and dense thickets . . . ; the dogs sometimes succeed in driving it out to the open spots, when, like the Kangaroo rats, it runs to the nearest hollow log, and is then easily captured’ ” (Gould, 1863, vol. 2, p. 64).



P.

FIG. 15.—Crescent Nail-tailed Wallaby (*Onychogalea lunata*)

Shortridge (in Thomas, 1907, p. 768) considers it “very numerous in some localities” of Western Australia. He adds (1910, pp. 815-816, map) the following information:

“Within a more limited area this species seems to have much the same range as *Macropus eugenii*, both forms frequently occurring together . . . —not extending far, if at all, beyond Beverley in the North, or near the coast; its western boundary apparently being the Darling Range.

“Also occurring in the southern interior of South Australia, where, however, it is little known and probably rare.”

Shortridge records 23 specimens from Arthur River and Woyaline Wells.

"Mr. J. T. Tunney, whose fame as a collector is world-wide, informed me that I could only hope to get the Crescent Wallaby . . . along one obscure river [of Western Australia], and a forlorn hope at that. Such a Wallaby should be energetically sought, trapped, and placed, not in Zoological Gardens, but in the haven of a properly supervised national reserve." (Troughton, 1923, p. 155.)

It occurs in "South-Western Australia, in isolated localities to the west of the lower Great Southern Railway, probably on the verge of extinction in the settled districts, but surviving further east towards the Great Victoria Desert" (Glauert, 1933, p. 29).

It is "still found on the Nullarbor Plain" (A. S. Le Souef, *in litt.*, February 15, 1937).

Jones (1924, p. 234) writes of its status as follows:

"In 1884 Mr. E. B. Sanger reported the Crescent-marked Wallaby from the Centre and in the British Museum catalogue of 1888 three South Australian specimens, collected by Sir George Grey, are recorded.

"The Elder Expedition in 1891 met with it in the Everard Ranges The Horn Expedition of 1894 obtained two specimens at Alice Springs. I know of no more recent observations, and probably so far as South Australia is concerned the animal has ceased to exist."

C. W. Brazenor writes (*in litt.*, March 3, 1937) of a single Victorian record, from the River Murray in 1857.

"Regarded as verging upon extinction in the settled areas of its south Western Australian habitat, but surviving in the more desert-like conditions between the Great Victoria Desert and Trans-Railway, to the eastward. Extinction may be regarded as inevitable, without establishment under favourable conditions." (E. Le G. Troughton, *in litt.*, April 16, 1937.)

Doubtless settlement and the concomitant imported pests have accounted for the decline of this lovely wallaby.

Brush-tailed Rock-wallaby

PETROGALE PENCILLATA PENCILLATA (J. E. Gray)

Tufted-tailed or Mountain Kangaroo, *K. pencillatus* [J. E. Gray, in] Griffith, Smith, and Pidgeon, *Anim. Kingdom* (Cuvier), vol. 3, Mammalia, pl. opposite p. 49, 1827. (No type locality given.)

*Kangurus Pencillatus*¹ [J. E. Gray, in] Griffith, *Anim. Kingdom* (Cuvier), vol. 5, Mammalia, p. 204, 1827. ("New Holland" = "Sydney, N.S.W.," according to Iredale and Troughton, 1934, p. 42.)

FIGS.: Waterhouse, 1841, pl. 22, and 1846, vol. 1, pl. 1, fig. 1; Gould, 1842, pl. 23, and 1853, pls. 39, 40; Lydekker, 1894, pl. 6; Le Souef and Burrell, 1926, fig. 47.

Formerly abundant in eastern Australia, this animal has suffered serious reduction of range and numbers.

¹ Corrected to *penicillatus* in index volume, p. 23, 1835.

The fur is long and thick; general color above dull brown, more rufous on rump; an indistinct black mark behind the shoulder succeeded by a pale gray one; chin and chest pale gray; belly brown, tinged with yellow; anal region yellowish rufous; arms and legs rufous brown, becoming black at extremities; tail more or less bushy, basal part rufous, remainder black, tip sometimes yellow. Head and body, 720 mm.; tail, 560 mm. (Thomas, 1888, p. 67.)

The Brush-tailed Rock-wallaby once inhabited the ranges of eastern Australia from southeastern Queensland to Victoria.

In New South Wales, according to Gould (1842, text to pl. 23), "the species abounds wherever the kind of country suitable to its habits occurs. The specimens in my own collection were procured on the Liverpool range, and on the rocky sides of the mountains facing Yarrundi on the Dartbrook, a tributary of the Hunter. I also ascertained that it is very abundant on Turi, and the other mountains situated to the eastward of the Liverpool Plains, and it doubtless ranges over a much greater extent of country than we are yet acquainted with. It is . . . strictly gregarious, assembling in such numbers as to form well-beaten paths along the sides of the mountains they inhabit. Their agility in leaping from rock to rock . . . tends greatly to their protection, as neither the wily aborigine, nor their still greater enemy the Dingo, can follow them to their retreats"

Gould writes later (1863, vol. 2, pp. 46-47):

"Those portions of the mountain ranges stretching along the eastern coast from Port Philip to Moreton Bay . . . are among the localities in which it is found; hills of a lower elevation than those of the great ranges, and the precipitous stony gullies between the mountains and the sea, are also situations it inhabits. . . ."

"Of its flesh as an article of food I can speak most highly, having frequently partaken of it in the bush and always found it excellent."

Le Souef calls attention (1923, p. 110) to the special need of protective measures, since this species is entirely confined to the fox area of eastern Australia. He adds that in New South Wales "a few are found round Jenolan Caves, and at the head of the Murray River." He also writes (1924, p. 272): "The Brush-tailed Rock Wallaby has become very scarce within Reynard's range during the past few years. Skins of this species used to come into the sale rooms in bales, now it is rare to see one."

Musgrave writes (1925, p. 210) of the species along the Nepean River in New South Wales: "In former times the Brush-tailed Rock Wallaby . . . occurred abundantly along the banks of the river, but they have been so reduced in numbers by sportsmen that now they are but rarely seen, and it is only a matter of time before the species entirely disappears from the district."

"For all their agility . . . the rock-wallabies fall victims to very sluggish enemies, for invariably the wallaby rocks are inhabited by large carpet-snakes (*Python varius*), which generally lie in wait for their victims in the caves in which they take shelter" (Le Souef and Burrell, 1926, p. 202).

Barry (1928, p. 163) reports a few in Kuringai Chase, near Sydney, where, "despite protective laws, shooters, foxes and hounds leave little chance of survival."

"The species should survive in the more rugged or inaccessible parts of the Great Dividing Range in N. S. W., especially in some of the sanctuaries recently declared, provided such are controlled, and the public informed of dangers to survival of rarities, etc." (E. Le G. Troughton, *in litt.*, April 16, 1937).

In Victoria it never occurred in great numbers and is now probably extinct. The last record was in 1905. (C. W. Brazenor, *in litt.*, March 3, 1937.)

The species has been acclimatized on Kawau Island, New Zealand, where it was introduced about 1870 and now exhibits some alteration of coloration (Le Souef, 1930, p. 111).

[*Petrogale herberti* Thomas is treated as a subspecies of *P. inornata* by Iredale and Troughton (1934, p. 43), who give its range as "South Queensland (about 23° to 26° S. lat.)." However, it is regarded as a subspecies of *P. pencillata* by Finlayson (1931, p. 82), who writes of its status in the Dawson Valley: "Still . . . very numerous and widely distributed. It is to be found in thriving colonies in almost every range of hills away from the large towns."]

Yellow-footed Rock-wallaby; Bar-tailed Rock-wallaby

PETROGALE XANTHOPUS XANTHOPUS J. E. Gray

Petrogale xanthopus J. E. Gray, Proc. Zool. Soc. London 1854, p. 249, pl. 39 (Mammalia), 1855. ("Australia (Richmond River?)" ; this is an erroneous type locality, for Thomas (1888, p. 66) lists the cotypes from "Flinder's Range, S. A.")

FIGS.: Proc. Zool. Soc. London 1854, pl. 39 (Mammalia); Gould, 1855, vol. 2, pls. 43, 44; Royal Nat. Hist., vol. 3, p. 245, fig., 1894-95; Lucas and Le Souef, 1909, p. 81, fig.; Le Souef and Burrell, 1926, fig. 46.

This largest and most striking of the Rock-wallabies has disappeared from many parts of its range in southern and eastern Australia and is in urgent need of protection to prevent its extermination.

"Pale brown, minutely grizzled; chin and beneath white; streak on side from back of shoulder, and along the side of the face under the eye, whitish; dorsal streak narrow, brown; legs, feet, and tail bright yellow; end of tail more bushy and varied with brown" (J. E. Gray, 1855, p. 249). Fur long, soft, and silky; back of ears dark

yellow; a brown blotch behind the elbow; a white patch on thigh near knee; tail more or less annulated (Thomas, 1888, p. 65). Head and body, 650-800 mm.; tail, 600-650 mm. (Jones, 1924, p. 226).

This animal's former range included southern and eastern South Australia and the interior of New South Wales. It has also been reported from Victoria and western Queensland.

Jones (1924, pp. 225-227) writes:

P. xanthopus inhabits the rocky country from the Gawler Ranges to the Flinders Ranges, and to the eastern boundary of the State [South Australia] at Bimbowrie and Cockburn. . . .

The Yellow-footed Rock Wallaby is still fairly abundant in certain parts of South Australia, but from many of its old haunts it has completely disappeared. It would seem that at the present time it is being driven mainly to the north and east of the State, and that its last stronghold in South Australia will be upon the New South Wales border. If it has not altogether disappeared from the Gawler Ranges it must now be a very rare animal, and in many parts of the Flinders Ranges its numbers are considerably reduced. From the eastern portion of the State it will almost certainly disappear before very many years are past, since its pelt is far too attractive to permit it to survive as long as the fur trade exists. Although a totally protected animal in this State, this protection is not extended to it by certain of the States upon the borders of which it lives. It is therefore not to be wondered at that pelts of the animal are disposed of in the markets of States other than South Australia, even though the animal was obtained within the geographical boundaries of our own State.

Petrogale xanthopus is a fitting example of an animal which needs sanctuary for its preservation and more stringent legislative efforts to check its slaughter.

Half a century ago Lydekker wrote (1894, p. 48): "Some hundreds of skins are annually imported to London from Adelaide, their value ranging from one-and-fourpence each. The skins of the common Rock-Wallaby [*P. pencillata*] are less valuable, averaging from threepence to ninepence each, although they have been known to reach as much as one-and-threepence."

"The [Melbourne] museum has no Victorian record of this species though its range has been extended to the State in literature" (C. W. Brazenor, *in litt.*, March 3, 1937).

A. S. Le Souef writes (*in litt.*, February 15, 1937) that it is "very scarce, probably nearing extinction owing to settlement and the fox."

"It provides an example of the need for unified control over State protection, as pelts are sold in other States though the beautiful and harmless marsupial is totally protected in South Australia. Such action may cause extermination as the animal is being driven north-east, and the hope of survival may rest with the sub-species described from south-western Queensland." (E. Le G. Troughton, *in litt.*, April 16, 1937.)

[*Petrogale celeris* Le Souef, described from the vicinity of Adelaide, Bulloo River, southwestern Queensland, is regarded by Iredale

and Troughton (1934, p. 44) as a subspecies of *P. xanthopus*. Practically no information is at hand concerning its numerical status, which, however, is presumably more satisfactory than that of *P. x. xanthopus*.]

Red-necked Pademelon; Pademelon Wallaby

THYLOGALE THETIS (Lesson)

Halmaturus Thétis "Busseuil" Lesson, Manuel Mammalogie, p. 229, 1827.

("Port-Jackson" [Sidney], New South Wales.)

Figs.: Geoffroy and Cuvier, Hist. Nat. Mamm., vol. 6, pl. 225, 1824; Lesson, in Bougainville, Jour. Navigation Globe Thétis et Espérance, atlas, pl. 37, 1837; Gould, 1842, pl. 21; Gould, 1857, vol. 2, pls. 31, 32; Cabrera, 1919, pl. 15, fig. 5; Le Souef and Burrell, 1926, fig. 42.

This species, formerly occurring from southern Queensland to Victoria, is now extinct in Victoria, and its range in New South Wales has become restricted to the north coast. Little seems to be known of its present status in Queensland.

The upper lip is little developed, not hiding the front teeth. The general color above is grizzled gray; rufous on neck, shoulders, and rarely on cheeks and round base of ears; a faint white hip-stripe sometimes present; arms and legs gray or rufous; hands and feet pale brown; tail gray basally, then brown above and white below. Head and body, 540 (female) to 660 mm. (male). (Thomas, 1888, p. 53.) Tail, 368 (female) to 476 mm. (male) (Waterhouse, 1846, vol. 1, p. 148).

Of the early abundance of this pademelon, Gould writes (1863, vol. 2, p. 38):

Of the smaller species of Wallaby inhabiting New South Wales, the present is perhaps the one best known to the colonists, inasmuch as it is more abundant than any other. . . . All the brushes I have visited from Illawarra to the Hunter, as well as those of the great range which stretches along parallel with the coast, are equally favoured with its presence; I have also received specimens from Moreton Bay. . . .

As an article of food, few animals are so valuable, its flesh being tender and well-flavoured, and more like that of the common Hare than that of any other European animal I can compare it with.

Le Souef and Burrell remark (1926, p. 196) that it "has been noted in the scrub on the Blue Mountains, New South Wales."

Troughton states (1932, p. 188) that it shows "a continual shrinkage in range" and is "now confined to the North Coast" of New South Wales.

Lewis (1931, p. 120) apparently refers to the present species in the following remarks on a Victorian animal: "The Dwarf Wallaby, commonly known as the Paddymelon, was very plentiful once along the coast between Lake Wellington and Metung, but I was afraid

that these had been exterminated. I have ascertained, however, that there are still some of them in this district."

In discussing the status of this and two other species in Victoria, Jones and Manson say (1935, p. 35): "All the small Wallabies are rare and very infrequently seen."

More recently David H. Fleay (*in litt.*, June 1, 1937) reports the species as extinct in Victoria but as still found in New South Wales.

Some of the older works (*e. g.*, Thomas, 1888, p. 53; Ogilby, 1892, p. 53) record it from southern Queensland, and more recently Longman (1930, p. 58) lists it from southeastern Queensland. However, Iredale and Troughton (1934, p. 46) give its current range as merely "New South Wales."

Parma Wallaby or Pademelon; White-throated Wallaby or Pademelon

THYLOGALE PARMA (J. E. Gray)

Hal [maturus] Parma "Gould" J. E. Gray, in Gray, Two Expeditions Discovery Australia, vol. 2, appendix, p. 403, 1841. ("Sidney, and its neighbourhood, New South Wales.")

FIG.: Gould, 1856, vol. 2, pl. 28.

This species of New South Wales is evidently extinct.

The general color is deep reddish brown, penciled with white and black; paler on sides; nape, shoulders, and forelegs brownish rust color; a narrow black stripe along back of neck; throat and chest white, rest of under parts dirty rusty white; tail scantily haired, black above, dirty white below (Waterhouse, 1846, vol. 1, pp. 150-151). Head and body, 590 (female) to 640 mm. (male); tail, 410 (female) to 430 mm. (male) (Thomas, 1888, p. 58).

Gould states (1863, vol. 2, p. 34) that in the Illawarra district of New South Wales "I myself saw it in a state of nature. In these extensive brushes it doubtless still exists, as since my return other specimens have been sent to me from thence by the late Mr. Strange. How far its range may extend westwardly towards Port Philip, or eastwardly in the direction of Moreton Bay, I am unable to state." Gould also speaks of its being hunted by the aborigines.

"This species seems to be very rare and locally distributed" in New South Wales (Lydekker, 1894, p. 40).

"The White-throated Wallaby . . . once plentiful in the Illawarra district south of Sydney is apparently quite extinct, and represented by only five specimens of which three are in England and two are in the Australian Museum." The uncertainty of range, as expressed by Gould, "will never be cleared up now, as the last of the two Australian Museum specimens was collected in 1889, and there

have been no recent evidences of its possible survival." (Troughton, 1932, p. 188.)

The range and status of the species are given by Iredale and Troughton (1934, p. 46) as "New South Wales (south coast, possibly extinct)."

A. S. Le Souef remarks (*in litt.*, February 15, 1937): "I think that this species is definitely extinct, though there may be a few in the dense bush near Jervis Bay." He adds that recent search and inquiry failed to reveal any trace of it.



FIG. 16.—Parma Wallaby or Pademelon (*Thylogale parma*). After Gould.

Concerning the smaller wallabies in general, Le Souef and Burrell say (1926, p. 195): "The fur is fine and soft, and great numbers are used for rugs, coats, and trimmings. We have practically no knowledge as to the individual life-histories of this group."

Flinders Island Wallaby; Flinders Island Pademelon

THYLOGALE FLINDERSI Jones

Thylogale flindersi Jones, Mammals South Australia, pt. 2, p. 240, 1924 (*cf.* Harper, 1940, p. 191). ("Flinders Island, . . . Investigator group, . . . Great Australian Bight.")

This wallaby is confined to Flinders Island. "The colony was estimated at a hundred or so in 1924, and in view of the presence of rabbits as food destroyers, and cats, extinction seems certain unless special measures are taken. This illustrates the need for unsettled islands as sanctuaries, unless very large." (E. Le G. Troughton, *in litt.*, April 16, 1937.)

The general color is grizzled light gray; sides and back of neck and shoulders bright rufous in the male, tawny in the female; a

well-marked pale area along the upper lip to beneath the eye; a dark middorsal stripe from occiput backwards, very pronounced in the male; chin and throat grayish white; lower neck, chest, and belly colored almost like back, but somewhat lighter; limbs pale fawn; tail pale gray. Head and body, 510 (female) to 570 mm. (male); tail, 340 (female) to 410 mm. (male). (Jones, 1924, p. 241.)

Jones gives the following account (1924, p. 242):

Flinders observed this animal in 1802, and he records that on the island "a small species of Kangaroo, not bigger than a cat, was rather numerous. I shot five of them, and some others were killed by the botanists and their attendants and found to be in tolerably good condition." Even comparatively recently the animal was very numerous, and it has been reported that as many as thirty thousand were killed on the island. In 1910 a destructive bush fire swept the portion of the island occupied by a wallabies, and when I visited the place in 1920 no traces of it were to be found, and the tenant of the island believed it to be extinct. In 1922 I again visited the island and found obvious evidences of its presence, but no actual specimen was seen. In 1924 the little colony had considerably increased, and two specimens were secured for study purposes. The present small colony of wallabies occupies only a very limited area upon which the native bush has not been destroyed by various attempts at cultivation. Although the colony probably contains a hundred or so individuals its hold on life cannot be considered a very secure one. It is always at the mercy of bush fires, having no line of retreat, since it lives on a corner of the island that is girt by high and inaccessible cliffs. Moreover, it has to contend against two introduced animals, the feral domestic cat, which has overrun the island, and the food-destroying rabbit. It may at any time, though fortunately this does not seem to be at present the case, have to contend against human enemies. . . . On account of its build being rather more elegant than that of the thickset Kangaroo Island wallaby it was at one time a favourite with people who cared to have wallabies running in their grounds, but at present I believe there are no descendants of these animals living on the mainland. It has also been an inhabitant of the Zoological Gardens in Adelaide, but no specimens have been exhibited there for many years. A former tenant of the island has assured me that when the wallabies were numerous there were two distinct types living in the island, the one obviously that described as *Thylogale flindersi*, and the other a more rare, slender, yellow wallaby. What this second species was it is impossible to guess; there seem to be no traces of it left.

H. H. Finlayson writes (*in litt.*, March 20, 1937) that although the species is plentiful in a small area, its position is insecure.

Scrub Wallaby; Dama Wallaby or Pademelon

THYLOGALE EUGENII (Desmarest)

Kangurus Eugenii Desmarest, *Nouv. Dict. Hist. Nat.*, nouv. ed., vol. 17, p. 38, 1817. (Based upon the "kangaroo de l'île Eugène," Péron and Freycinet, *Voy. Terres Australes*, vol. 2, p. 117, 1816; type locality "île Eugène, Josephine Archipelago," currently known as St. Peter's Island, Nuyt's Archipelago, South Australia.)

FIGS.: Gould, 1841, pl. 11, and 1859, vol. 2, pls. 29, 30 (as *Halmaturus derbianus*); Lydekker, 1894, pl. 5; Le Souef and Burrell, 1926, fig. 43.

The present group of wallabies has long been in a state of great taxonomic confusion, and part of the material necessary for elucidation is evidently no longer obtainable. Under these circumstances the group will be treated here as a specific unit, although attention may be called to the three subspecies recognized by Iredale and Troughton (1934, pp. 46-47):

Thylogale eugenii eugenii (Desmarest). Type locality as stated above.

Thylogale eugenii derbiana (J. E. Gray). Type locality not stated in the original description but said by Waterhouse (1846, vol. 1, p. 155) to be "Swan River," Western Australia. Synonym: *Macropus gracilis* Gould.

Thylogale eugenii binoë (Gould). Type locality: "Port Essington," Northern Australia. This is considered an error by Iredale and Troughton (1934, p. 47), who substitute "Wallaby Island, Houtman's Abrolhos, West Australia" (cf. J. E. Gray, List of Specimens Mammalia Brit. Mus., p. 91, 1843); however, Thomas (1888, p. 44) lists the type from "Port Essington, N. T. (*Sir J. Richardson*)" and places *binoë* in the synonymy of *Macropus agilis* (Gould), as Gould himself had already done (1863, vol. 2, p. 31). Synonyms: *Halmaturus houtmanni* Gould; *H. dama* Gould; *H. emiliae* Waterhouse.

The former range of the species as a whole included South Australia, the coastal areas of southern and southwestern Western Australia, and various islands along the coast, including Kangaroo Island and Nuyt's Archipelago, South Australia, and the Recherche Archipelago, Garden Island, and Houtman's Abrolhos, Western Australia. It has become extinct on the South Australian mainland and on St. Peter's Island (the type locality); in 1910 it was reported as rapidly disappearing before settlement in Western Australia; but apparently it remains plentiful in most of its insular habitats.

The following is adapted from Desmarest's description of what may be considered the paratype, which presumably came from St. Peter's Island: Fur soft; general color grayish brown, mixed with rufous near the shoulders and on the nape, crown, and forelegs; under parts whitish, distinctly separated from the dark color of the upper parts; tail grayish brown above, white below, with a slight reddish tint. Head and body about 21 (French) inches [567 mm.]; tail, a little more than 1 (French) foot [324 mm.].

Gould states (1841, text to pl. 11) that he had never heard of "*Halmaturus derbianus*" being found on the mainland of South Australia. But he writes (1863, vol. 2, p. 36) of its abundance on Kangaroo Island. "The almost impenetrable scrub of dwarf *Eucalypti*, which covers nearly the whole of Kangaroo Island, will always afford it a secure asylum, from which in all probability it will never

be extirpated Such is the dense nature of the vegetation, that nothing larger than a dog can follow it; still it is taken by men residing on the island in the greatest abundance, both for the sake of its skin and its flesh: they procure it principally by snares, a simple noose placed on the outskirts of the brush; but they also shoot it when it appears on the open glades at night."

Jones (1924, pp. 235-239) gives the following account for South Australia:

Unfortunately the time has gone by when a good first-hand account of the small scrub wallabies inhabiting South Australia could have been written. The disappearance of the mainland wallabies is almost as remarkable a phenomenon as the disappearance of the Native Cat. . . .

It is extremely difficult to define the former range of this complex species on the mainland of South Australia, or even to discriminate with any certainty between the mainland form and the type of animal now living on Kangaroo Island. Only a few years ago it swarmed in scrub-covered districts all over the State, to-day it seems impossible to secure a single mainland specimen for scientific study. In places where annual battues were held by the present landowners less than twenty years ago it has disappeared altogether. It is almost certain that some still linger upon the mainland, notably at the southern end of Eyre's Peninsula and in the South-eastern districts, but so far these animals have not been properly studied or preserved. . . .

In Kangaroo Island it is abundant and, since it lives in thousands upon Flinders Chase fauna reserve, it is guaranteed, in so far as complete protection can guarantee it, perpetual survival. . . .

The wallaby of St. Peter Island has become extinct, and therefore we cannot compare the animal now known as *Thylogale eugenii* with the St. Peter Island animal, and, moreover, the original specimen described by Desmarest is no longer in existence in Paris. It would seem to be somewhat doubtful if the animal now known as *Thylogale eugenii* is the same as the animal originally seen and captured on L'île Eugene. The Kangaroo Island Wallaby is readily kept and bred in confinement

E. Le G. Troughton remarks (*in litt.*, April 16, 1937) that its survival "appears assured on Kangaroo Island, illustrating the value of island sanctuaries in preserving remnants of vanishing stock."

Hoy writes (1923, pp. 164-165) of conditions on Eyre's Peninsula, South Australia: "I was told, by a professional kangaroo hunter, that at the time of the introduction of the fox he was always sure of at least six dozen wallabies (*Macropus eugenii*) per week, but during the season I was there, the fourth after the introduction of the fox, he had not even seen one."

According to Finlayson (1927, p. 375), "the *Thylogale* of the South Australian mainland has been exterminated before its identity was properly established."

Shortridge (1910, pp. 812-813) gives its status in Western Australia as follows:

"Very plentiful in many parts of the South-West, but rapidly disappearing in the cultivated districts, especially towards the northern end of its range. Not occurring in the coastal country between

Albany and Cape Leeuwin, although extending to the coast at the Margaret River and Cape Naturaliste. Said still to exist in isolated patches in the North between the Swan River and Gin-Gin. Also occurring on the Abrolhos (Wallabi Group), Garden, and some of the islands off Esperance. . . . Not extending on the South Coast much beyond Phillips River”

Shortridge records specimens from Arthur River, Boyadine-Dale River, Stockpool, Dwaladine, Woyaline Wells, Ellensbrook, and Twin Peak and Middle Islands, off Esperance. The accompanying map (p. 812) shows the former range extending in a broad coastwise strip from Northampton to South Australia; but the current (1910) range restricted to the southwestern corner of the state.

Under the name of *Macropus (Thylogale) dama*, Glauert (1933, p. 32) gives the range of the mainland form as “South-Western Australia, from the Moore River in the north to the south coast (Cape Leeuwin and Cape Arid), inland to the Great Southern Railway.”

Troughton (1932*a*, p. 175) reports the species as “plentiful on the two largest islands” of Houtman’s Abrolhos.

Le Souef states (1930, p. 111) that it was introduced about 1870 on Kawau Island, New Zealand, and is still present there.

Rufous-bellied Wallaby or Pademelon; Tasmanian Wallaby or Pademelon

THYLOGALE BILLARDIERII (Desmarest)

Kangurus Billardieri Desmarest, Mammalogie, pt. 2, suppl., p. 542, 1822. (“La terre de Van-Diemen” [Tasmania].)

FIGS.: Gould, 1841, pl. 10; Gould, 1860, vol. 2, pls. 35, 36; Le Souef and Burrell, 1926, fig. 44.

Although this wallaby remains numerous in Tasmania and is still found on some of the islands of Bass Strait, it seems desirable to place it on record here as a vanished species of the Australian mainland.

It is distinguished by its short ears, stout form, and long fur; upper parts grayish brown, tinged with olive on head and rump; under parts yellowish or rufous; tail short, grayish brown, the basal part orange above, the terminal part grayish white below (Thomas, 1888, p. 59). Head and body, 640-765 mm.; tail, 315-320 mm. (Lord and Scott, 1924, p. 247). Weight, 15-20 lb. (Gould, 1863, vol. 2, p. 42).

Gould gives the following account (1863, vol. 2, p. 42):

I have but little doubt that the habitat of this Wallaby is limited to Van Diemen’s Land and the larger islands in Bass’s Straits, in all which localities it is so numerous that the thousands annually destroyed make no apparent

diminution of its numbers. . . . Being one of the best-flavoured of the small Kangaroos, it is very generally eaten in Van Diemen's Land.

The Tasmanian Wallaby may be regarded as strictly gregarious, hundreds generally inhabiting the same localities It is very easily taken with snares, formed of a noose placed in the run; and thousands are captured in this way, solely for their skins: the sportsman also may readily procure it by stationing himself in some open glade of limited extent, accompanied by two or three small yelping dogs, before which it keeps hopping round and round, and thus affords him an opportunity of shooting it as it passes.

Gunn states (1838, p. 106) that "they are excellent eating, but the smallness of the skins renders them less valuable for tanning."

The recent status of the Rufous-bellied Wallaby in Tasmania is given by Lord (1928, p. 19): "It is evenly distributed and is plentiful in certain districts remote from settlement; but close to the settled areas its history is the same as the larger forms." He adds (p. 23) that in recent years it has increased considerably in the Tasmanian National Park. He also quotes (p. 24) the official Tasmanian returns from the hunting of this species as follows:

1923	201,365
1924	86,393
1925	121,245
1926	94,531

Jones (1924, pp. 242-243) discusses its former occurrence in South Australia:

In the collection of the British Museum there is a skull of this animal, formerly the property of Sir Richard Owen, which came from Mount Gambier. There are also two skeletons said to have been procured in South-east South Australia. . . .

This is the common small wallaby of Tasmania, it is present also in some of the islands of Bass's Straits and on the mainland of Victoria. Evidently it was at one time an inhabitant of the South-eastern portion of this State, where the Platypus and the Koala intruded into the South Australian fauna. If it lingers in any corner of the South-East, I have been unable to ascertain. I know of no South Australian specimens.

The species is now regarded as extinct in South Australia (David H. Fleay, *in litt.*, June 1, 1937).

Le Souef and Burrell, evidently referring to personal experience, say (1926, p. 196): "*M. billardieri* has been met with in Gippsland (Victoria)."

C. W. Brazenor writes (*in litt.*, March 3, 1937): "Once a common animal in southern Victoria, the species has now entirely disappeared, though it is still found on the islands of Bass Strait and in Tasmania."

In the absence of the fox from Tasmania, this wallaby should survive indefinitely in that country.

Whiptail, Gray-face, or Pretty-face Wallaby; Parry's Wallaby

WALLABIA ELEGANS (Lambert)

Macropus elegans Lambert, Trans. Linnean Soc. London, vol. 8, p. 318, pl. 16, 1807. ("New South Wales.")

SYNONYM: *Macropus parryi* Bennett.

FIGS.: Lambert, *op. cit.*, pl. 16; Bennett, 1835, pl. 37; Gould, 1842, pl. 19; Gould, 1852, vol. 2, pls. 12, 13; Lydekker, 1894, pl. 4; Le Souef and Burrell, 1926, fig. 38.

This wallaby, well named *elegans*, is rapidly diminishing in numbers in its somewhat limited range in New South Wales and Queensland, and is in distinct need of total protection.

It is characterized by a slender and graceful build and a very long tail. The general color is clear gray, with a bluish tinge; top of muzzle brown, sides darker; white cheek-stripe sharply defined, bordered below by a gray band; ears brown at base and tip, with an intervening white area; digits of hands and feet black; under parts grayish white; tail pale gray, with a black or gray crest below the tip. (Thomas, 1888, p. 39.) Head and body, 732 (female) to 793 mm. (male); tail, 858 (female) to 1,077 mm. (male) (Finlayson, 1931b, p. 77).

"With this animal neither the colonists of New South Wales nor the naturalists of Europe are very familiar; not so much in consequence of its being really scarce, as from the extreme shyness of its disposition, the fleetness with which it escapes from its pursuers, and the mountainous and almost inaccessible parts of the country it inhabits. I did not succeed in procuring it myself while in Australia, it being confined, as far as I could learn, to the range of hills which stretch along parallel to the coast from Port Stephens [New South Wales] to Moreton Bay [Queensland], a part of the country not visited by me. Like most other members of its race, it is easily tamed, readily becoming familiar and docile." (Gould, 1842, text to pl. 19.)

"Mr. Strange informs me that it inhabits the rocky ranges of the Clarence [New South Wales], occasionally descending into the more open broken country, where it frequents the ledges of rocks at an elevation of 2000 feet So fleet is this animal, that it is only with the assistance of the finest dogs that there is any chance of procuring examples; it surpasses in fact every other animal in speed, and when fairly on the swing no dog can catch it." (Gould, 1863, vol. 2, p. 18.)

Finlayson (1931b, pp. 75-77) gives the following valuable account of the species in the Dawson Valley, Queensland:

This magnificent species still occurs in large numbers in suitable tracts all over the valley, but in the northern part of the area is rapidly diminishing. In 1884 it was obtained by Lumholtz near Rockhampton and on Coomooboo-

laroo, for instance, but is now quite unknown in the vicinity of the first place and on the second has become rare. . . .

Typical of the whiptail habitats are the beautiful undulating upland parks of the broad-leaved ironbark (*Eucalyptus siderophlora*) As a characteristic example of this type of country might be cited the Grevillea plateau, where *parryi* [= *elegans*] is still in very large numbers. . . .

It is distinctly social in habit, and very likely truly gregarious, though it would take closer and more prolonged observation than I was able to give to determine the point. It certainly camps in rather large parties, 12 or 15 being frequently seen lying up together, but in the late afternoon, when feeding begins in earnest, there is a tendency, I believe, for the larger males and females to go off in pairs. At Drumburle, where I watched it most, they were so numerous, however, that towards evening whole hillsides were dotted with the members of these disbanded camps, and it was impossible to make out the existence of any natural grouping. Old males are always solitary, as in many other species. . . .

Like so many mammals living in open country they are very curious, and their curiosity has earned them a reputation for stupidity amongst trappers and shooters. It is said by such, that in winter when large "mobs" congregate on the sunny side of the ridges, a dozen may be shot down one by one before the rest make up their minds to go, provided the shooter does not move from his position.

Locally it is regarded as an extremely fast wallaby, but as it is not hunted with dogs to any extent, it is difficult to get data for comparison with other species. . . .

In considering the future of this wallaby in Queensland, there are sound reasons for anxiety. It is true that it is still numerous over a large area, but no one with any knowledge of the fate of open country species elsewhere would maintain that it will long survive the present rate of slaughter in the cattle country of the Dawson. Where man is concerned its instinct for self-preservation is almost nil, and as its colouration and habits make it a most conspicuous animal at any time, its destruction is almost a mechanical matter. It is very probable that the scores of thousands of whiptails which are killed every year in coastal Queensland, represent, not the natural increase, as is assumed locally, but rather the natural drainage of the species from large areas of relatively poor feeding grounds into smaller areas which are more attractive to it and which will support a denser population. When the country is settled these "fur pockets" act as natural traps, and destruction which appears to be local actually affects a much wider area, indirectly. It is this factor of natural concentration which is largely responsible for the element of unexpected suddenness which often marks the extinction of mammal species before advancing settlement.

M. parryi is one of the most beautiful of Australian mammals, and is one of the very few species which can be easily and freely observed under natural conditions. It is to be hoped that its value will be recognised while there is still time.

E. Le G. Troughton writes (*in litt.*, April 16, 1937) that this nearest eastern ally of the extinct Toolach was once plentiful in the more open coastal country from north of Sydney to the Rockhampton district of Queensland. It is becoming rare owing to the natural shrinkage of habitat with settlement and to destruction for "sport" and profit. It is more beautiful and observable than most species and requires total continued protection to ensure its survival.

Toolach; Toolache; Grey's Wallaby

WALLABIA GREYI (Waterhouse)

Macropus (Halmaturus) Greyi Waterhouse, Nat. Hist. Mammalia, vol. 1, p. 122, 1846. ("South Australia." Iredale and Troughton (1934, p. 50) give, as a restricted type locality, the "Coorong, *vide* G. F. Angas.")

FIGS.: Gould, 1852, vol. 2, pls. 18, 19; Finlayson, 1927, pls. 16, 17.

This very beautiful wallaby, a former inhabitant of South Australia, is apparently extinct in a wild state. "One or two specimens in the Zoo at Adelaide are supposed to be the last living specimens of this species" (A. S. Le Souef, *in litt.*, February 15, 1937).

General color pale ashy brown, tinted with yellowish; under parts, legs, and feet pale buff-yellow; toes black; head gray; a pale yellow cheek-stripe, bordered above with blackish and below with brownish; back of neck and back of ears pale rufous; tip of ears black; tail very pale gray, brown-white beneath, and with a terminal crest of dirty yellowish hairs. Head and body, 761 mm.; tail, 660 mm. (Waterhouse, 1846, vol. 1, pp. 122-124.) Additional characters given by Jones (1924, pp. 244-245) are: a white patch above eye; back with 10 to 12 dark gray bands; an ill-defined pale hip-bar. Head and body, 810-840 mm.; tail, 710-730 mm.

From the time of its discovery this species seems to have been almost entirely confined to southeastern South Australia, chiefly between the Murray River and Victoria. "Both species [*Wallabia r. rufogrisea* and *W. greyi*] appeared to have crossed the Murray, but the extent of their tenure of the river flats is difficult to estimate, and from this north-western part of their range they were early driven, or greatly reduced, by the rapid advance of closer settlement. Their former presence in the lower part of the county of Sturt is vouched for by many residents of that part of the country still living." (Finlayson, 1927, p. 364.)

"The species was not exclusively confined to South Australia, but occurred also through a small strip of Victorian territory contiguous to the border" (Finlayson, 1927, p. 366).

"Mr. Strange informs me that he met with this animal 'between Lake Albert and the Glenelg. The kind of country in which it is found consists of large open plains intersected by extensive salt lagoons and bordered by pine ridges. . . . I never saw anything so swift of foot as this species: it does not appear to hurry itself until the dogs have got pretty close, when it bounds away like an antelope, with first a short jump and then a long one, leaving the dogs far behind it. . . . I have had twenty runs in a day with four swift dogs and not succeeded in getting one.'" (Gould, 1863, vol. 2, p. 25.)

"Many people can remember the time when Toolaches swarmed

in the neighbourhood of Kingston. Being by far the fleetest of all the wallabies, its chase was at one time a very popular form of sport, and its beautiful pelts have been marketed in very large numbers in the salesrooms of Melbourne. . . . It is not correct to say that this very fine and distinctly South Australian wallaby is extinct, for at the present moment five or six individuals still exist. Any effort to preserve this remnant must be made immediately and with vigour if it is to be of any service whatever." (Jones, 1924, p. 245.)



FIG. 17.—Toolach (*Wallabia greyi*). From photo.

Finlayson furnishes an extensive account (1927, pp. 367-369), from which the following excerpts are taken:

The Toolach . . . in all parts of its range showed a marked partiality for grass country In the typical desert country of the counties of Russell and Buccleuch, where grass flats are few and far between, it occurred but sparsely, and here appeared to be comparatively solitary, but in the lower south-east, where richer soils permit a far greater development of grasses, its undoubted instinct towards gregariousness asserted itself, and when the country was first settled it was here established in a series of isolated colonies The groups . . . showed marked partiality for certain quite restricted areas, from which they were only driven by persistent persecution, and to which they returned again and again. . . .

A considerable weight of evidence inclines me to the belief that in point of numbers *M. greyi* fell far short of the four other species of *Macropus* in the district. Although human persecution and the occupation of its chosen

country early reduced its numbers and broke up and dispersed its larger colonies, it was still far from uncommon even as late as 1910, and scattered bands were still to be found in suitable localities. The chief of these were along the edges of the long strip of grass country extending from a little north of Millicent to the vicinity of Bull Island and Reedy Creek, and known locally as Avenue Valley, on the Biscuit Flat between Robe and Kingston, the Mosquito Plain between Naracoorte and Penola, and in the country between Clay Wells and Conmurra, and probably also in the sand-hill country of its northern district. Its rapid disappearance in the last twenty years may be attributed with some confidence to the invasion and enormous increase of the English fox, which has been proved without doubt to take a heavy toll of the young, even of the large kangaroos, and indeed in the almost unoccupied desert country where man has had little influence on its destinies, it seems that the fox has been the sole factor in effecting its extermination. Its chief natural enemies [*sic*] before the advent of the white man and the fox seems to have been the wedge-tailed eagle (*Uroaetus audax*), which, like the latter, chiefly attacked the young. These attacks were by no means always successful, and were sometimes thwarted by the courage of the females. . . .

I learn from another source that small boys in a certain district were in the habit of periodically visiting the sites of eagles' nests to recover the scalps from the remains of young toolaches to be found lying underneath; this at a time when a bonus of sixpence was paid on all marsupial scalps.

By 1923 the species had become exceedingly rare. Isolated pairs were no doubt scattered through the rougher stringy-bark country, but the sole remnant of the Toolach population which continued living in country and under circumstances which might be regarded as typical of that formerly obtaining, was a small band of perhaps fourteen individuals, located on the south end of Konetta sheep run, some twenty-six miles south-east of Robe.

Public attention was first called to the rapidly approaching extinction of the Toolach by Professor Wood Jones, who repeatedly stressed the urgent need for rigid protection of this group at Konetta. In May, 1923, as there appeared little prospect for effective conservation in the south-east, an organised attempt was made on a considerable scale to capture living specimens for transference to the sanctuary on Kangaroo Island. This, and a later attempt in 1924, failed in their main objective, since as a result of overmuch driving the four examples obtained were either dead or died shortly after capture, but were not altogether fruitless, as much-needed Museum material was thus acquired.

The subsequent history of the species consists of a resumption of the exterminating process. Owing to the extensive publicity given to the two expeditions noted above, local attention was focussed on the Toolach to a degree hitherto unknown. Much of this attention was sympathetic to the idea of conservation, but the realization of the great rarity of the wallaby roused the cupidity of an unscrupulous few, and that survivors of the 1924 attempt have been wantonly killed for the sake of the pelt as a trophy, is an assertion based on the admission of at least one of the slayers. The constant hunting of foxes with dogs over the Toolach country has been made the excuse for some of this killing, the plea being advanced that it is impossible to prevent the dogs running anything and everything that is put up. . . . Interrogation usually elicits the fact that "nothing spoils a dog like checking him." This peculiar solicitude for the dog's training has borne very heavily on the Toolach and still bears very heavily on his cousin the brusher. Occasionally, however, a better spirit prevails, and recently a Toolach doe was promptly rescued from two kangaroo dogs which had seized her, and, in the

patient care of Mr. J. Brown, of Robe, she has survived the rough handling received. She may well represent the last of her race in this State, as a careful and extended examination of the beat of the Konetta band by the writer in February of this year failed to reveal any recent traces, either in the shape of tracks or dejecta, and the opinion is expressed by the resident who knows the country best that the band has been entirely extirpated.

The species is very poorly represented in Museums, and enquiries recently instituted in all the States indicate that there are six skins and seven skulls in the public collections of Australia.

Mr. Finlayson writes (*in litt.*, March 20, 1937) that the species is nearly extinct.

"This beautiful species presents the most tragic, and probably prophetic, history of all the kangaroos since white settlement" (E. Le G. Troughton, *in litt.*, April 16, 1937). "The sum total of the isolated protective effort apparently is a doe, rescued from kangaroo dogs, which by now may represent the sole survivor of the species" (Troughton, 1938, p. 407).

Black-gloved Wallaby; Western Brush Wallaby

WALLABIA IRMA (Jourdan)

Halmaturus irma Jourdan, C. R. Acad. Sci. [Paris], vol. 5, p. 523, 1837. ("Les bords de la rivière des Cygnes, sur les côtes de Leuwin (Australasie)" = Swan River, Western Australia.)

SYNONYM: *Macropus (Halmaturus) manicatus* Gould (1841).

FIGS.: Gould, 1841, pl. 9, and 1852, vol. 2, pls. 20, 21; Le Souef and Burrell, 1926, fig. 39.

Though apparently remaining common for the present in its restricted range in Western Australia, this species "requires observation and close protection wherever possible" (E. Le G. Troughton, *in litt.*, April 16, 1937).

Head gray above; cheeks and lips yellowish white; black spot under chin; back of ears brown; inside of ears yellow, the terminal third black; crown brown; chest, neck, sides, and outer surface of limbs light tawny-yellow; wrists and tarsi yellow; digits brown and black; tail with a dorsal and ventral crest, mostly gray, blackish toward the end, and tipped with white hairs. Head and body, 720 mm.; tail, 630 mm. (Jourdan, 1837, p. 523.) According to Thomas (1888, p. 41), the general color is dark bluish gray; back of ears, crown, and digits black.

"To what extent this pretty animal ranges over Western Australia has not been ascertained, but we know that it is very generally diffused over every part of the colony of Swan River, wherever sterile and scrubby districts interspersed with belts of dwarf *Eucalypti* exist

"Mr. Gilbert informs us that it may be ranked among the fleetest of its race; that it requires dogs of the highest breed to capture it,

and that a full-grown male weighs nearly twenty pounds. The flesh forms an excellent viand for the table, and the skins manufactured into rugs are extensively used by those whose avocations and mode of life lead them to spend much of their time in the bush." (Gould, 1863, vol. 2, p. 27.)

Thomas (1888, pp. 41-42) lists specimens from Swan River, Toodyay, and Perth.

Shortridge gives the following account (1910, pp. 809-811, map):

Range almost identical with that of *Macropus giganteus* [= *ocydromus*], except that it does not seem to occur in the southern coastal districts between Cape Naturaliste and the Leeuwin. . . . Generally considered to be the best sporting animal in Western Australia.

Not apparently dying out or disappearing even in the more thickly populated districts to the same extent as the smaller marsupials.

Extending northwards beyond Watheroo, its range probably ends at some point to the south of Geraldton.

Shortridge also records specimens from King River, Mount Barker, Boyadine-Dale River, Stockpool, Dwaladine, and Woyaline Wells. His map shows the range extending through the southwestern corner of Western Australia between Geraldton and Esperance.

Le Souef and Burrell state (1926, p. 190): "The black-gloved wallaby is still very numerous in South-west Australia. . . . This species, strangely enough, is difficult to keep in captivity; evidently it requires special food to keep it in health." They also remark (pp. 188-189) that "all wallabies live in or about scrub or brushwood, for they have three enemies ever on the look-out for stray animals that venture into the open, namely, the dingo, fox, and the great wedge-tailed eagle."

According to Glauert (1933, p. 32), the range of the present species is "South-Western Australia, from the vicinity of Geraldton in the north to the south coast. The eastern limit is approximately the No. 3 Rabbit-proof Fence. Still common near Perth."

E. Le G. Troughton calls attention (*in litt.*, April 16, 1937) to the fact that this wallaby is the nearest relative of the practically extinct Toolach, and suggests that "shrinkage of range should be watched for, although survival seems at present assured by reservations, in the event of more intensive cultivation."

Tasmanian Kangaroo; Forester Kangaroo; "Boomer"

MACROPUS TASMANIENSIS Le Souef

Macropus giganteus tasmaniensis Le Souef, Australian Zool., vol. 3, pt. 4, p. 145, 1923. (Tasmania.)

Formerly common and ranging practically throughout Tasmania, this fine species has been almost exterminated.

Similar in size and appearance to *M. giganteus*, but with somewhat coarser fur and showing greater variation in color; upper parts sooty, sooty gray, rusty brown, or rusty red—as a rule rusty brown, with grayish under parts. Head and body, 1230-1400 mm.; tail, 970-1000 mm. (Le Souef, 1923*b*, pp. 145, 147.) Size very large, form slender and graceful; tail gray, with terminal portion black; male about one-eighth larger than female. (Lord and Scott, 1924, p. 244).

"In Van Diemen's Land, among other places, it resorts to the bleak, wet, and frequently snow-capped summit of Mount Wellington." In this country it "forms an object of chase, and like the Deer and Fox in England, is hunted with hounds; and twice a week, during the season, the Nimrods of this distant land may be seen, mounted on their fleet steeds, crossing the ferry of the Derwent, at Hobart Town, on their way to the hunting-ground, where they seldom meet without 'finding'." (Gould, 1863, vol. 2, pp. 2-3.) The same author gives (p. 4) an account of a hunt for an old male "Boomer" that led the hounds a chase of 18 miles on land, and then swam in the sea for more than 2 miles before he became exhausted and was killed. He also (p. 2) quotes R. C. Gunn to the effect that while the species may be found in numbers at certain places where food is abundant, yet it is not as a general rule gregarious and does not travel from place to place in flocks.

Lord (1928, p. 18) gives the following account:

The Forester Kangaroo formerly roamed over the greater part of Tasmania where conditions were suitable. It frequents, as a rule, more open country than *M. ruficollis*, and this fact, together with its larger size, is undoubtedly responsible for its decline. At the present time this species is met with only in a few localities in Tasmania. In some instances, the owners of large estates have taken an interest in the animal, and it is owing to the protection thus received that groups of this species exist to-day in certain places in the island.

In other parts where there are scattered mobs, such as in the extreme North-East of Tasmania, the advance of settlement is having its effect, for although the species is totally protected by law, the fact must be recognised that in the more distant country districts it is a matter of extreme difficulty to enforce the game laws.

Although very much reduced in numbers the Forester Kangaroo does not appear to be in any immediate danger of extinction, particularly if the landowners who have protected it in the past continue to recognise the variety as one worthy of being retained. Again, the species will probably be bred in local zoological gardens, and there is still the further possibility of this and other species being bred on a large scale and made an item of great economic importance to the State.

More recently R. Boswell writes (*in litt.*, May 13, 1937) that the species, though still wholly protected by law, has now been almost exterminated through excessive hunting. There has been economic exploitation of its hide and flesh.

Order INSECTIVORA: Insectivores

Family SORICIDAE: Shrews

This family is nearly cosmopolitan in distribution but is absent in the Australian region (including New Guinea). There are about 25 genera and several hundred species and subspecies. They are animals of generally small size and secretive habits. A single form is considered extinct.

Christmas Island Musk-shrew

CROCIDURA FULIGINOSA TRICHURA Dobson

Crocidura fuliginosa, var. *trichura* Dobson, in Thomas, Proc. Zool. Soc. London 1888, p. 532, 1889. (Christmas Island, eastern Indian Ocean.)

This is described as a small shrew, with skull and teeth closely like those of the species *C. fuliginosa* of the mainland (Assam, Tenasserim, and Malay Peninsula). Dobson differentiated it mainly on the basis of a longer tail, beset with long fine hairs, but later collections showed that the tail as recorded by Dobson for his specimen (80 mm.) was much longer than the average of 10 other specimens for which C. W. Andrews (1900) gives measurements. The color is not described but is doubtless, like that of the related form, of a dark gray. According to Andrews, the well-haired tail is the best character. Measurements: head and body, 65-82 mm.; tail, 63-75 mm.; hind foot, 13-17 mm.

The original specimen was brought back to the British Museum by the surveying-ship *Flying-fish* under command of Captain Maclear in 1886. Later, in 1897, a number of additional specimens were secured by Andrews (1900), who lists measurements in his *Monograph of Christmas Island*, and remarks: "This little animal is extremely common all over the island, and at night its shrill squeak, like the cry of a bat, can be heard on all sides. It lives in holes in rocks and roots of trees, and seems to feed mainly on small beetles." In 1908, Dr. Andrews again visited the island, to see what changes had taken place with the establishment of a settlement, clearing, and agriculture, since 1897. He found (1909, p. 102) that the shrew "is probably also extinct, at least no specimen was either seen or heard during my visit." He implies that this may have been due in part to cats, which had been introduced and had become numerous. However, cats would seem hardly sufficient to account for the extermination of a shrew, which they will kill but seldom care to eat. It may be that agricultural use of the land has reduced the numbers of the shrew about the settlement at Flyingfish Cove; nevertheless a careful search with modern collecting methods might still reveal the animal's presence. On the other hand, if it is actually gone, one

may invoke some introduced disease, which seems, as Andrews describes, to have been the reason for the extinction of the two native rats, *Rattus nativitatis* and *R. macleari* (*q. v.*).

G. M. A.

Order PRIMATES: Primates

Family LEMURIDAE: Lemurs

This family is restricted to Madagascar and the Comoro Islands. Six genera and 26 species and subspecies are recognized. While some forms remain common, others have become greatly reduced in numbers, and one is evidently extinct. Owing to a steady reduction in the forested area of Madagascar and to a certain amount of persecution by the natives, the lemurs are faced with a rather uncertain future. Consequently, accounts of all the forms are provided in the following pages.

Miller's Dwarf Lemur

MICROCEBUS MURINUS MURINUS (J. F. Miller)

Lemur murinus J. F. Miller, *Icones Anim. et Plant.*, pl. 13, 1777. (Madagascar.)

SYNONYMS: *Prosimia minima* Boddaert (1784); *Lemur prehensilis* Kerr (1792); *Lemur pusillus* É. Geoffroy (1796); *Galago madagascariensis* É. Geoffroy-Saint-Hilaire (1812); *Cheirogaleus minor* É. Geoffroy-Saint-Hilaire (1812); *Microcebus rufus* Wagner (1839); *Myscebus palmarum* Lesson (1840); *Microcebus myoxinus* Peters (1852); *Chirogalus gliroides* Grandidier (1868); *Microcebus minor griseorufus* Kollmann (1911).

FIGS.: P. Brown, *New Illustratr. Zool.*, pl. 44, 1776; J. F. Miller, *Icones Anim. et Plant.*, pl. 13, 1777; G. Shaw, *Cimelia Physica*, pl. 13, 1796; Audebert, 1800, *Makis*, pl. 8; É. Geoffroy-Saint-Hilaire, *Ann. Mus. Hist. Nat.* [Paris], vol. 19, pl. 10, fig. 3; Peters, *Reise Mossambique, Zool.*, I, *Säugethiere*, pl. 3, 1852; Major, 1894, pl. 1, fig. 2; Milne Edwards, Grandidier and Filhol, 1897, pl. 259, fig. 6; Kaudern, 1915, pl. 2, fig. 3.

The comparative abundance of this species is indicated by the fact that the Mission Zoologique Franco-Anglo-Américaine of 1929-31 secured 43 specimens (Delacour, 1932, p. 220)—more than of any other Madagascar lemur.

Size very small; head rounded; muzzle short and pointed; eyes large and brilliant; ears large and naked (Forbes, 1894, vol. 1, p. 55). "Two phases, rufous brown or gray. The first has the head rusty brown; orbital ring and upper lip black; stripe between eyes and on nose, grayish white; upper parts of body rufous brown; dorsal line indistinct; sides of body and outer side of limbs mouse gray washed with rufous brown; entire under parts and inner side of limbs white . . . ; tail rufous brown . . . ; hands and feet gray. The other phase is mouse gray above, the back washed with rufous, a rufous spot over each eye; outer side of limbs mouse gray; entire under parts

white; tail pale rufous." Total length, about 300 mm.; tail, 150 mm. (Elliot, 1913, vol. 1, p. 104.)

Schwarz (1931, p. 403) gives the range as "the whole of S.E., E. [=S.], and W. Madagascar, as far north as the Betsiboka River Exact limits in central Madagascar not known, but probably only found in the plains. Not extending farther north than Ft. Dauphin on the east coast." He mentions (pp. 402-403) specimens from: Fort Dauphin; Ankazoabo, Bara; Ambolisatra and Itampolo Bé, north of Tuléar; Tuléar; and Morondava.

Sibree (1915, p. 243) refers to this as one of the most beautiful and interesting of Madagascar lemurids. It "is remarkable also for its large and very resplendent eyes, for the eye admits so much light at dusk that quite an unusual brilliance is produced."

Three specimens were captured in 1932 in the Manampetsa Reserve in the southwest (Petit, 1935, p. 474).

"At Tabiky [inland from Cape St. Vincent], the mouse lemur was apparently very common and numbers were brought in alive by natives. . . . On November 2, 1929, fifteen specimens were brought to me." Remains of a *Microcebus* were found in a pair of goshawks (*Astur henstii*) taken near Tabiky. (Rand, 1935, p. 95.)

Smith's Dwarf Lemur

MICROCEBUS MURINUS SMITHII (J. E. Gray)

Cheirogaleus Smithii J. E. Gray, Ann. Mag. Nat. Hist., ser. 1, vol. 10, p. 257, 1842. ("Madagascar"; type locality restricted by Harper (1940, p. 192) to "a few miles north of Fianarantsoa, central Betsileo.")

FIGS.: Forbes, 1894, vol. 1, pl. 6; Beddard, 1902, p. 544, fig. 260.

This lemur was reported as tolerably abundant by Shaw in 1879 (p. 135). Although scarcely any later information is at hand, its nocturnal habits and its penchant for the tops of the highest trees have perhaps safeguarded it from serious depletion.

Gray's type description (1842, p. 257) is as follows: "Pale brown; streak up the nose and forehead, the chin and beneath paler; tail redder." Schwarz (1931, p. 401) distinguishes this subspecies from *M. m. murinus* as follows: "Tail not longer or shorter than head and body. Colour above reddish brown; an indistinct dorsal band sometimes present. Facial streak accompanied on both sides by a distinct black stripe which extends as far as but hardly beyond the eyes." Both body and tail are about 180 mm. in length in a specimen from Majunga, north of the Bay of Bombetoka, which Lorenz-Liburnau records (1898, p. 445) as *M. myoxinus*.

Schwarz (1931, p. 403) records specimens from: Vohémar, NE. coast; Mananara, Bay of Antongil; Mahambo, north of Foulpointe, NE. coast; Anabama Forest, Lake Alaotra; Ivohimanitra, Tanala;

Vinanitelo, SE. Betsileo; and north of Fianarantsoa, central Betsileo. He states the range as follows: "The whole of eastern, northern, and east-central Madagascar, including the plateau, as far south as Ft. Dauphin. Also the north-west, down to the Bay of Bombétoka." If, however, Schwarz is correct (p. 402) in recording *murinus* from Fort Dauphin, the range of *smithii* can scarcely extend quite so far south.

G. A. Shaw (1879, pp. 135-136) gives the following account:

They inhabit a belt of forest-land stretching from the eastern forest into the heart of Betsileo, a few miles north of Fianarantsoa, where they are tolerably abundant. They live on the tops of the highest trees, choosing invariably the smallest branches

Their food consists of fruit and insects and most probably honey. I have frequently seen them catching the flies that have entered their cage for the honey; and I have supplied them with moths and butterflies, which they have devoured with avidity.

They are extremely shy and wild. Although I have had between thirty and forty caged at different times, I have never succeeded in taming one. . . .

I have had none breed in captivity.

Kaudern (1915, p. 74) records several specimens (as *M. minor*) from Ste. Marie de Marovoay on the Betsiboka River in the north-west, and one specimen (as *M. smithii*) from Fenerive on the east coast.

G. M. Allen (1918, p. 516) records a specimen from Didy, south of Lake Alaotra.

Coquerel's Dwarf Lemur

MICROCEBUS COQUERELI (Grandidier)

Cheirogalus Coquereli Grandidier, Rev. Mag. Zool., ser. 2, vol. 19, p. 85, 1867. ("Morondava," west coast of Madagascar.)

SYNONYM: *Microcebus coquereli* Schlegel and Pollen (1868).

FIGS.: Schlegel and Pollen, 1868, pl. 6; Milne Edwards, Grandidier and Filhol, 1897, pl. 259, fig. 4; Beddard, 1902, p. 544, fig. 261; Elliot, 1913, vol. 1, pl. 4, upper fig. (facing p. 145).

To judge by the small number of specimens recorded, this is one of the rarest lemurs of Madagascar.

It is a little smaller than *Phaner furcifer*; above dark gray, washed with rufous; tail dark rufous, except at the base, where it is colored like the back; under parts yellowish gray. Head and body, 210 mm.; tail, 340 mm. (Grandidier, 1867a, p. 85.)

Grandidier (1867a, p. 85) had seven of these animals in his possession. They were nocturnal and lived on leaves and fruit.

Schlegel and Pollen state (1868, p. 13) that the species inhabits the most impenetrable forests. They had only a single specimen, secured in the forests of Congony, inland from the Bay of Passandava, in northwestern Madagascar.

According to Elliot (1913, vol. 1, p. 107), the range extends on the west coast from Cape St. Vincent to Helville, in the vicinity of the Bay of Passandava.

Only five specimens are reported by Delacour (1932, p. 220) as collected by the Mission Zoologique Franco-Anglo-Américaine of 1929-31.

Geoffroy's Fat-tailed Lemur

CHEIROGALEUS MEDIUS MEDIUS É. Geoffroy-Saint-Hilaire

Cheirogaleus medius [É.] Geoffroy-Saint-Hilaire, Ann. Mus. Hist. Nat. [Paris], vol. 19, p. 172, 1812. (Type locality not stated; restricted by Schwarz (1931, p. 405) to "Ft. Dauphin, S.E. Madagascar.")

SYNONYM: *Opolemur thomasi* Major (1894).

FIGS.: É. Geoffroy-Saint-Hilaire, Ann. Mus. Hist. Nat. [Paris], vol. 19, pl. 10, fig. 2, 1812; Major, 1894, pl. 1, fig. 1.

Extremely little information is available concerning this lemur, but it is evidently one of the less common of the Madagascar forms.

Head broad; snout short; upper parts gray, with a wash of rusty brown, the tips of the hairs silvery; a whitish band extending from between the eyes to the naked nose-pad; a whitish half-collar on each side of the neck; orbital ring and ears brownish black; under parts, inner side of limbs, and hands and feet yellowish white. Head and body of female, 232 mm.; tail, 195 mm. (Major, 1894, p. 20; type description of *Opolemur thomasi*.)

Major (1894, p. 20) records three specimens (as *O. thomasi*) from Fort Dauphin. "Nothing is known of the distribution . . . north of Ft. Dauphin in eastern Madagascar" (Schwarz, 1931, p. 405).

The Mission Zoologique Franco-Anglo-Américaine of 1929-31 collected nine specimens (Delacour, 1932, p. 220).

"These little lemurs are apparently entirely nocturnal At Tabiky [inland from Cape St. Vincent], I found them in a gallery forest through savannah and dry brush." (Rand, 1935, p. 95.)

Neither Delacour nor Rand gave the subspecific determination of their specimens.

Samat's Fat-tailed Lemur

CHEIROGALEUS MEDIUS SAMATI (Grandidier)

Chirogaleus Samati Grandidier, Rev. Mag. Zool., ser. 2, vol. 20, p. 49, 1868.

("Flumen Tsidisibon in littore occidentali Madagascar insulae.")

FIG.: Proc. Zool. Soc. London 1872, pl. 70.

The few known specimens of this lemur come from a limited section of the west coast of Madagascar (Tsidisobon River to Morondava).

Fur of body and tail rather short; dark gray above, fulvous below; tail fat, faded rufous; a white stripe from forehead to nose; orbital ring black. Head and body, 190 mm.; tail, 170 mm. (Grandidier, 1868, p. 49.)

Major (1894, p. 18) and Schwarz (1931, p. 405) record specimens from Morondava.

Milius's Mouse Lemur

CHEIROGALEUS MAJOR MAJOR É. Geoffroy-Saint-Hilaire

Cheirogaleus major [É.] Geoffroy-Saint-Hilaire, Ann. Mus. Hist. Nat. [Paris], vol. 19, p. 172, 1812. (Type locality not stated; restricted by Schwarz (1931, p. 406) to "Fort Dauphin, S.E. Madagascar.")

SYNONYMS: *Lemur commersonii* Wolf (1822); *Cheirogaleus milii* É. Geoffroy (1828); *Ch. typicus* A. Smith (1833); *Mioicebus griseus* Lesson (1840); *Chiogalus adipicaudatus* Grandidier (1868).

FIGS.: É. Geoffroy, Ann. Mus. Hist. Nat. [Paris], vol. 19, pl. 10, fig. 1, 1812; Geoffroy and Cuvier, Hist. Nat. Mamm., livr. 32, pl. 188, 1821; Proc. Zool. Soc. London 1879, pl. 9 (ssp.); Milne Edwards, Grandidier and Filhol, 1897, pl. 259, fig. 5; Elliot, 1913, vol. 1, pl. 5 (ssp.).

The meager information we have concerning this lemur is an indication of its rarity.

Upper parts varying from brownish gray to ashy brown; under parts and inner side of limbs yellowish or whitish; orbital ring black; nose light gray; hands and feet dark brown; tail pale rufous or ashy brown, sometimes with white tip. Total length, 580 mm.; tail, 275 mm. (Elliot, 1913, vol. 1, pp. 93-94.) Ears naked for their distal half; color more grayish than in *Ch. m. crossleyi* (Schwarz, 1931, p. 405).

The respective ranges of *Ch. m. major* and *Ch. m. crossleyi* are none too clearly defined in the available literature. The former seems to occur in the south and west of Madagascar; the latter, in the center and the northeast.

Elliot's statement (1913, vol. 1, p. 93) of the range of the present form is probably not altogether accurate: "Eastern coast of Madagascar; Fort Dauphin to Tamatave; also in the lower wooded regions of Betsileo Province; and on the west coast from Tullare [=Tullare] to Pasandava, Central Madagascar."

G. A. Shaw (1879, pp. 134-135) records a specimen (subspecies not determined) from the forests on the eastern side of Betsileo. "Its food consists of fruits and possibly honey It appears to be a very uncommon animal, . . . as this is the only specimen I have been able to obtain, although I kept a man in the forest for two months seeking for one after I had obtained this one."

Major (1894, p. 22) records specimens from Morondava in the southwest and from Tamatave and Ankay Forest in the northeast.

"Milius' Mouse-Lemur, though a rare species, is widely distributed in Madagascar" (Forbes, 1894, p. 51).

Kaudern (1915, p. 74) records a specimen from Ste. Marie de Marovoay on the Betsiboka River, northwestern Madagascar (where the animal is said to be rather rare), and several specimens from Andranolava, north central Madagascar. (Here again, the specimens do not appear to have been determined subspecifically.)

Delacour (1932, p. 219) reports only six specimens collected by the Mission Zoologique Franco-Anglo-Américaine of 1929-31.

Crossley's Mouse Lemur

CHEIROGALEUS MAJOR CROSSLEYI (Grandidier)

Chirogaleus crossleyi Grandidier, Rev. Mag. Zool., ser. 2, vol. 22, p. 49, 1870.
("Forêts est d'Antsianak," Madagascar.)

SYNONYMS: *Chirogale melanotis* Major (1894); *Chirogale sibreei* Major (1896).

FIGS.: Proc. Zool. Soc. London 1872, pl. 71, nearer fig.; Forbes, 1894, pl. 5.

This subspecies is apparently even rarer than *Ch. m. major*.

Upper parts rufous, especially on the head, under parts whitish; head very large, rounded; orbital ring black; inner surface of ears covered with dark brown hairs; tips of ears bordered with black; tail short and well furred. Body, 200 mm.; tail, 120 mm. (Grandidier, 1870, p. 49.) Ears hairy inside and out, with hardly a naked tip; fore parts of body strongly washed with brownish (Schwarz, 1931, p. 405). The tail of the type specimen of *crossleyi* was evidently defective; the types of "*melanotis*" and "*sibreei*" have a total length of 490-500 mm., and a tail length of 225-250 mm. (Elliot, 1913, vol. 1, pp. 95-96).

This lemur seems to be scarcely known except from the type specimens of *crossleyi*, "*melanotis*," and "*sibreei*." These are, respectively, from the forests east of Antsianak; from Vohima on the northeast coast; and from Ankeramadinika, one day's journey to the east of Antananarivo. Thus the known range extends from east central to northeastern Madagascar.

Hairy-eared Mouse Lemur; Tufted-eared Mouse Lemur

CHEIROGALEUS TRICHOTIS (Günther)

Chirogaleus trichotis Günther, Proc. Zool. Soc. London 1875, p. 78, 1875. (On the "way from Tamantave to Murundava," Madagascar.)

FIGS.: Günther, 1875*b*, pl. 15, p. 79, figs. 1, 2; Milne Edwards, Grandidier and Filhol, 1897, pl. 259, fig. 9.

Since the single specimen of the Hairy-eared Mouse Lemur was described in 1875, no subsequent specimen has turned up, despite the extensive collecting that has been carried on in Madagascar in

the meantime. It seems fairly necessary, therefore, to class it among the extinct species.

"Brownish grey; lower parts grey, with the hairs white-tipped. A triangular spot in front of the eye black; median line of the snout and lips whitish. Hands and feet grey, with white-tipped hairs. Ears very short, hidden in the fur. The lower part of the concha and the space before the ear covered with a tuft of very long hairs. Tail rather shorter than the body, covered with short hairs All the nails pointed, claw-like." Head and body, 152 mm.; tail, 149 mm. (Günther, 1875*b*, pp. 78-79.) "This species differs from all the members of this genus in the tufts of hair standing out from the ears and sides of head, above the ears" (Elliot, 1913, vol. 1, p. 97).

Elliot's authority for giving (p. 96) the range of the species as the "forests of Antsianak" is not apparent. The exact type locality is unknown, and no information is at hand concerning the route followed by Crossley, the collector of the type, on his way from Tamatave on the east coast to Morondava on the west coast.

Fork-marked Lemur. Maki à fourche (Fr.)

PHANER FURCIFER (Blainville)

L[emur] furcifer Blainville, Ostéogr., Mammif., Primates, Lemur, p. 35, 1839.

(Type locality not stated originally; "probably the region of the Bay of Antongil, N.E. Madagascar" (Schwarz, 1931, p. 407).)

FIGS.: Blainville, Ostéogr., Mammif., Primates, Atlas, Lemur, pl. 7, 1839; Schlegel and Pollen, 1868, pl. 5; Milne Edwards, Grandidier and Filhol, 1897, pl. 259, fig. 3.

The Fork-marked Lemur was formerly abundant in Madagascar and is still fairly common.

Upper parts reddish gray; outer side of limbs dark rufous; throat pale rufous; chin and rest of under parts yellowish; a black stripe from lower part of back to crown, where it bifurcates, one branch ending over each eye; hands and feet dark brown; tail bushy, dark reddish brown with black tip. Total length about 600 mm.; tail, 350 mm. (Elliot, 1913, vol. 1, p. 109.)

"This species has been recorded by Pollen and van Dam from various localities on the N.W. coast, north of the Bay of Bombétoka (Bay of Ampasindava, Jangoa River, Kongony River), but also farther south at Morondava, on the W. coast. Found by M. J. Audebert at 'Passumbé,' N.E. coast." (Schwarz, 1931, p. 407.) He also states that "there is no definite record of the occurrence of this species considerably south of the Bay of Antongil." He mentions having examined specimens from Vohémar, NE. coast, and Andoany, NW. coast.

This pretty species is found in abundance in the forests of western Madagascar, and it also appears to inhabit the eastern part. The natives state that it is very fond of honey. It is nocturnal and its chase is extremely difficult. (Schlegel and Pollen, 1868, pp. 9-10.)

Twelve specimens were collected by the Mission Zoologique Franco-Anglo-Américaine of 1929-31 (Delacour, 1932, p. 220).

"Near Tabiky [inland from Cape St. Vincent], in November, 1929, I found the squirrel lemur fairly common about my camp in a gallery forest through savanna and low dry brush. Usually found in pairs, . . . they sometimes moved about rapidly through the tops of the tall trees, but more often were in the lower trees and bushes

"In the rain forest on Mt. d'Ambre [in the extreme north] this lemur was fairly common, and noisy throughout the night, but it kept to the tops of the forest trees." (Rand, 1935, p. 95.)

Broad-nosed Gentle Lemur

HAPALEMUR SIMUS J. E. Gray

Hapalemur simus J. E. Gray, Cat. Monkeys, Lemurs, and Fruit-eating Bats Brit. Mus., p. 133, 1870. ("Madagascar.")

FIGS.: Gray, Proc. Zool. Soc. London 1870, pl. 52; Milne Edwards, Grandidier and Filhol, 1896, pls. 122 A, 122 D (fig. 1), 122 E.

Comparatively few specimens of this species seem to be known, and the information concerning it (other than anatomical) is very meager.

"Nose broad and truncated; . . . back iron-grey, with a rufous tinge; the hairs black, with a subapical rufous band, and the lower part lead-coloured; throat whitish; patch on rump at base of tail yellowish" (J. E. Gray, 1870, p. 133). Forbes (1894, pp. 82-83) adds the following details: ears short, covered with long hair; sides of head, neck, and region round the eyes lighter than the back; lower back, sides of body, and outer surface of limbs sooty gray, with here and there a wash of rufous; tail, except at base, sooty gray; under side of body and inner side of arms pale sooty gray; no patch of spines on the arm above the wrist as in *H. griseus*. Schwarz (1931, p. 407) gives a total length of 900 mm.

"It would appear . . . that the distribution . . . includes the whole forested region of eastern Madagascar. It has not been recorded up to now from the north-west." Single specimens from Nandihizana, central Betsileo, S.E. Madagascar, and from Passum-bée, N.E. coast, are mentioned. (Schwarz, 1931, pp. 407-408.)

G. A. Shaw writes (1879, pp. 133-134) of a live specimen that "came from the higher-level forests on the eastern side of the Betsileo, among the bamboos, on which it appears in a great measure to subsist. . . . I have tempted it with very many different

kinds of berries and fruits growing in the forest; but it would not touch any of them." It fed steadily and regularly upon grass.

G. M. Allen (1918, p. 516) records two specimens from near Ambatondrazaka.

An indication of the rarity of this species is the fact that no specimens were reported by the Mission Zoologique Franco-Anglo-Américaine of 1929-31.

Gray Lemur

HAPALEMUR GRISEUS GRISEUS (Link)

L[emur] griseus Link, Beytr. Naturg., vol. 1, pt. 2, p. 65, 1795. (Based upon "Le petit Maki gris" of Buffon (Hist. Nat., suppl., vol. 7, p. 121, 1789); type locality, Madagascar.)

SYNONYMS: *Lemur griseus* É. Geoffroy (1796); *Lemur cinereus* Desmarest (1820); *Hapalemur schlegeli* Pocock (1917).

FIGS.: Buffon, Hist. Nat., suppl., vol. 7, pl. 34, 1789; Audebert, 1800, pl. 7; Schlegel and Pollen, 1868, pl. 3; Milne Edwards, Grandidier and Filhol, 1896, pls. 122 B, 122 D (fig. 2), 122 F.

Extremely little new information concerning this subspecies has come to light during the past 70 years. It must have become quite rare.

Upper parts light olive-brown, brighter on top of the head; rest of head gray; cheeks, throat, breast, and inner side of limbs ochraceous-white; tail a little darker than the back. Total length, 24 inches; tail, 13½ inches. (Schlegel and Pollen, 1868, p. 7; Forbes, 1894, vol. 1, p. 81.) The general grayish green of this subspecies is contrasted with the reddish green of *H. g. olivaceus*. The presence of a wrist gland distinguishes both of these forms from *H. simus*. (Schwarz, 1931, p. 408.)

Schwarz (1931, p. 408) gives the range of the present form as follows: "The whole south and west, and the dry central plateau as far east as Lake Alaotra; it also goes north beyond the Betsiboka River in the north-west." He records specimens from the following localities: Lake Alaotra and Ambatondrazaka, central northeastern Madagascar; District Ambalavo, in the southeast; and Tany Malandi, in the northwest.

According to Schlegel and Pollen (1868, pp. 7-8), this lemur in northwestern Madagascar inhabits by preference the forests of bamboo. It was found at a few days' journey from the coast, along the Ambassuana River in the Tanimalandy district. It is entirely nocturnal, and sleeps during the day on the highest stems of the bamboos. The stomachs of all specimens were found filled with bamboo leaves.

Delacour (1932, p. 219) records 25 specimens of "*Hapalemur griseus*" as collected by the Mission Zoologique Franco-Anglo-Améri-

caine of 1929-31. However, the further account given by Rand (1935, p. 95) indicates that these represent the subspecies *olivaceus*.

Olivaceous Lemur

HAPALEMUR GRISEUS OLIVACEUS I. Geoffroy

Hapalemur olivaceus I. Geoffroy, Cat. Méthod. Mamm. [Mus. Paris], pt. 1, Primates, p. 75, 1851. ("Madagascar." Type locality restricted by Elliot (1913, vol. 1, p. 127) to "Ampazenambe, Madagascar.")

FIGS.: Forbes, 1894, vol. 1, pl. 8 (ssp.?); Milne Edwards, Grandidier and Filhol, 1896, pls. 122 C, 122 D (fig. 3).

This subspecies appears to be considerably commoner than *H. g. griseus*.

It is similar to the latter but has a longer and denser pelage; color olive, with a rufous tint; throat gray rather than white; cheeks speckled gray (I. Geoffroy, 1851, p. 75).

According to Schwarz (1931, pp. 408-409), this lemur "is found in the moist and wooded north-east and east [of Madagascar], probably as far south as Fort Dauphin." He records specimens from the following localities: Mananare, Bay of Antongil; Vohémar, NE. coast; Tamatave, E. coast; Analamazaotra, east of Tananarive; Ambohitombo, Tanala country, E. Madagascar; Vinanitelo, S. Betsileo; and several localities on the east coast north of Tamatave.

Kaudern (1915, pp. 70-71) reports the animal as apparently not rare in the forests west of Fenerive on the east coast, where he obtained three specimens from the natives.

Rand writes (1935, p. 95) that it is diurnal. He found it in the tops of the lower trees in the rain forest, and occasionally in dense thickets of bamboo on the edge of the forest. "Occasionally found singly, it was more often seen in groups of two or three. At Manombe in the southeast I saw two running about through the forest tree tops *Hapalemur* was fairly common about camp two days northeast of Maroantsetra."

Ring-tailed Lemur

LEMUR CATTÀ Linnaeus

[*Lemur*] *Catta* Linnaeus, Syst. Nat., ed. 10, vol. 1, p. 30, 1758. (Based upon the "Maucauco" of Edwards (Nat. Hist. Birds, pt. 4, p. 197, 1751); type locality, "Madagascar.")

FIGS.: Edwards, 1751, pl. 197; Schreber, Säugthiere, vol. 1, pl. 41, 1774; Audebert, Hist. Nat. Makis, pl. 4, 1800; Geoffroy and Cuvier, Hist. Nat. Mamm., livr. 5, pl. 27, 1819; Milne Edwards and Grandidier, 1890, pls. 171, 172; Royal Nat. Hist., vol. 1, p. 211, fig., 1893-94; Proc. Zool. Soc. London 1906, p. 124, fig. 48; Elliot, 1907, p. 545, fig. 76; Elliot, 1913, vol. 1, pl. 5, upper fig.

This is perhaps the best known of all the Madagascar lemurs, and it still appears to be moderately common.

The fur is soft and delicate; face and ears white; nose and area about each eye black; top and back of head dark ashy; back and sides of a redder ash color; outer side of limbs light ashy; upper sides of paws whitish; under parts and inner sides of limbs white; tail with broad alternate rings of black and white (Edwards, 1751, p. 197). "Length of body and tail together, 40 inches" (Forbes, 1894, vol. 1, p. 76).

"This species, which inhabits rocky open country, is found in south-western, southern, and south-eastern Madagascar" (Schwarz, 1931, p. 410).

"As far as my experience of seven years goes, these Lemurs are found only in the south and south-western borders of the Bétsileo province of Madagascar." They are not found in the forests, but among the rocks. "The prickly pear . . . constitutes their chief article of winter food . . . Their summer food consists of different kinds of wild figs and bananas." (G. A. Shaw, 1879, pp. 132-133.)

This species bears captivity well, and is everywhere offered for sale by the natives (Kaudern, 1915, p. 50).

Schwarz (1931, p. 410) records specimens from Tulear in the southwest, and adds: "It has been found by van Dam at Morondava, Matseroaka, and the Bay of St. Augustin in the south-west, and is recorded by him as far north-east as the region of Ft. Dauphin."

This species ranges over a vast area, from Mangoky on the north to beyond Menarandra on the south. Decary records it in Androy along all the rivers and as far as the region of Beloha. Perrier de la Bathie has observed bands on the western parts of the massif of Andringitra. (Petit, 1931, p. 560.)

Thirty specimens were collected by the Mission Zoologique Franco-Anglo-Américaine of 1929-31 (Delacour, 1932, p. 219).

Rand (1935, p. 96) mentions observations on this lemur at Ampotaka and Lake Tsimanampetsotsa and near Tulear. He also writes (pp. 95-97): "The ring-tailed lemur was found in and about most of the more densely-wooded areas and the gallery forest in the arid parts of southwestern Madagascar.

"It is a diurnal and crepuscular creature

"This animal, like most of the lemurs, is gregarious. It was usually seen in parties of from four or five up to ten or fifteen and more. . . .

"Wild specimens were seen to eat leaves of certain trees

"They are often kept as pets by Europeans and are carried to various parts of the island."

At the Manampetsa Reserve in the southwest numerous bands were seen in 1926, but the species was rare in 1933 (Petit, 1935, p. 474).

Black Lemur

LEMUR MACACO MACACO Linnaeus

[*Lemur*] *Macaco* Linnaeus, Syst. Nat., ed. 12, vol. 1, p. 44, 1766. ("Madagascar.")

SYNONYM: *Lemur leucomystax* Bartlett (1863).

FIGS.: Schreber, Säugthiere, vol. 1, pl. 40 A, 1774; Proc. Zool. Soc. London 1862, pl. 41; Schlegel and Pollen, 1868, pl. 1; Proc. Zool. Soc. London 1880, p. 451, fig. 1; Proc. Zool. Soc. London 1885, p. 672, fig.; Milne Edwards and Grandidier, 1890, pls. 130-132.

The Black Lemur still occurs in fairly large bands in the north-west of Madagascar.

It has the ears tufted, with long hairs continuing down the side of the neck to the angle of the mouth. The male is entirely black. Female: snout and back of head black; forehead blackish gray; whiskers and ear-tufts white; general body color rich ferruginous brown; limbs and neck reddish yellow; tail whiter; under parts and inner side of limbs creamy white. There is a considerable degree of variation in the color of this species. (Forbes, 1894, vol. 1, p. 70.) Total length, 41 inches; tail, 22 inches (Schlegel, 1876, p. 303).

"The range . . . is limited to the forests of the N.W. coast, north of the Bay of Bombétoka and the coast islands. It has been recorded by Pollen and van Dam from the following places:—Anorontsanga; Syrangene; Kongony and Jangoa Rivers; Andoany, Narendry Bay ("Maroandiana")." (Schwarz, 1931, p. 417.)

These animals inhabit the forests extending between the Bay of Diego-Juarez and the Bay of Bombétoka, as well as the forest of Loucoubé in the isle of Nossi-Bé. They live in bands in the highest trees of the impenetrable forests. Bananas are their ordinary food in the wild state. They are also fond of the brains of birds. (Schlegel and Pollen, 1868, p. 2.)

The range includes the upper Sambirano (Petit, 1931, p. 562).

Eight specimens were collected by the Mission Zoologique Franco-Anglo-Américaine of 1929-31 (Delacour, 1932, p. 220).

"The parties observed were much larger than those of that species [*L. fulvus*], containing sometimes as many as 18 individuals—males, females, old, and young. They were always very tame." (Rand, 1935, p. 99.)

Sanford's Lemur

LEMUR MACACO SANFORDI Archbold

Lemur fulvus sanfordi Archbold, Am. Mus. Novit., no. 518, p. 1, 1932. ("Mt. D'Ambre, Madagascar.")

This lemur is known only from 18 specimens collected in the type locality by the Mission Zoologique Franco-Anglo-Américaine of 1929-31.

It differs from all the black-nosed lemurs, except *Lemur macaco rufus*, in its lighter color, and from the latter in its cheek and ear tufts, in which it resembles *Lemur macaco*. Nose black; top of head dark olive-buff; general color of upper parts snuff-brown to drab; hands russet; spot at root of tail and basal half of tail bay-colored; distal half of tail bushy, the hairs with blackish brown tips and with a subterminal clay-colored band; a ruff of long hairs around the ears and down the cheeks, varying from white to light ochraceous-buff; under parts gull-gray, washed with buffy. Female without cheek-tufts. Total length of male, 895 mm.; tail, 495 mm.

This form is restricted to the rain forest of Mount D'Ambre, northern Madagascar. (Archbold, 1932, p. 1.)

White-fronted Lemur; White-faced Lemur. Maki à front blanc (Fr.)

LEMUR MACACO ALBIFRONS É. Geoffroy

[*Lemur*] *Albifrons* [É.] Geoffroy, Mag. Encycl. [2d yr.], vol. 1, p. 48, 1796.

(Type locality not stated in original description, but later given as "Madagascar" (É. Geoffroy-Saint-Hilaire, 1812, p. 160).)

SYNONYM: *Prosimia frederici* Lesson (1840).

FIGS.: Audebert, Hist. Nat. Makis, pl. 3 (facing p. 13), 1800; Geoffroy and Cuvier, Hist. Nat. Mamm., livr. 3, pls. 17, 18, 1819; Milne Edwards and Grandidier, 1890, pls. 136, 144, 154, 155.

To judge by the 36 specimens collected by the Mission Zoologique Franco-Anglo-Américaine of 1929-31 (Delacour, 1932, p. 220), this must be one of the commonest of Madagascar lemurs.

Pelage brown; top of head, cheeks, and jaws white (É. Geoffroy, 1796, p. 48). "Of this race there are two mutations which occur together, viz., (1) a normally black-headed, whitish-cheeked type, with dark ground-colour, in which the female is only slightly paler than the male, and (2) the '*albifrons*' type, which shows a reduction of black pigment, the ground-colour being more reddish, especially so in the female; the male has the whole crown, cheeks, and beard white or whitish, but there are females which show a whitening on the head, although the normal phase of the '*albifrons*' female has a lead-grey head and a grey muzzle" (Schwarz, 1931, p. 410).

"The range of this local race apparently includes the northeastern coast of Madagascar as far as, and slightly beyond, the Bay of Antongil. The northern and western limit is uncertain; only the dark phase apparently occurs on the north-west coast." Specimens are recorded from: Vohémar and Sahambavany, N.E. coast; Mananare, Maroansetra, Androutsé, and Ampazénardo, in the vicinity of the Bay of Antongil. (Schwarz, 1931, pp. 410-411.)

"The effects of hunting by natives on the animal life of Madagascar are negligible. The main destruction of the fauna is caused

by the cutting of the forests. But near Maroantsetra we saw what might happen. Near the town itself these lemurs were scarce and very wary, apparently having been hunted with guns, but once away from large settlements they were very common and tame. On July 22, 1930, two days northwest of Maroantsetra, I surprised a party of eight in the low bushes of the ground cover in the forest. They fled but a little way and I sat down to watch them. Very soon the whole party came back and resumed feeding on the fruit of a low bush near me.

"Parties of these lemurs were often heard grunting and growling in the forest as though fighting." (Rand, 1935, p. 98.)

Brown Lemur; Fulvous Lemur. *Maki brun* (Fr.)

LEMUR MACACO FULVUS É. Geoffroy

L[emur] Fulvus [É.] Geoffroy, Mag. Encycl. [2d yr.], vol. 1, p. 47, 1796. ("Madagascar." This subspecies is considered typified by specimens from the Tamatave region (Schwarz, 1931, p. 411).)

SYNONYMS: *Prosimia macromongoz* Lesson (1840); *Lemur bruneus* van der Hoeven (1844).

FIGS.: Buffon, Hist. Nat., suppl., vol. 7, pl. 33, 1789; Lacépède and Cuvier, 1801, unnumbered pl.

Although it is said that "this race is about the most common Lemur in captivity" (Schwarz, 1931, p. 412), very little information can be offered concerning it, owing partly to the confusion that has long prevailed in the taxonomy and nomenclature of this specific group.

The pelage is brown above, gray below; head black; hands fulvous or brown (É. Geoffroy, 1796, p. 47). The animal is a third larger than *Lemur mongoz*; its tail, less bushy and more woolly, tapers toward the tip; rump and legs washed with olive (É. Geoffroy, in Lacépède and Cuvier, 1801, p. 3 of "Le Maki Mococo et le Maki brun"). Ground color olive-brown; cheeks yellowish white (Schwarz, 1931, p. 410).

"The range of this race is not completely known. It obviously inhabits the coast between the Bay of Antongil and Andovoranto, but may go farther south, as far as Mahanoro. In the interior it appears to go into the forest-belt east of Tananarive." Specimens are recorded from: Andragoloaka, S.E. of Tananarive, Prov. Imerina; Lakato Forest, Ankay, N.E. of Tananarive, Imerina; Sakana and Ambotorao, opposite the Ile Ste. Marie; and Tamatave. (Schwarz, 1931, p. 411.)

Collared Lemur. Maki à fraise (Fr.)

LEMUR MACACO COLLARIS É. Geoffroy-Saint-Hilaire

Lemur collaris [É.] Geoffroy-Saint-Hilaire, Ann. Mus. Hist. Nat. [Paris], vol. 19, p. 161, 1812. ("Madagascar.")

SYNONYMS: *Prosimia melanocephala* J. E. Gray (1863); *P. xanthomystax* J. E. Gray (1863); ?*P. flavifrons* J. E. Gray (1867); *Lemur nigerrimus* P. L. Sclater (1880); *Lemur mongoz* var. *cinereiceps* Milne Edwards and Grandidier (1890).

FIGS.: Geoffroy and Cuvier, Hist. Nat. Mamm., livr. 2, pl. 11, 1819; Proc. Zool. Soc. London 1863, pl. 17 (as *Prosimia xanthomystax*), pl. 18 (as *P. melanocephala*); ?Proc. Zool. Soc. London 1867, pl. 31 (as *P. flavifrons*); ?Proc. Zool. Soc. London 1880, p. 451, fig. 2 (as *Lemur nigerrimus*); Milne Edwards and Grandidier, 1890, pls. 140, 147 (as *L. mongoz* var. *cinereiceps*); Elliot, 1913, vol. 1, pl. 6 (as *L. fulvus*).

This lemur appears to be common in southeastern Madagascar.

Pelage rufous-brown above, fulvous below; a ruff of rufous hairs; face lead-colored (E. Geoffroy-Saint-Hilaire, 1812, p. 161). Cheeks orange-yellow; ground color light brown; a faint spinal line generally present; female generally with head gray. "This race . . . may be slightly smaller than the other races There is considerable individual variation, especially as regards the amount of black, grey, or reddish brown on the crown and forehead. There are female specimens which have a lot of black on the head like the males, but specimens occur too without any black markings, or even with a reddish crown, which resembles the colour of the back." (Schwarz, 1931, pp. 410, 412-413.)

"The range of this form is only imperfectly known. It clearly inhabits the south-eastern coast from Ft. Dauphin in the south to at least Masindrano in the north. How far it goes into the interior is not known, but it would appear that it is restricted to the coastal forests, as *L. f. rufus* is already found in eastern Betsileo. It also remains to be ascertained where the ranges of *collaris* and *fulvus* meet." Specimens are recorded from: Farafangana, about 23° S.; Loholoka, about 21° 60' S.; and Fort Dauphin. (Schwarz, 1931, p. 412.)

Ten specimens of "*Lemur nigerrimus*" were collected by the Mission Zoologique Franco-Anglo-Américaine of 1929-31 (Delacour, 1932, p. 220).

"At Vondrozo, in June and July, this lemur was common in the rain forest, usually traveling in the trees in parties of from four to six. . . .

"The animals were not shy and could be closely approached

"Several stomachs examined contained woody fruits of forest trees and one, green vegetable matter that was possibly leaves.

"At Manomba in October many females were carrying young." (Rand. 1935, p. 97.)

The same author describes the native method of capturing these lemurs by means of snares arranged on "a line of poles set up on forked sticks across a long, narrow clearing, forming a bridge from the trees on one side of the clearing to those on the other."

[In view of the still existing uncertainty concerning the taxonomic status of *Prosimia flavifrons* J. E. Gray, the exact type locality of which is unknown, it seems hardly worth while to give a separate account of it here. Schwarz (1931, p. 412), after provisionally considering it a synonym of *L. m. collaris*, proposes later (1936, p. 24) to recognize it as a distinct subspecies of *L. macaco* and assigns to it a range at Maromandia, northwestern Madagascar. On the other hand, G. M. Allen (1939, p. 127) regards it as "probably a synonym of *Lemur macaco collaris*," whose range lies at approximately the opposite end of Madagascar from Maromandia.]

Red-fronted Lemur

LEMUR MACACO RUFUS Audebert

Lemur Rufus Audebert, Hist. Nat. Singes et Makis; Makis, p. 12, 1800. (Type locality not stated = Madagascar.)

SYNONYM: *Lemur rufifrons* Bennett (1833).

Figs.: Audebert, 1800, Makis, pl. 2; Milne Edwards and Grandidier, 1890, pls. 138, 139, 145.

This is apparently one of the more common of the Madagascar lemurs.

Female (type of *rufus*): similar in size to *L. mongoz*, but differs in shorter ears, shorter hairs on tail, and rufous pelage; snout, and a line from forehead to crown, black; crown, temples, cheeks, and throat dirty white; body yellowish rufous; tail brown at the tip (Audebert, 1800, Makis, p. 12). Male (type of "*rufifrons*"): back grizzly; tail darker; under parts, haunches, and limbs mixed with rufous; forehead and cheek-tufts rufous; a nearly complete circle of white about the eye; nose, and line through middle of forehead, black (Bennett, 1833, p. 106). The male differs from males of other subspecies of *L. fulvus* in having a rusty-red forehead (Schwarz, 1931, p. 410). This form is very variable in coloration.

Schwarz (1931, pp. 413-414) describes its occurrence as follows:

The range of *L. f. rufus* includes the greater part of Madagascar, all the central plateau, and the west coast. . . . It would appear that, except the north and a fairly narrow strip on the east coast, the whole mainland of Madagascar is inhabited by this race.

As a matter of fact the majority of the individuals found north of the Betsiboka River are black-headed and much like the black-headed phase of *L. f. albifrons*; but there can be no doubt that a mixed population is found in a considerable part of the north. At present I am not prepared to say

definitely whether this is due to mutation or, what is more probable, to secondary invasion of the northern area by *L. f. rufus* down the right bank of the Betsiboka River. Red-fronted skins have been recorded from north of the River Betsiboka from Betsako . . . , Narendry Bay . . . , Anorontsanga . . . ; also . . . from Ambatondrazaka, south of Lake Alaotra. Black-headed skins have been recorded from the same general region, but not south of the River Betsiboka. In various cases black- and red-fronted skins are known from the same localities.

Additional localities from which Schwarz records specimens are: Ankona Forest, E. Betsileo; Fianarantsoa; Tuléar, SW. coast; and Morondava, W. coast.

Lorenz-Liburnau (1898, p. 448) records 16 specimens from Kandani and 3 from nearby Antema in the Bay of Bombetoka region.

In the forests in the vicinity of Betsina, west of the Mahavavy River, northwestern Madagascar, this lemur is not rare, and four specimens were secured (Kaudern, 1915, p. 45).

G. M. Allen (1918, p. 515) records "a fine series of six males and ten females, all from localities on the upper Siribihina River [inland from Morondava] and some thirty miles south of Berevo."

"This lemur was common about Tabiky [inland from Cape St. Vincent] in the low dense brush, the wooded plains, and the gallery forest." On one occasion a party of six was seen. (Rand, 1935, p. 98.)

Mayotte Lemur

LEMUR MACACO MAYOTTENSIS Schlegel

Lemur mayottensis Schlegel, Nederl. Tijdschr. Dierk., vol. 3, p. 76, 1866.
("L'île de Mayotte," Comoro Isles.)

FIG.: Schlegel and Pollen, 1868, pl. 2.

In former years the Mayotte Lemur was apparently common, but with the increase of population and cultivation on the island its numbers have probably declined.

Coloration of the head similar to that of *L. f. collaris* but much more pronounced; in old males the snout is deep black, this coloration extending between the eyes to the forehead and continuing as a median stripe to the crown; this color pattern of the head less pronounced in younger males and in females; upper parts grayish brown, speckled with rufous and yellowish gray; rump with a blackish spot; lower parts pale rufous (Schlegel, 1866, pp. 76-77). Total length, 39 inches; tail, 21 inches (Schlegel, 1876, p. 308).

These animals live in bands of 6 to 20 individuals in the virgin forests of Mayotte, where they are hunted with dogs. The flesh is excellent and tastes like that of young rabbits. A favored food of the lemurs is wild dates. A series of 10 specimens is recorded. (Schlegel and Pollen, 1868, pp. 5-6.)

Mongoose Lemur

LEMUR MONGOZ MONGOZ Linnaeus

[*Lemur*] *Mongoz* Linnaeus, Syst. Nat., ed. 12, vol. 1, p. 44, 1766. (Based upon the "Mongooz" of Edwards (1758, p. 12); type locality, "Madagascar.")

SYNONYMS: *Lemur nigrifrons*, *L. albimanus*, and *L. anjuanensis* of É. Geoffroy-Saint-Hilaire (1812); *Prosimia micromongoz*, *P. bugi*, *P. brissonii*, and *P. ocellaris* of Lesson (1840); *Lemur cuvieri* Fitzinger (1870); *Propithecus brissonianus* J. E. Gray (1870).

FIGS.: Edwards, 1758, pt. 1, pl. 216; Schreber, Säugthiere, vol. 1, pls. 39 B, 42 ("Lemur Simia-Sciurus"), 1774; Audebert, 1800, Makis, pl. 1^{re}; Geoffroy and Cuvier, Hist. Nat. Mamm., livr. 2, pl. 11, 1819, livr. 30, pl. 176, 1821; Proc. Zool. Soc. London 1871, pl. 16; Milne Edwards and Grandidier, 1890, pls. 156, 157, 162, 163, 164, 165 (figs. 1, 2); Elliot, 1913, vol. 1, pl. 4, lower fig. ("*Lemur nigrifrons*").

In 1915 this lemur was reported as found now and then in the forests of northwestern Madagascar, but as apparently nowhere common (Kaudern, 1915, p. 43). Concerning its present numerical status on certain islands of the Comoro group we have no information.

Size less than that of a small cat; area about eyes and tip of nose black; area beneath eyes white; upper parts dark brownish ash color; under parts white; tail long (Edwards, 1758, pt. 1, p. 12). A white- and a red-cheeked phase, generally sex-linked; anal region almost naked. "In the red-cheeked phase there is not the black crown-patch found in the male of *L. m. coronatus*, whereas in the white-cheeked phase the colour of the cheeks is brighter than in the female of *L. m. coronatus*, and a large black or blackish crown-patch developed which is absent in that race. The tail is grey or blackish in both sexes in *mongoz*; in *coronatus* it is reddish in the female. As far as my experience goes the males invariably have red and the females white cheeks in all specimens from Anjouan and Moheli, Comoro Island[s]." (Schwarz, 1931, pp. 414-415.)

"This race is found on the Comoro Islands, Anjouan and Moheli, but not on Mayotte On the mainland of Madagascar this form is found on the south bank of the Betsiboka River, which it ascends up to its head-waters." Specimens are recorded from: Anjouan and Moheli Islands; Antema, Bay of Bombétoka, S. bank; and Ambatondrazaka, south of Lake Alaotra. (Schwarz, 1931, p. 416.)

Lorenz-Liburnau (1898, pp. 450-451) records 14 specimens (as *L. albimanus*) from Kandani, and 5 from Antema, on the south side of the Bay of Bombetoka.

G. M. Allen (1918, p. 515) records a specimen from Didy, south of Lake Alaotra.

Petit (1931, p. 560) records a specimen from Ambongo, northwestern Madagascar.

Delacour (1932, p. 219) records 18 specimens of "*Lemur nigrifrons*" collected by the Mission Zoologique Franco-Anglo-Américaine of 1929-31.

Crowned Lemur

LEMUR MONGOZ CORONATUS J. E. Gray

Lemur coronatus J. E. Gray, Ann. Mag. Nat. Hist., ser. 1, vol. 10, no. 65, p. 257, 1842. ("Madagascar"; type locality restricted by Schwarz (1931, p. 416) to "Bay of Mahajamba, N.W. coast (15° 14' S.).")

SYNONYM: *Lemur chrysampyx* Schuermans (1848).

FIGS.: J. E. Gray, Zool. Voy. Sulphur, Mammalia, pl. 4, 1844; Schuermans, Mém. Couronnés et Mém. Savants Étrangers, Acad. Roy. Belgique, vol. 2, pl. facing p. 6, 1848; Milne Edwards and Grandidier, 1890, pls. 158-161, 165 (figs. 3, 4), 166.

This subspecies of northern Madagascar apparently still remains very common.

"Ashy above, limbs and beneath pale yellowish; face white; orbits gray; cheeks and forehead bright rufous, with a large black spot on the crown; tail thick, end blackish" (J. E. Gray, 1842, p. 257). Males with red, females with whitish cheeks; anal region thickly haired; tail reddish in the female (Schwarz, 1931, pp. 414-415).

"This race of *L. mongoz* is found in northern Madagascar, both in the east and west, north of the bays of Bombétoka and Antongil respectively." Specimens are recorded from: Vohémar, NE. coast; Ampasimbato, Central N. Madagascar; Amber Mountains; and Bay of Mahajamba. (Schwarz, 1931, p. 416.)

Lorenz-Liburnau (1898, p. 449) records one specimen from Betsako and four from near-by Ambundubé, north of the Bay of Bombetoka, under the name of *L. mongoz nigrifrons*. According, however, to Schwarz (1931, p. 416), the animals of this area are *coronatus*.

Delacour (1932, p. 219) reports 39 specimens collected by the Mission Zoologique Franco-Anglo-Américaine of 1929-31. Judged on this basis, it is one of the commonest lemurs of Madagascar.

"Very common in the dry wooded areas of the northern savanna, sometimes in rather low dense brush; found also in dry forest on the slopes of Mt. d'Ambre, up to about 800 meters. It was absent, however, from the humid forest on the summit. . . .

"The animals were very tame and the natives sometimes killed them with sticks. . . .

"Near Vohemar, DuMont and I saw a party of seven

"At Tarakibany . . . I saw a party of five." (Rand, 1935, p. 98.)

Red-bellied Lemur

LEMUR RUBRIVENTER I. Geoffroy-Saint-Hilaire

Lemur rubriventer I. Geoffroy-Saint-Hilaire, Compt. Rend. Acad. Sci. [Paris], vol. 31, p. 876 (1850), 1851. ("Madagascar.")

SYNONYMS: *Lemur flaviventer* I. Geoffroy-Saint-Hilaire (1851); *L. rufiventer* J. E. Gray (1870); *Prosimia rufipes* J. E. Gray (1871).

FIGS.: Milne Edwards and Grandidier, 1890, pls. 167-170; J. E. Gray, Proc. Zool. Soc. London 1872, pl. 69.

Even 30 years ago this species was considered rather rare on the eastern coast of Madagascar (Kaudern, 1915, p. 47).

It may be distinguished from all the other lemurs by the rufous-chestnut of its under parts, limbs, and ruff; upper parts speckled rufous-brown; tail blackish (I. Geoffroy-Saint-Hilaire, 1851, p. 876). Elliot (1913, vol. 1, p. 152) adds the following details from the type (a male) in Paris: line from forehead, top of nose, and lips maroon; head above mixed dark brown and buff; body above chocolate-brown; base of tail maroon, rest blackish; total length, 711 mm.; tail, 407 mm. Schlegel's measurements (1876, p. 311) are larger: total length, 38 inches; tail, 20 inches.

Schwarz (1931, p. 417) records specimens from the following localities: Vohémar, NE. coast; Bay of Antongil; Betsimisaraka country, west of Tamatave; Tamatave, NE. coast; Forest of Ankay, NE. of Tananarive; Ambohimombo and Ivohimanitra, N. Tanala country; Vinanitelo, "SW." [=SE.] Betsileo; Manakara River, SE. coast; Mojanga, Bay of Bombétoka; and Morondava, W. coast. "If all these records are correct the range of *L. rubriventer* includes the greater part of Madagascar, not only the eastern forest region, as has hitherto been supposed."

Delacour (1932, p. 219) records 21 specimens collected by the Mission Zoologique Franco-Anglo-Américaine of 1929-31.

"This diurnal lemur was found in small parties similar to the groups of *L. fulvus*. One party contained at least four adults and five young. To the west of Andapa [in northeastern Madagascar] . . . eight young . . . were taken with the adults." (Rand, 1935, p. 98.)

Ruffed Lemur. Vari (Fr.)

LEMUR VARIEGATUS Kerr

L[emur] Macaco variegatus Kerr, Anim. Kingdom of Linnaeus, p. 86, 1792. (Based upon the "Vari" of Smellie's Buffon (vol. 7, pl. 229, 1791?); type locality, "the islands of Madagascar and Johanna, and the neighbouring countries of Africa" = Madagascar.)

SYNONYMS: *Lemur ruber* É. Geoffroy-Saint-Hilaire (1812); *Prosimia erythromela* Lesson (1840); *Lemur varius* I. Geoffroy (1851).

Figs.: Buffon, Hist. Nat., vol. 13, pl. 27, 1765; Schreber, Säugthiere, vol. 1, pl. 40 B, 1774; Audebert, 1800, Makis, pls. 5, 6; Gervais, Hist. Nat. Mammif., pt. 1, pl. 10, 1854; Milne Edwards and Grandidier, 1890, pls. 123-129; Forbes, 1894, vol. 1, pl. 7; Beddard, 1902, p. 542, fig. 259; Elliot, 1913, vol. 1, pl. 5, lower fig. (facing p. 158); Kaudern, 1915, pl. 3, fig. 1.

This lemur is apparently still common in northeastern Madagascar.

"Mostly white in the body; all the paws, the fore-head, the tail, the insides of the thighs, a large blotch on each shoulder, and a long narrow patch on the loin before the upper part of the thigh, are black The muzzle is long and thick, the ears very short, and fringed with long flowing hairs, which join the collar, or hairy ruff, on the neck, cheeks, and throat." (Kerr, 1792, pp. 86-87.) A color phase, described as "*Lemur ruber*," has a general rufous color; head, hands, tail, and abdomen black; a half-collar of white on top of the neck (É. Geoffroy-Saint-Hilaire, 1812, p. 159). Total length 44 inches, of which the tail makes up nearly half (Schlegel, 1876, p. 302).

Schwarz (1931, p. 418) records specimens from: Tombato River; Sakana, opposite the Ile Ste. Marie; Alumanitra Forest; Bay of Antongil; and Ambatondrazaka, south of Lake Alaotra. He adds:

"Black and white and red specimens have been collected in the same place by J. Audebert in the coast region north of the Bay of Antongil. Red specimens are recorded from Maroansetra, Bay of Antongil; Malewo and Andranofotsy, N.E. coast, north of the Bay of Antongil. . . .

"From the material at hand it would thus appear that *Lemur variegatus* is restricted to the forests of N.E. Madagascar. Its northern limit may be about 13° 30' S., its southern range has been ascertained as the region of Tamatave at about 18° S. . . . On the plateau Ambatondrazaka remains the only place known."

Coquerel writes (1859, p. 462) that this animal is sacred to the inhabitants of Tamatave; they say that it worships the sun and prays to it every morning.

Pollen stated (1868, p. 21) that up to that time it had been observed only in the forests of the region between Tintingue, Tamatave, and Antananarivo. It was found there in considerable bands, living on fruits.

Kaudern (1915, p. 43) records specimens from west of Fenerive and south of Tamatave.

G. M. Allen (1918, p. 516) records a specimen from 100 miles west of Tamatave.

The Mission Zoologique Franco-Anglo-Américaine of 1929-31 collected 8 specimens of *variegatus* and 9 of "*ruber*" (Delacour, 1932, p. 219).

"Near Maroantsetra (two days northeast) individuals in the red phase, the only phase seen there, were common. The variegated lemur is diurnal and arboreal, usually seen in pairs." (Rand, 1935, p. 99.)

Weasel Lemur

LEPILEMUR MUSTELINUS I. Geoffroy

Lepilemur mustelinus I. Geoffroy, Cat. Méthod. Mamm. [Mus. Paris], pt. 1, Primates, p. 76, 1851. ("Madagascar"; type locality restricted by Schwarz (1931, p. 420) to "Tamatave.")

SYNONYMS: *Mixocebus caniceps* Peters (1875); *Lepidolemur microdon* Major (1894).

FIGS.: Peters, Monatsb. Preuss. Akad. Wiss. Berlin 1874, pl. 1 (facing p. 694), 1875 (as *Mixocebus caniceps*); Milne Edwards, Grandidier and Filhol, 1897, pl. 255, pl. 259, fig. 1.

Only four specimens of this species were collected by the Mission Zoologique Franco-Anglo-Américaine of 1929-31 (Delacour, 1932, p. 220). This fact, in connection with the meager information concerning the animal, indicates that it is one of the less common of the Madagascar lemurs.

General color rufous; throat white; forehead and cheeks gray; under parts and inner side of limbs yellowish gray; last third of tail brown; rest of tail and lower part of limbs yellowish gray. Head and body, about 350 mm.; tail, 250 mm. (I. Geoffroy, 1851, p. 76.)

"The range of *L. mustelinus* includes the moist east and north-east of Madagascar, at least as far south as Betsileo and as far north as Vohémar. It does not occur in the north-west, where *L. ruficaudatus* is found." Specimens are recorded from: Vohémar; Ankay Forest, NE. of Tananarive; Ampitambe and Antsiraka, Betsimisarakana country; Ankona Forest; Upper Masiatra River, E. Betsileo; and Vinanitelo, "SW." [=SE.] Betsileo. (Schwarz, 1931, p. 420.)

G. M. Allen (1918, p. 516) records a specimen from Didy, south of Lake Alaotra.

All the localities of this species are on the eastern slope of the island, from Vohémar on the north to Vinanitelo on the south; these localities are littoral or belong to the region of the Hauts-Plateaux. The altitudes where it is found vary from less than 100 m. to more than 1,000 m. It is probably divisible into subspecies not yet determined. All alleged records from the west coast really belong to *L. ruficaudatus*. (Petit, 1933, p. 34.)

Red-tailed Lemur. Hattock (Madagascar)

LEPILEMUR RUFICAUDATUS Grandidier

Lepilemur ruficaudatus Grandidier, Rev. Mag. Zool., ser. 2, vol. 19, p. 256, 1867.¹ ("La côte sud-ouest de Madagascar"; type locality restricted by Elliot (1913, vol. 1, pp. 122) to "Morondava, Madagascar.")

SYNONYMS: *Lepilemur dorsalis* Gray (1870); *L. pallidicauda* Gray (1873); *Lepidolemur leucopus* Major (1894); *L. edwardsi* Major (1894); *L. globiceps* Major (1894); *L. grandidieri* Major (1894); *L. mustelinus rufescens* Lorenz-Liburnau (1898).

FIGS.: Forbes, 1894, vol. 1, pl. 9 (as *L. leucopus*); Milne Edwards, Grandidier and Filhol, 1897, pl. 256 (as *L. m. var. dorsalis*), pl. 257, pl. 258 (as *L. m. var. leucopus*), pl. 259 (as *L. dorsalis*); Lorenz-Liburnau, 1898, pl. 30 (as *L. m. rufescens*); Kaudern, 1915, pl. 1, fig. 3, pl. 2, fig. 2 (as *L. m. rufescens*).

This is apparently a rather common as well as widespread species in western and southern Madagascar. No less than 36 specimens were collected by the Mission Zoologique Franco-Anglo-Américaine of 1929-31 (Delacour, 1932, p. 220).

General color ashy rufous; head blackish; hind limbs pale ashy; tail reddish; throat fulvous; abdomen whitish. Total length, 560 mm.; tail, 250 mm. (Grandidier, 1867, p. 256.)

Schwarz (1931, pp. 420-421) records specimens from the following localities: Loko-Bé, Nosy Bé Island, NW. Madagascar; Betsako, north bank, Bay of Bombétoka; Ambundubé, near Betsako; Antema and Kandani, south bank, Bay of Bombétoka; Morondava, W. coast; Ambolisatra, SW. coast; and Fort Dauphin, SE. coast. "This species has also been recorded by Pollen and van Dam from various points on the N.W. coast: Anorontsanga, Jangoa River, Ampasindava, all at or near the Bay of Ampasi[n]dava; also from the Bay of Mahajamba. The range, therefore, covers the entire west coast, including the north-west and south-east, but not the central plateau. The northern and eastern limits remain to be ascertained." (P. 421.)

Schlegel and Pollen write (1868, p. 12) concerning this species (under the name of *L. mustelinus*) that it is very stupid and more slothful than *Hapalemur griseus*. The natives of the northwest say that they sometimes kill it in daytime with sticks and eat its flesh. It is nocturnal, and its food consists of buds and leaves of trees as well as certain fruits.

Kaudern (1915, p. 74) records several specimens from Ste. Marie de Marovoay on the Betsiboka River, northwestern Madagascar.

¹Petit (1933, pp. 36-37) recognizes three subspecies, including *L. r. dorsalis* Gray and *L. r. leucopus* Major. However, he attempts to distinguish *dorsalis* from *ruficaudatus* in part by "a more russet coloration" and by "a constant and more distinct dorsal band," in contradiction to Gray's type description of *dorsalis* (1870, p. 135): "Back grey, yellow-washed; dorsal stripe none." As for *leucopus*, Schwarz states (1931, p. 420) that "the type-specimen is in every respect typical *ruficaudatus*."

In recognizing *dorsalis* as a subspecies, Petit states (1933, p. 37) that it inhabits the Mahafaly and Antandroy districts, and disappears abruptly with the very distinct limit of the xerophytic vegetation near Bevilana, west of Fort Dauphin. The same author (1935, p. 474) remarks on its former presence in the Manampetsa Reserve in the southwest, but it was not found there in 1932 or 1933.

Rand (1935, p. 99) records the "Hattock" from Tabiky and Tsarakibany.

Family INDRIIDAE: Sifakas, Indri, Avahis

The Sifakas and their relatives constitute a family of 3 genera and 13 forms. All are endemic to Madagascar. Some of the natives have a certain degree of superstitious veneration for the elegantly attired Sifakas and the Indri, and yet the animals are not altogether free from persecution. In numerical status they vary from common to rare. Their limited distribution and their uncertain future render all of them suitable subjects for inclusion in the present report.

Diademed Sifaka. Propithèque à diadème (Fr.)

PROPIITHECUS DIADEMA DIADEMA Bennett

Propithecus Diadema Bennett, Proc. Zool. Soc. London 1832, p. 20, 1832. ("Madagascar"; type locality restricted by Milne Edwards and Grandidier (1875, p. 300) to "la côte Est de Madagascar."¹)

SYNONYMS: *Macromerus typicus* A. Smith (1833); *Indris albus* Vinson (1862). FIGS.: Gervais, Hist. Nat. Mammif., pt. 1, pl. 8, 1854; Milne Edwards and Grandidier, 1875, pl. 1.

Over a hundred years ago this Sifaka was said to be rare, and it is apparently still more so today. The Mission Zoologique Franco-Anglo-Américaine of 1929-31 collected only three specimens—the smallest number reported for any of the Madagascar lemuroids (Delacour, 1932, p. 220).

Face nearly naked; hairs generally long, silky, waved, erect, and glossy; ears rounded, concealed within the fur; a yellowish-white band extending across the forehead and below the ears to the throat; crown, nape, and hands black; shoulders, sides, and lower back mixed black and white; limbs, rump, and tail pale fulvous; throat like sides, rest of under parts white. Head and body, 21 inches; tail, 17 inches. (Bennett, 1832, pp. 20-21.)

This subspecies is found only between the Bay of Antongil on the north and the Masora River on the south [at about lat. 20° S.],

¹ Elliot (1913, vol. 1, pp. 169, 171) attempts the impossible in stating that Sambava, northeastern Madagascar, is the type locality of this subspecies as well as of *P. d. sericeus*. For the latter he also attempts to switch Sambava to the northwest coast.

in the narrow bands of forests on the eastern slope of the mountains (Milne Edwards and Grandidier, 1875, p. 300).

"It is stated to be rare" (Bennett, 1832, p. 22).

G. M. Allen (1918, p. 515) records a specimen from Didy, south of Lake Alaotra.

Schwarz (1931, p. 422) mentions specimens from: Tamatave, NE. coast; Andragoloaka, SE. of Tananarive; and Mananare, Bay of Antongil.

Silky Sifaka. *Propithecus soyeux* (Fr.)

PROPITHECUS DIADEMA CANDIDUS Grandidier

Propithecus candidus Grandidier, Compt. Rend. Acad. Sci. [Paris], vol. 72, p. 232, 1871. ("Les forêts au nord de la baie d'Antongil, sur la côte est de Madagascar"; type locality restricted by Schwarz (1931, p. 421) to "Sahambavany, N.E. coast" of Madagascar.)

SYNONYM: *Propithecus sericeus* Milne-Edwards and Grandidier (1872).

FIG.: Milne Edwards and Grandidier, 1875b, pl. 2.

This Sifaka has a limited range in the northeast of Madagascar, and its numbers are apparently few.

It is distinguished from *P. verreauxi* by its entirely white color, without black crown or ashy spot on the back (Grandidier, 1871, p. 232). Muzzle bare, black, with spots of flesh color; pelage generally entirely white, with silky reflections and washed lightly with yellow; hairs at base of tail and beneath claws rufous; various intergradations between this subspecies and *P. d. diadema* observed (Milne Edwards and Grandidier, 1875a, p. 301). Head and body, 620 mm.; tail, 400 mm. (Milne-Edwards and Grandidier, 1872, p. 274).

Schwarz (1931, pp. 421-422) records specimens from Sahambavany, NE. coast, and from Antsompirina and Ansandrizina, NE. coast (probably on the peninsula which forms the eastern border of the Bay of Antongil). "The range of this race includes the north-eastern coast ranges of the island from the region of Bemarivo (14° 16' 30" S.), which is the northernmost locality recorded, to the Bay of Antongil; I suppose the Tsingambala River, at the northern end of the bay, will be found to separate the range of *candidus* from that of *diadema*."

The Silky Sifakas inhabit the narrow bands of forests covering the eastern slope of the mountains in the northeast, between the Lokoy River (13 miles south of Sambava) and the Bemarivo River (10 miles north of Sambava). They go ordinarily in smaller bands than their congeners; scarcely more than three or four are found together. (Milne Edwards and Grandidier, 1875a, p. 302.)

Elliot (1913, vol. 1, p. 171) is in error in placing the range in northwestern, instead of northeastern, Madagascar.

The Mission Zoologique Franco-Anglo-Américaine of 1929-31 collected six specimens (Delacour, 1932, p. 220).

Milne-Edwards's Sifaka. Propithecus d'Edwards (Fr.)

PROPITHECUS DIADEMA EDWARDSI Grandidier

Propithecus Edwardsi Grandidier, Compt. Rend. Acad. Sci. [Paris], vol. 72, p. 232, 1871. ("Les forêts situées dans l'ouest de Mananzary, à Madagascar"; type locality further delimited by Milne Edwards and Grandidier (1875a, p. 303) as "la forêt de Manampahy," in southeastern Madagascar.)

SYNONYM: *Propithecus bicolor* Gray (1872).

FIG.: Milne Edwards and Grandidier, 1875b, pl. 3.

No information is at hand concerning the numerical status of this subspecies.

It is entirely black, save for an area of rufous-white on each side of the loins; face naked and black; ears well developed and covered with long hairs. Head and body, 640 mm.; tail, 460 mm. (Grandidier, 1871, p. 232.) Milne Edwards and Grandidier (1875a, p. 303) give additional details: black areas lightly washed with rufous; a narrow band of reddish black separating the light lumbar areas; a light reddish spot at the base of the tail; considerable variation in coloration evident, some individuals exhibiting an approach to *P. d. diadema*, and others to *P. d. holomelas*.

This Sifaka inhabits the narrow bands of forests that partly cover the eastern slope of the mountains between the Rivers Masora (about 20° S.) and Matitanana (about 22° S.) (Milne Edwards and Grandidier, 1875a, pp. 304-305).

Schwarz (1931, p. 422) is in error in placing the type locality east of Masindrano, which would be somewhere in the Indian Ocean. He records specimens from: Ampitambé, Betsimisaraka country; Ivohimanitra, Tanala; Ambohimotombo, N. Tanala; and Vinanitelo, "S.W." [=S.E.] Betsileo. "The specimens from Vinanitelo would indicate a considerable extension of the range on the central plateau."

Black Sifaka

PROPITHECUS DIADEMA HOLOMELAS Günther

Propithecus holomelas Günther, Ann. Mag. Nat. Hist., ser. 4, vol. 16, p. 125, 1875. ("Fienerentova" = Fianarantsoa, central Betsileo, Madagascar.)

Very little information about the Black Sifaka has ever been assembled.

Nearly as large as *P. d. edwardsi*. "Throat and all the lower parts covered with dense fine woolly hair. Male with a small patch of ferruginous hairs . . . in the middle of the chest . . . ; in the

female this patch is replaced by two smaller ones . . . of a whitish colour. All the upper parts deep black, except the back of the root of the tail, which is brownish. Abdomen greyish brown. A few whitish hairs at the extremity of the tail." Head and body, 23 inches; tail, 15-16 inches. (Günther, 1875*a*, p. 125.)

Schwarz (1931, p. 423) records specimens from: Fianarantsoa; S. Betsileo; Nandihizana, N. Betsileo; and "Ambavombé," south [=west?] of Fort Dauphin, S. coast. "The range of this race appears to be the inland mountain range in the south-east of Madagascar, whereas *P. d. edwardsi* inhabits the coast range. I have little doubt as regards the distinctness of the two races."

Verreaux's Sifaka. Propithèque de Verreaux (Fr.)

PROPIHÆCUS VERREAUXI VERREAUXI Grandidier

Propithecus Verreauxi Grandidier, Rev. Mag. Zool., ser. 2, vol. 19, p. 84, 1867.

("Les contrées arides et sablonneuses où habitent les Antandrouïs, les Mahfales, et les Antitenes"; type locality restricted by Schwarz (1931, p. 424) to "Tsifanihy, Prov. Antandroy, north of Cape Ste. Marie, S. Madagascar." "Mananzari," erroneously stated by Elliot (1913, vol. 1, p. 172) to be the type locality, is outside the entire range of the species.)

FIGS.: Grandidier, Album de l'île de la Réunion, vol. 4, pls. 1, 2, 1867; Milne Edwards and Grandidier, 1875*b*, pls. 4, 8.

This Sifaka has been reported as common in Madagascar from Flacourt's time (1661) to the present.

It is similar to *P. d. diadema* but with a smaller body, longer tail, and more whitish pelage; crown and nape rufous-brown; shoulders and sides yellowish white; a gray dorsal patch often present; limbs and hands white; face black, almost naked, with some white hairs; under parts and inner side of limbs white; tail white except at base; throat with a small longitudinal rufous spot. Head and body, 490-500 mm.; tail, 450-600 mm. (Grandidier, 1867*a*, p. 84.)

Schwarz (1931, p. 424) records specimens from: Tuléar, SW. coast; Morondava, W. coast; Bemamanga near Morondava; Antanosy country; and Ankazoabo, central SW. Madagascar. "According to A. Milne-Edwards and Grandidier the range of *P. v. verreauxi* includes the whole south-western part of Madagascar from the Tsidsobon River on the west coast to the region of Ft. Dauphin in the south-east. Nothing is known of the exact limits of the range, neither in the east, where it should meet *P. d. holomelas*, nor in the west, where no record exists for the region between the Mananbolo and Tsidsobon Rivers, where either this race or *P. v. deckeni* should occur."

Flacourt (1661, p. 153) reported many of these Sifakas in the

region west of Fort Dauphin. More than two centuries then elapsed before they were rediscovered and named by Grandidier.

They inhabit the arid coasts in the south and the southwest, from Andrahoumbe to the Tsidsibon River. They are always found in bands of 10 to 12 individuals. They are diurnal and feed upon young shoots of trees and upon fruits. (Grandidier, 1867*a*, p. 84, and 1867*c*, p. 313.)

In 1866 Grandidier encountered this Sifaka some leagues north of the village of the Antandroy king, Tsifanihy, in the vicinity of Cape Ste. Marie. Here he found it regarded with a certain veneration by the natives; they objected to his skinning and dissecting a specimen in their village, and they buried the remains ceremoniously at some distance from the village. Later he secured a large number at various points on the southwestern coast, especially along the Morondava River, and at one time he had 15 living individuals. The natives capture them by means of snares in the clearings. The animals never lived long in captivity. (Milne Edwards and Grandidier, 1875*a*, pp. 308-311.)

"This species was common on the Upper Siribihina River [inland from Morondava], and at a locality twenty-five kilometers east of Tulear" (G. M. Allen, 1918, p. 515).

Petit (1931, p. 559) records a specimen from the vicinity of Androka, in the Mahafaly country.

The Mission Zoologique Franco-Anglo-Américaine of 1929-31 collected 18 specimens (Delacour, 1932, p. 220).

"The brown-capped *Propithecus* was very common in the wooded areas of the southwest. A diurnal, arboreal creature, it was usually seen in parties of five to eight. . . .

"They were usually not at all wild and could be watched at close range. . . . Near Tulear . . . a group in the trees by the roadside" was noticed.

"Green leaves of trees are probably their staple food. . . . The animals were often seen to feed on leaves and the young one I kept for a time ate them eagerly." (Rand, 1935, pp. 100-101.)

This Sifaka has become rare in the Manampetsa Reserve in the southwest (Petit, 1935, p. 474).

Coquerel's Sifaka. *Propithecus de Coquerel* (Fr.)

PROPITHECUS VERREAUXI COQUERELI A. Milne-Edwards

Propithecus Coquereli A. Milne-Edwards, in Grandidier, Rev. Mag. Zool., ser. 2, vol. 19, p. 314, 1867. ("Nord-est" = probably northwestern Madagascar.)

SYNONYM: *Propithecus damonis* J. E. Gray (1870).

FIGS.: Milne Edwards and Grandidier, 1875*b*, pl. 6; Forbes, 1894, vol. 1, pl. 11; Kaudern, 1915, pl. 1, fig. 1.

Up to about 30 years ago, Coquerel's Sifaka was very common in parts of northwestern Madagascar (Kaudern, 1915, p. 4). On the other hand, not a single specimen seems to have been taken by the Mission Zoologique Franco-Anglo-Américaine of 1929-31 (Delacour, 1932, p. 220).

General color white; a band of reddish brown extending across the chest and onto the arms; a spot of the same color on the upper part of the legs; crown, hands, and inner side of the limbs pure white; face covered with very short white hairs; tail slender; fur woolly. Head and body of the type (a young individual), 250 mm.; tail, 220 mm. (A. Milne-Edwards, in Grandidier, 1867c, p. 314.) Adults have the head, cheeks, nape, and back yellowish white; loins dark reddish gray; sides and pelvic region dirty white; outer side of arms and anterior side of thigh dark chestnut-rufous; tail reddish gray (Milne Edwards and Grandidier, 1875a, p. 315). Total length of adults, 3 feet 4 inches (Schlegel, 1876, p. 293).

This Sifaka is found only on the northwest coast of Madagascar, from the south side of Narinda Bay to the north side of the Bay of Bombetoka, between the Rivers Loza and Betsiboka. Numerous specimens from this region have been examined. (Milne Edwards and Grandidier, 1876, pp. 315-316.)

Lorenz-Liburnau (1898, p. 454) records five specimens from Betsako and two from near-by Ambundubé, north of the Bay of Bombetoka.

The animal is very common in the forests on the Ankarafantsika Plateau, where it wanders about in bands of 3 to 10 or 12 individuals. It was observed in several places between the Betsiboka and Mahajamba Rivers. At Ste. Marie de Marovoay, on the Betsiboka, several hundred were seen in the wild, and about 60 specimens were shot. (Kaudern, 1915, p. 4, map, p. 5.)

Additional specimens from Island Nosy Komba and from Ambatondrazaka, south of Lake Alaotra, are recorded by Schwarz (1931, p. 423). "The specimen from Ambatondrazaka . . . shows an eastern extension of the range as far as Lake Alaotra."

Crowned Sifaka. Propithèque couronné (Fr.)

PROPIHTECUS VERREAUXI CORONATUS A. Milne Edwards

P[ropithecus] coronatus "Pollen" A. Milne Edwards, Rev. Scientifique, ser. 2, year 1, no. 10, p. 224, 1871. (Type locality not stated; restricted by Elliot (1913, vol. 1, p. 174) to "Province of Boeny on the Bay of Bombetok, Madagascar.")

SYNONYM: *Propithecus damanus* Schlegel (1876).

FIG.: Milne Edwards and Grandidier, 1875b, pl. 7.

About 30 years ago the Crowned Sifaka was reported as common (Kaudern, 1915, p. 6), but apparently none were taken by the

Mission Zoologique Franco-Anglo-Américaine of 1929-31 (Delacour, 1932, p. 220).

General color white; chest washed with brown; crown black (A. Milne Edwards, 1871, p. 224). Similar in size to *P. v. verreauxi*; forehead, head, and cheeks varying from dark blackish brown to reddish gray; nape and remaining upper parts white, more or less washed with rufous on the limbs and at the base of the tail; a gray or brown spot on the nape; tail and hands white; under parts varying from light rufous to very dark rufous-brown (Milne Edwards and Grandidier, 1876, pp. 318-319). Total length, 3 feet 5 inches; tail, 21 inches (Schlegel, 1876, p. 294).

This Sifaka inhabits the Boeny country, which is comprised between the sea on the north, the Betsiboka River on the east, and the Manzaray [Mahavavy] River on the west. In the south some were killed by Crossley not far from the great forest of Manerinerina, where he secured a large number of Decken's Sifaka. (Milne Edwards and Grandidier, 1876, p. 319.)

Lorenz-Liburnau (1898, p. 453) records 4 specimens from Antema and 21 from Kandani.

A small band was seen in 1906 on the west side of the Betsiboka River opposite Marovoay, and two specimens were collected in 1912 near the coast between the Bay of Bombetoka and the Mahavavy River. It is not rare along this part of the coast, and it is very common in the great forests on the Boeny Mountains. It does not seem to occur east of the Betsiboka or west of the Mahavavy River. (Kaudern, 1915, p. 6, map, p. 5.)

Decken's Sifaka. Propithecus de Decken (Fr.)

PROPITHECUS VERREAUXI DECKENII Peters

Propithecus Deckenii Peters, Monatsb. Preuss. Akad. Wiss. Berlin 1870, p. 421, 1871. ("Kanatzi [= Kanatsy], im 18° s. Br. an der Westküste von Madagaskar" (Peters, 1869, p. 4).)

Figs.: Peters, 1869, pl. 1 (as *P. diadema*); Milne Edwards and Grandidier, 1875*b*, pl. 5.

This is still a common animal in western Madagascar.

The (immature?) type female is described by Peters (1871, p. 421) as having the hands and head yellowish white like the rest of the body; lumbar region and sides washed with gray; face black, with a whitish spot on the ridge of the snout; tail as long as, or longer than, the head and body. Milne Edwards and Grandidier add (1876, pp. 313-314) that adults have a little black diadem in front of the white crown; upper chest bright rufous; rest of under parts reddish white; a tawny spot at the base of the white tail. Total length 42 inches, of which the tail occupies half (Schlegel, 1876, p. 295).

Crossley secured a number of specimens in the Forest of Manerine-rina and in the plains north of Ankavandra [lat. 19° 15' S.]. These Sifakas inhabit the forests scattered here and there in the midst of the great Jurassic plains lying between the Mananbolo and Manzaray [=Mahavavy] Rivers. The Antimailaka natives consider them sacred animals and never kill them. (Milne Edwards and Grandier, 1876, pp. 313-314.)

Decken's Sifaka is very common in the forests south of Lake Kinkony (near the lower Mahavavy), and five specimens were obtained there. It is said not to occur in the forests between this lake and Cape Tanjona. The Mahavavy River appears to form its north-eastern limit. (Kaudern, 1915, pp. 6-7, map, p. 5.)

Beravina, 17° 10' S., NW. coast, is one of the localities from which Schwarz (1931, p. 424) records specimens.

No less than 30 specimens were collected by the Mission Zoologique Franco-Anglo-Américaine of 1929-31 (Delacour, 1932, p. 220).

"This *Propithecus* was common in the country from Namoroka to the Mahavavy Rivers, and a number apparently of the same subspecies were seen between the Mahavavy and Betsiboka Rivers. . . .

"This is a common, diurnal animal, found in parties of sometimes as many as nine individuals. It frequented the heavy gallery forest, the lower, dryer forest, and at Soala I found a party in the coast mangroves. . . . We found them rather tame here and easily approached." (Rand, 1935, p. 99.)

Major's Sifaka

PROPITHECUS VERREAUXI MAJORI Rothschild

Propithecus majori Rothschild, Novit. Zool., vol. 1, p. 666, 1894. ("The Antinosy country in south-west Madagascar"; according to Schwarz (1931, p. 424), this is the "country of the emigrated Antanosy, S. Central Madagascar.")

FIG.: Rothschild, 1894, pl. 14.

Apparently no additional information has been secured concerning this Sifaka since the original series was collected in 1889 and described in 1894.

"Adult.—Head and neck black. Face, snout, and ears naked, and of a blackish colour, encircled by a broad band of long white hairs, joining under the throat, slightly intermixed with darker hairs. Rest of fur, including the tail, white on the upper surface, back and upper rump dark brown. The large white patch on and between the shoulders much grizzled with brown hairs. Upper surface of hind limbs to just below the knees blackish brown. Inside

of hind limbs down to the heel also brown, joining the colour of the upper surface, thus forming a continuous dark stripe along the legs. Inner and upper surface of arms, thumb, and two following fingers deep blackish brown; throat, chest, and greater part of abdomen deep brown. Size perceptibly larger than that of *Propithecus verreauxi*, with the tail longer.

"A number of specimens, all perfectly alike in colour, were sent to me by Mr. Last from the *Antinosy country* in south-west Madagascar. The collector also found *Propithecus verreauxi* Grandid. in the same country, some with the back much darker than others, but no specimens in any way intermediate between it and *P. majori*." (Rothschild, 1894, p. 666.)

"There are four more skins exactly like the type in the Tring Museum.

"The original label only says 'Antinosy' (=Antanosy) country. It would appear that this means the mountain range round and east of Manansoa (23° 3' S., 44° 50' E.), where J. T. Last was collecting in 1889. The specimens of true *verreauxi* collected by Last and also labelled 'Antinosy country' are probably from the plains farther west, and collected on the way to or from Tuléar, on the S.W. coast. Only the original series of this race is known." (Schwarz, 1931, p. 424.)

Perrier's Sifaka

PROPITHECUS FERRIERI Lavauden

Propithecus Perrieri Lavauden, Comptes Rendus Acad. Sci. [Paris], vol. 193, no. 1, p. 77, 1931. ("Forêt d'Analamera, située au sud-est de Diego-Suarez, dans le nord de Madagascar.")

This Sifaka is known only from a few specimens collected in the Forest of Analamera, which covers an area of 5,000 or 6,000 hectares.

It bears some resemblance to *Propithecus verreauxi coquereli* of western Madagascar but differs especially in its color. The entire pelage is velvety black; ears small and glabrous; eyes brown. Head and body, 500 mm.; tail, 450 mm.

It may seem surprising that this species has remained unknown until so recently. The explanation lies in the fact that both the animal itself and the forest in which it lives are strictly taboo to the local Antakara natives. They give it the name of "Radjako"; this was the name of a legendary hero among their ancestors. Few Europeans have penetrated the Forest of Analamera. (Lavauden, 1931, pp. 78-79.)

G. M. Allen (1939*b*, p. 133) regards the type specimen as "probably a melanistic individual of *P. v. coquereli*."

Indri; Indris; Endrina. Indri (Fr.)

INDRI INDRI (J. F. Gmelin)

[Lemur] *Indri* J. F. Gmelin, Syst. Nat., vol. 1, pt. 1, p. 42, 1788. (Based upon the "Indri" of Sonnerat (Voy. Indes or. et Chine, vol. 2, p. 142, 1782); type locality, "Madagascar.")

SYNONYMS: *Indris brevicaudatus* É. Geoffroy (1796); *Indri niger* Lacépède (1800); *Indris ater* I. Geoffroy (1825); *Lichanotus mitratus* Peters (1871); *Indris variegatus* Gray (1872).

FIGS.: Sonnerat, 1782, vol. 2, pl. 88; Audebert, Hist. Nat. Makis, pl. 1, 1800; Milne Edwards and Grandidier, 1875*b*, pls. 11, 12; Royal Nat. Hist., vol. 1, p. 204, fig., 1893-94; Forbes, 1894, pl. 12.

The distribution of the Indri appears to be subject to considerable local variation, but here and there in eastern Madagascar it is still common.

This is the largest of the lemurs; it is almost entirely black; fur silky and dense; snout, posterior under parts, back of thighs, and lower arms grayish; rump white, with woolly hair; tail perceptible only to the touch (Sonnerat, 1782, vol. 2, p. 142; J. F. Gmelin, 1788, vol. 1, p. 42). It exhibits "a great variety of color pattern as well as diversity of hues" (Elliot, 1913, vol. 1, p. 177). Head and body, 650 mm.; tail, 60-70 mm. (Milne Edwards and Grandidier, 1875*a*, p. 337).

Elliot (1913, vol. 1, p. 176) gives the range as "eastern coast of Madagascar, in forests on the eastern side of the high mountains between the Bay of Antongil on the north and the River Masara on the south."

According to Sonnerat (1782, vol. 2, p. 142), the natives of the south capture the animals when young, rear them, and train them like dogs for hunting.

Pollen writes (1868, pp. 20-21) that up to that time the Indri was known only from the interior of eastern Madagascar. His friend Dr. Vinson reported that while passing through the great forest of Alanamasoatrao he was deafened, during two days, by the incessant clamor of apparently numerous but invisible bands of these animals. The natives have a superstitious veneration for the Indri, and it plays quite a part in their folklore. It feeds upon fruits and also preys upon small birds.

Milne Edwards and Grandidier state (1875*a*, pp. 340-341) that the species lives only on the eastern slope of the great massif between the Bay of Antongil and the River Masora. It is essentially diurnal and lives in bands, usually of no more than 4 or 5 individuals. They refute Sonnerat's tale of its being trained by the natives for hunting.

"This Lemuroid is probably the best known to travellers in Madagascar, at least by ear, as no one can travel along the most

frequented route in the island, that from Tamatave to Antananarivo, without often hearing the cries of these animals as he passes through the great forest. They are not often seen." (Forbes, 1894, vol. 1, p. 109.)

Schwarz (1931, p. 425) records specimens from the following localities: Vohémar, NE. coast; Lalo River and Antsompirina, east of the Bay of Antongil; Sakana, opposite the Ile Ste. Marie; Tamatave; Antsihanaka Forest, Lake Alaotra.

Specimens to the number of 16 were collected by the Mission Zoologique Franco-Anglo-Américaine of 1929-31 (Delacour, 1932, p. 219).

Rand writes as follows (1935, pp. 101-102):

We encountered the indri only in the heavy forest of the northeast, from sea level to 1800 meters, and found some surprising discrepancies in their range. About the Bay of Antongil they were common forty kilometers northwest of Maroantsetra, but at Maroantsetra, two days northeast, altitude 1000 meters, where the forest was equally heavy and continuous with that near Maroantsetra, none were found. Again, east and north of Andapa there is magnificent humid forest but none were heard in it, although west of Andapa, perhaps eight kilometers away in similar forest continuous with the former, they were common. . . .

The flesh of these creatures was well flavored but usually so tough and hard even when the animals were fat that it was rather unsatisfactory food.

Many writers have said that this species is sacred to the Malagash. This certainly is not true for the Malagash as a whole, for the people of the south who had migrated to this part of the island had no objection to skinning or eating these creatures, and even the native Betsimisaraka and Tsimihity were quite ready to assist us in locating and shooting them, though the Tsimihity at Andapa, one day west, would not eat the flesh.

Eastern Woolly Avahi. *Avahis laineux oriental* (Fr.)

AVAHI LANIGER LANIGER (J. F. Gmelin)

[*Lemur*] *laniger* J. F. Gmelin, Syst. Nat., vol. 1, pt. 1, p. 44, 1788. ("Madagascar." Lorenz-Liburnau (1898, p. 452) restricts this subspecies to the east coast, and refers to Milne Edwards and Grandidier (1875*a, b*), whose pl. 9 represents a specimen from the Bay of Antongil. The vicinity of this bay may be considered the restricted type locality.)

SYNONYMS: *Lemur brunneus* Link (1795); *Lemur lanatus* Schreber (1800?); *Indris longicaudatus* É. Geoffroy (1812); *Semnocebus avahi* Lesson (1840); *Avahis laniger orientalis* Lorenz-Liburnau (1898).

FIGS.: Sonnerat, Voy. Indes or. et Chine, vol. 2, pl. 89, 1782; Schreber, Säugthiere, vol. 5, pl. 42 A, 1800(?); Gervais, Hist. Nat. Mammif., pt. 1, pl. 7, 1854; Proc. Zool. Soc. London 1866, pl. 15; Milne Edwards and Grandidier, 1875*b*, pl. 9; Forbes, 1894, pl. 10; Elliot, 1913, vol. 1, col. pl. 7.

At the present time this appears to be one of the less common of the Madagascar lemurs.

The hair is long and woolly, mouse gray at the base, reddish brown in the middle, black at the tips; face broad, covered with

grayish-brown hairs; nose-pad alone nude; ears concealed, rufous; a whitish band across the forehead, bordered anteriorly by a black band; back grayish brown; a patch over the rump and region about the base of the tail white, washed with rufous; under parts and inner surface of limbs gray, washed with rufous; tail bright dark red, deepest at its extremity (Forbes, 1894, p. 95). Body, 300 mm.; tail, 390 mm. (Milne Edwards and Grandidier, 1875*a*, p. 327).

"*A. l. laniger* inhabits the whole forest region of north-eastern, eastern, and south-central Madagascar." Specimens are recorded from the following localities: Vohémar, NE. coast; Lakato Forest, Ankey, NE. of Tananarive; Ambohitra, Kolaby Forest, N. Betsileo; Vinanitelo, "S.W." [=S.E.], Betsileo; Fianarantsoa, central Betsileo. (Schwarz, 1931, p. 426.)

According to Pollen (1868, p. 21), this species appears to be more common than the Indri. It is recorded from the Île Sainte-Marie as well as from the mainland of Madagascar.

The Avahi does not live in bands, but is always found singly or in pairs. Its diet is exclusively vegetable. (Milne Edwards and Grandidier, 1875*a*, p. 329; 1875*b*, map, pl. 122.)

"The first specimen . . . was brought to Europe by Sonnerat . . . in 1781, and nearly half a century elapsed before a second one was obtained" (Forbes, 1894, p. 96).

G. M. Allen (1918, p. 515) records a specimen from the Eastern Forest.

The Mission Zoologique Franco-Anglo-Américaine of 1929-31 obtained only 9 specimens (Delacour, 1932, p. 219).

Rand (1935, p. 102) records several individuals, including a party of three, from the vicinity of Vondrozo in the southeast.

Western Woolly Avahi. *Avahis laineux occidental* (Fr.)

AVAHI LANIGER OCCIDENTALIS (Lorenz-Liburnau)

Avahis laniger occidentalis Lorenz-Liburnau, Abh. Senckenb. Naturf. Ges., vol. 21, p. 452, 1898. ("Ambundubé," near Betsako, near Majunga, north-western Madagascar.)

FIG.: Milne Edwards and Grandidier, 1875*b*, pl. 10.

According to native report, this animal is not uncommon on the Ankarafantsika Plateau and on the Bongolava of northwestern Madagascar (Kaudern, 1915, p. 2).

Upper parts gray, with a yellowish-brown shade; woolly hair at the base of the tail thin; tail reddish brown, toward the end more blackish brown; hands and feet yellowish brown; face whitish; under parts cream-colored. Body, 330 mm.; tail, 195 mm. (Lorenz-Liburnau, 1898, p. 452).

Milne Edwards and Grandidier wrote (1875*a*, p. 329) that this

western form occurs between Mount d'Ambre and Anorontsangana, near the Bay of Passandava. Since then the range has been extended considerably to the southward.

"Collected by van Dam at Kakamba and Ampasidava, N.W. coast, by Voeltzkow and [=at] Ambundubé near Betsako, and by Kaudern from the Mahajamba River near Ste. Marie de Marovoay. The range of this race includes the north-west coast as far south as the Bay of Bombétoka; the northern and eastern limits are not certain." (Schwarz, 1931, p. 427.)

Family DAUBENTONIIDAE: Aye-aye

The single representative of this family, the remarkable Aye-aye, occurs in Madagascar, where it is decidedly rare.

Aye-aye

DAUBENTONIA MADAGASCARIENSIS (J. F. Gmelin)

[*Sciurus*] *madagascariensis* J. F. Gmelin, Syst. Nat., vol. 1, pt. 1, p. 152, 1788. (Based upon the "Aye-aye" of Sonnerat (Voy. Indes or. et Chine, vol. 2, p. 137, 1782); type locality, "in occidentali parte insulae Madagascar.")

SYNONYM: *Lemur psilodactylus* Schreber (Säugethiere, vol. 4, pl. 38 D, 1800?); *Cheiromys madagascariensis* var. *laniger* G. Grandidier (1929).

FIGS: Sonnerat, Voy. Indes or. et Chine, vol. 2, pl. 86, 1782; Schreber, Säugethiere, vol. 4, pl. 38 D, 1800?; Owen, 1863, pls. 14-19; Wolf, 1867, pl. 3; Royal Nat. Hist., vol. 1, p. 241, fig., 1893-94; Forbes, 1894, pl. 1; Beddard, 1902, p. 548, fig. 263; Lydekker, 1903, frontisp.; Elliot, 1907, p. 552, fig. 80; Elliot, 1913, vol. 1, pl. 1; G. Grandidier, Bull. Acad. Malgache, n. s., vol. 11, pl. facing p. 101, (1928) 1929.

The Aye-aye is perhaps the rarest as well as the most interesting of all the surviving lemurs of Madagascar.

The head is short and round; patches of bristles above eyes and nose and on cheeks and chin; eyes round, prominent; ears large, rounded, naked, black; tail bushy, with hairs 3-4 inches long; middle digit attenuated and wirelike. Fur on back, flanks, tail, and limbs dark brown, nearly black; long hairs on top of head and back of neck tipped with white; face, throat, under parts of body, and inner side of limbs yellowish white; feet and digits black; tail often with long white hairs throughout. Head and body, 18 inches; tail, 18 inches. (J. F. Gmelin, 1788, p. 152, and Forbes, 1894, pp. 14-16.)

"I have not seen any specimen with definite locality. The range of this animal appears to include the whole forested portion of Madagascar in the east, and apparently also in the north-west." (Schwarz, 1931, p. 427.)

"I am told that the Aye-aye is an object of veneration at Mada-

gascar, and that if any native touches one, he is sure to die within the year; hence the difficulty of obtaining a specimen. I overcame this scruple by a reward of £10." (H. Sandwith, in Owen, 1863, p. 38.)

This animal inhabits by preference the bamboo forests of the interior. According to the natives, it is very rare; it lives solitarily



FIG. 18.—Aye-aye (*Daubentonia madagascariensis*). From photo in Brehm.

or in pairs; and it is essentially nocturnal. It feeds on the pith of bamboos and sugarcane and also on beetles and their larvae. (Pollen, 1868, p. 22.)

"The Aye-aye lives in the dense parts of the great forest that runs along the eastern border of the central plateau of the island, but only in that part of it which separates the Sihànaka Province from that of the Bétsimisàraka, and which is about twenty-five miles from the east coast, in latitude $17^{\circ} 22'$ S. or thereabouts. . . . From what I have gathered from the natives, it seems to be pretty common, its nocturnal habits and the superstitious awe with which it is regarded . . . accounting for its apparent rarity

"Occasionally it is brought to Tamatave for sale, where it realizes a good sum. Now and then it is accidentally caught in the traps which the natives set for Lemurs." (Baron, 1883, pp. 639-640.)

"Many of the Bétsimisáraka still believe that the Haihay is the embodiment of their forefathers, and hence will not touch it, much less do it an injury. It is said that when one is discovered dead in the forest, these people make a tomb for it and bury it with all the formality of a funeral." (G. A. Shaw, 1883, p. 45.)

"It was first discovered by Sonnerat during his travels in Madagascar in 1780, and by him sent to Paris. The skin remained unique in Europe for the best part of a century. . . . It was for a long period, and is still, very difficult to procure, or to induce the natives to capture, specimens." (Forbes, 1894, pp. 16-17.)

Elliot (1913, vol. 1, p. 2) gives the range as "east coast from Bay of Antongil to Mahanoro."

Kaudern (1915, p. 1) records four specimens from the forests west of Fénériver and Tamatave on the east coast. He also mentions (p. 2) some questionable reports of the species on the Ankara-fantsika Plateau in the northwest.

G. M. Allen (1918, p. 516) records a specimen from Fénériver on the Maningory River.

"The only aye-aye seen [by the Mission Zoologique Franco-Anglo-Américaine of 1929-31] was in the northwest. Throughout the rain forest of the east we found few who knew this creature, but in the Sambirano it was well known to the natives by name, though few had seen it. All of them said it fed on bamboo and was very ferocious. . . . Our single specimen was collected at Ampasamena, a fishing village on the coast This individual ventured into the village during the early part of the night and was walking about amongst the houses when found by a native, who impaled it on a fish spear. It was evidently not common or else not often seen as the chief of the village, a gray-haired old man . . . , knew the beast by name but had never seen one before." (Rand, 1935, p. 103.)

In view of the general tolerance and even awe exhibited by the natives toward the Aye-aye, its rarity and possibly approaching extinction must be attributable to more or less natural causes, as yet undetermined.

Family COLOBIDAE: Leaf-eating Monkeys

The handsome Colobus Monkeys are externally distinguished among African species by the reduction of the thumb, which is either very small or altogether absent. A further point of structure is in the sacculation of the stomach, a means probably for giving greater capacity and a larger absorbing surface to the digestive system, for the species are typically leaf-eaters and must in consequence live upon a type of food requiring bulk and much digestion. Two chief types occur, the black-and-white and the red groups.

These show much local variation, and many names have been applied. According to the latest reviser, Schwarz, however, these may be regarded as representing but two distinct species, each with 19 or 20 races, or some 39 in all. They are typically monkeys of the great rain forest, from French Guinea south to Angola, and across the Congo Basin to the more isolated rain-forest and gallery forest of Abyssinia (Ethiopia), Kenya, Tanganyika, and Zanzibar. Over a large part of this range both species in one race or another occur together, but in some regions only one of them is found, as in Zanzibar, Kirk's Red Colobus, or in Abyssinia where the black-and-white Guereza is alone represented. Both were first made known from the West Coast, Sierra Leone.

G. M. A.

Black-and-white Colobus; Guereza

COLOBUS POLYKOMOS (Zimmermann) and races

Cebus polykomos Zimmermann, Geogr. Geschichte, vol. 2, p. 202, 1780.
(Sierra Leone.)

SYNONYMS and list of valid races: Schwarz (1929).

FIGS.: Elliot, 1913, vol. 3, pls. 3, 18, 19.

In these handsome black-and-white monkeys, the hair of the flanks and hips tends to become elongate, the tail distinctly tufted, with progressive increase in amount of white from all-black forms (*satanas*) as in the Cameroons, to those with little and much white. The most handsome of the races is perhaps *kikuyuensis* of Mount Kenya or the race *caudatus* of Mount Kilimanjaro. For the characters and synonymy of the various races, see Schwarz (1929).

On account of the long fine hair which forms the prominent fringes along the sides, these monkeys are sometimes referred to as "shawl monkeys." This quality seems also to have made them desirable as fur so that a great many are killed. There is little information at hand as to the extent of this trade. Leplae (1925), however, states that in the Belgian Congo the fur has a rather high commercial value, and the species would be threatened with extinction if it were not protected by law. Such protection is given in the British colonies but apparently not in the Congo to the extent that it should be, although since 1929 it is given partial protection. In Kenya Colony the race *kikuyuensis* occurs and on account of the length of its white "shawl" is one of the handsomest of the races. Its fur is, or not long ago was, much used by the natives in personal decoration. Portions of the black-and-white fur are used as anklets (particularly by the young men) or as caps. In the Gabun A. R. Maclatchy (*in litt.*, February 5, 1937) found them numerous in bands in the mountainous region of Mimongo. They are of sedentary habits and affect the high, abrupt mountains. "The vogue which

their magnificent skin enjoyed lately and even today has been the cause of intensive hunting. A furrier of my acquaintance spoke of having 30,000 skins in stock, collected from various parts of Africa over several years. In view of the animal's restricted habitat, one must admit that the protective decree was not unnecessary." These monkeys are placed in Schedule B of the London Convention of 1933.

In general habits the Colobus Monkeys are in the main animals of the dense saturate forests; they are not easy to find or shoot and will often show considerable adroitness in hiding. Their food consists largely of leaves, perhaps also lichens, among the hanging festoons of which some of the races live, and probably small forest fruits are also taken. Heller has recorded that in the Lado his party came upon a troop of Colobus among thorn scrub, to which they had come seeking the ripening bean pods, but on being approached they made off over the ground to the nearest high forest. Such foraging excursions must rather seldom be made in the case of the forms which are more strictly high-forest dwellers. Apart from man, their enemies are probably limited to leopards and the big crested eagles, the food of which consists in part of monkeys.

While there seems to be little evidence that any of the races is at present threatened with extinction, and since the demand for their furs seems to have become less, they will no doubt be favored by a limited permission to shoot specimens.

G. M. A.

Red Colobus

COLOBUS BADIUS (Kerr) and races

Simia (*Cercopithecus*) *badius* Kerr, Anim. Kingdom of Linnaeus, p. 74, 1792. (Sierra Leone, based on the Bay Monkey of Pennant.)

SYNONYMS and list of valid races: See Schwarz, E., Zeitschr. f. Säugetierkunde, vol. 3, pp. 92-97, June, 1928.

FIGS.: Elliot, 1913, vol. 3, pls. 5, 6, 14-16 (animal and skulls).

The Red Colobus Monkeys include no less than 20 recognized races and differ in color from the black-and-white group, in having the fur more or less black and red in varying pattern. Since the fur is not as modified in long fringing patches along the sides, it is not in special demand. Nevertheless one or two of the races are rare or localized and may require special protection for their continued safety.

G. M. A.

Gordons' Red Colobus

COLOBUS BADIUS GORDONORUM (Matschie)

Piliocolobus gordonorum Matschie, Sitzb. Ges. Naturf. Freunde Berlin, 1900, p. 186. (Uzungwe Mountains, Uhehe, Tanganyika Territory.)

This rather strikingly colored subspecies is known only from a circumscribed area in the Uzungwe Mountains to the northeast of Lake Tanganyika. The name was based on a single imperfect skin found in a native hut and two other skins secured by the brothers von Gordon, for whom it is named. In 1923 Kershaw recorded another specimen secured in the same region by Arthur Loveridge, who on a second visit obtained four others for the Museum of Comparative Zoölogy.

The top of the head is deep ferruginous, the back shining black; forelimbs black, hind limbs mixed black and silvery, the tail mixed black and ochraceous; lower surfaces white.

On the somewhat isolated Uzungwe Mountain range Mr. Loveridge found this monkey but once, when at an altitude of some 5,000 feet he came upon a troop just at dusk. They live in high forest and are with difficulty obtained. Their nearest relative is perhaps Kirk's Red Colobus of Zanzibar. Their chief danger is perhaps from native hunters, but also possibly in future encroachments upon the small area of forest to which they are confined.

G. M. A.

Kirk's Red Colobus

COLOBUS BADIUS KIRKII Gray

Colobus kirkii Gray, Proc. Zool. Soc. London 1868, p. 180, May, 1868. ("Zanzibar.")

Figs.: Gray, *op. cit.*, pl. 15; Elliot, 1913, vol. 3, pl. 16 (skull).

Restricted to the Island of Zanzibar, this form is in danger only to the extent that future settlement and cultivation may reduce its area of habitat.

Forehead and sides of head yellowish white, the long hairs extending beyond the sides of the head; crown, lower part of neck, back from shoulders, reddish brown; shoulders, outer side of arms, hands and feet black; throat and under parts grayish white; tail dull reddish brown.

The chief interest of this monkey, apart from its island habitat to which no member of the black-and-white group extends, is that in the skull the median frontal suture remains open into adult life, a rare condition sometimes found also in man.

This monkey was first secured and sent to Europe by Sir John Kirk in 1868. He regarded it as rare at that time but in 1884 wrote that it was still to be found in many of the wooded districts of the island, although "so rare as not to be procurable, even when I sent the hunters over the island. I have a report that it exists still in one spot, which they could not reach. . . . It looks as if the animal will be lost to science. This is due to the destruction of forest and jungle over the island." Two years later Sir Harry Johnston wrote

that it had "disappeared from nearly every part of the island of Zanzibar, but a rumor prevailed that it still lingered on a clump of forest as yet unvisited by hunters." On sending his hunters thither, they returned after a week's absence, bringing 12 dead monkeys, with the report that they had killed every one, so that, as Sir Harry supposed, this animal too had gone to "the limbo of species extinguished by the act of man." Nevertheless these evidently were not the last, and even to this day a few still remain on the island, but of their number and present status no information is at hand, beyond the fact that Arthur Loveridge procured a pair there in 1923.

G. M. A.

Family PONGIDAE: Anthropoid Apes

The two forms of Gorillas (genus *Gorilla*) and the four forms of Chimpanzees (genus *Pan*) are found in central Africa. The third genus of the family, the Orang-utan (*Pongo*), is represented by one species, occurring in Borneo and in Sumatra. As man's nearest living relatives, these apes have an exceptional interest for us, and their generally waning numbers call for a discussion of each form in this volume.

Orang-utan. "Mias" (Borneo); "Mawas" (Sumatra)

PONGO PYGMAEUS (Hoppius)

Simia pygmaeus Hoppius, Amoenit. Acad., 1763, p. 68. (Locality unknown.)

SYNONYMS: *Simia satyrus* Linnaeus, Syst. Nat., ed. 12, vol. 1, p. 34, 1766 (not of the 10th ed.); *Pongo wurmbi* Tiedemann, Zool., p. 329, 1808 (Borneo); *Simia morio* Owen, Proc. Zool. Soc. London 1836, p. 92, 1837 (Borneo); *Simia abelii* Clarke, Asiatick Researches, vol. 16, p. 489, pls. 1, 3, 4, 5, 1825 (Sumatra). For extensive synonymy, including names given by Selenka and others, see Elliot (1913, vol. 3, pp. 192-195).

FIGS.: Elliot, 1913, vol. 3, pls. 5 (photos of animal), 23-28 (skulls); Carpenter and Coolidge, 1938, fig. opp. p. 18; Yerkes and Yerkes, 1929, figs. 43-66.

It is at present believed that the Bornean and Sumatran Orangs are not separable even subspecifically; at least they represent the same species and are not found living elsewhere. No doubt they inhabited the Asiatic mainland at no very distant time, but with the separation of Borneo and Sumatra from the Malay Peninsula the populations of these islands were cut off and have survived to the present. On the mainland, remains of anthropoids resembling the Orang are known from the Siwalik Hills of India, but there seems to be no evidence of their survival to the historic period.

The adult Orang-utan is a large shaggy animal, of dark rufous color. The profile of the skull is much more sloping than in the African anthropoids, the skull showing very little of the brow ridges

so prominent in the latter. The arms are very long, reaching to the ankles when the animal is erect; foot long and narrow, the great toe very short. Tail absent. Prominent cheek callosities sometimes present in adult males. Wallace, who measured 17 freshly killed Orangs, states that adult males "only varied from 4 feet 1 inch to 4 feet 2 inches in height, measured fairly to the heel, so as to give the height of the animal if it stood perfectly erect; the extent of the outstretched arms from 7 feet 2 inches to 7 feet 8 inches." The total length of a Bornean skull is said to be 246 mm. (Elliot), for the largest of many. Selenka gives series of measurements. For an excellent account of the history, characters, psychology, see Yerkes and Yerkes (1929).

The Orang is a much more lethargic animal than the African anthropoids, moving leisurely through the forest, seeking various fruits, especially those of the durian, of which it is extremely fond. Leaves and bark of certain trees are also eaten. It is somewhat social and may be found singly or in pairs or in small groups. Banks (1931) writes:

In a wild state and unmolested, Mias exhibit little more than a benevolent curiosity towards men and the extremely child-like and almost pathetic expressions that can be assumed in captivity point to the Mias as an extremely peaceful and gentle animal when left to himself, always remembering of course that both temper and strength are there in reserve for use when aroused. . . . [They] make a kind of platform of sticks on which they sleep at night and even during the day but I have never seen captive ones make any sort of roof or make use of leaves to keep the rain off, as is sometimes alleged. Nests are of two kinds, either a flat platform or more usually a deep triangular shaped affair in the upright fork of a tree. . . . I counted eleven such nests still with green leaves all close together near a "Kayu Ara" fruit tree where a pair were feeding. . . .

The distribution of the Mias in Sarawak is peculiar in its relations to the rest of Borneo; it occurs in parts of N. Borneo . . . and it is common in W. Borneo, the Landak River and right up the Kapuas River. Now the Mias is very sensibly fond of neither cold nor rain, in fact the damp is his worst enemy and for this among other reasons the occurrence of Mias at 3000 ft. is very exceptional nor is he as common in the immediate lower vicinity of mountains as he is at the foot. For some 70 miles the Kalinkang Mountains run N.E. and S.W. forming a watershed between that part of the Kapuas River running S.W. and numerous short Sarawak rivers running West into the sea and it is obvious that these mountains form an obstacle to the movements of Mias which are common on the Kapuas and curiously on the Sarawak side. The explanation lies I think in a gap in the Kalinkang Mountains which towards Lobok Antu slope away almost to sea level, eventually to rise on the other side of the Batang Lupar Mts. and stretch away unbroken northwards into central Borneo. It is therefore more or less true that the Mias is confined to a range bounded on the N.E. by the Rejang River, on the west by the Sadong River: the Orang Utan has flowed through from Dutch Borneo and filled up suitable and available places.

In upper Sarawak the Orang was formerly reported, but these reports are doubtful, although Everett records two imperfect skulls

found in a crevice of the limestone hills at Paku, but at present it is absent from all that region adjacent to the watershed of the Landak River. According to Wallace, it has a wide distribution



FIG. 19.—Orang-utan (*Pongo pygmaeus*). From photo of specimen in Philadelphia Zoo.

in the low country, inhabiting many districts not only on the southwest and southeast, but also on the northeast and northwest coasts, but of its more exact local distribution at the present time little information is at hand.

In Sumatra, the only place outside of Borneo where the Orang is native, it is now confined to the former state of Atjeh, which

comprises practically the northwestern quarter of the island. In their recent report on the animal here, Carpenter and Coolidge (1938) indicate that the regions of Lami, Tapa Toean, and Bakongan are the places on the west coast of Atjeh where Orang-utans live in the largest numbers. They occur over the greater part of Atjeh except the high central districts above 1,500 meters, the cultivated and thickly populated districts on the east coast, the grasslands of the north, the rough mountains north of Lamno, and cultivated sections of the west coast, especially around Meulaboh. Although an estimate of the numbers and normal density of population is largely guesswork, it seems likely that the centers of abundance are "around the Simpang Kanan and Peureulak Rivers on the East Coast, and along the West Coast in suitable forests from Lami to Singkel." They show a marked preference for lowlands but may range up to 1,500 meters, though with a sharp decrease above 700 or 800 meters. There is some evidence of local movements following the seasonal ripening of certain fruits on which they feed. In summary, these authors state that the Orang is found in "an estimated fifty per cent of the primary forests" in Atjeh; "as large clearings are made in the rather level lowlands, these apes are being destroyed or forced into the hills and mountains where it is questionable whether or not conditions, including food supply, are sufficiently suitable for the maintenance of the present population level. However, large areas of Atjeh, because of its rugged topography and inaccessibility, will remain naturally protected for a long time as an orang-utan habitat. Europeans and not natives threaten the orang-utan population, the most serious inroads being made by commercial developments in the areas suitable for orang-utan habitats. Numbers of these apes are being shot annually under the supposition that they attack human beings, and it is feared that government records do not accurately record all animals captured or killed."

For the better preservation of these interesting apes, the authors recommend an extension of the present Alas National Park or Löser Reservation and the development of a smaller reserve especially for Orangs south of Meulaboh, together with the planting of food trees, especially the durian. Further, the desirability of additional reserves and special measures is advocated, particularly that "the killing and capture of this animal for trading or exhibition purposes be completely stopped and that its use for accredited but limited scientific purposes alone be permitted."

G. M. A.

Coast Gorilla. Gorille (Fr.). Gorilla (Ger.)

GORILLA GORILLA GORILLA (Savage and Wyman)

T[roglodytes] gorilla Savage and Wyman, Proc. Boston Soc. Nat. Hist., vol. 2, p. 245, 1847. ("Empongwe, near the river Gaboon, Africa"; about lat. 0° 20' N., long. 9° 30' E.)

FIGS.: Gervais, Hist. Nat. Mammifères, pt. 1, pls. facing pp. 26, 28, 1854; Du Chaillu, 1861, frontisp.; Forbes, 1894, vol. 2, pl. 28; Proc. Zool. Soc. London 1896, p. 505, fig.; Elliot, 1913, vol. 3, frontisp.; Cunningham, 1921, pp. 119-124, figs.; Barns, 1923, figs. 45, 46, 50, 51; Yerkes and Yerkes, 1929, numerous figs.; Coolidge, 1936, pl. 12; Raven, 1936a, p. 316, fig.; Fauna [Philadelphial], vol. 1, no. 1, pp. 8-9, figs., 1939.

The Coast Gorilla is generally considered to be diminishing in numbers but not to be in danger of extermination. All gorillas are given full protection under Schedule A of the London Convention of 1933.

"This animal . . . is much larger and more ferocious than the Chimpanzée. Its height is above five feet; but it is remarkable for the disproportionate breadth of the shoulders, which is double that of the Chimpanzée. The hair is coarse, and black, except in old individuals, when it becomes gray. The head is longer than that of an ordinary man by two inches, and is remarkable for having a crest of coarse hair over the sagittal suture, which meets at right angles a second, extending over the upper part of the occiput, from one ear to the other. The fore-arm is much shorter than the arm, the hand is remarkable for its great size, and the thumbs larger than the fingers." (Savage and Wyman, 1847, pp. 245-246.)

"Face and chest bare, black; . . . arms and belly black; back and outside of thighs gray grading into black towards ankles and on feet; hands black; no beard; top of head black, nape mixed black and red." Height, 5 feet 10 inches. (Elliot, 1913, vol. 3, pp. 213-214.)

The numerous described forms of Gorillas are reduced by Coolidge (1929, p. 348) to two subspecies—the present one and the Mountain Gorilla (*G. g. beringei*).

"For the Coast Gorilla, the westernmost boundary approximates the Cross River in the southern provinces of Nigeria. The most westerly point actually recorded is Ikom, 8° 40' east and 6° north. The northernmost point is close to Basha, 9° 25' east, 6° 7' north. On the east we have reports from several places such as Wesso and Nola on the Sanaga [error for Sanga] River. The Sanaga River, about 16° 15', seems to mark the eastern boundary of the range of the Coast Gorilla. On the southeast the line follows the border of the forest which reaches its southernmost limit at Mayombe on the edge of the Belgian Congo, 5° south, 13' [=13°] east. Along the Atlantic coast in most places the forest begins a little way inland.

Gorillas have been reported actually on the coast, but generally they are found not closer than thirty miles from the sea. They seem especially plentiful along the Gaboon, Ogowe, Camp, and Sanaga Rivers." (Coolidge, 1929, p. 363.) More recently the range has been found to extend somewhat eastward of the Sanga River in French Equatorial Africa (Coolidge, 1936, p. 493, maps 1-2). The total range of the Coast Gorilla seems to be strictly confined to the western portion of the Lower Guinea Forest District of Chapin (1932, p. 90) and of Bowen (1933, pp. 256, 258).

Gabun.—"They live in herds, the females exceeding the males in number. . . . They are exceedingly ferocious, and objects of terror to the natives, who seldom encounter them except on the defensive. The killing of an Engëena is considered an act of great skill and courage, and brings to the victor signal honor. . . .

"Their flesh, when obtained, is eaten by the natives, as well as that of the Chimpanzée." (Savage and Wyman, 1847, p. 246.)

Du Chaillu's classical account of the Gorilla (1861, pp. 388-404) is based upon his experiences in Gabun. Among other things, he says (pp. 399-400): "The negroes never attack them with other weapons than guns; and in those parts of the far interior where no European guns had yet reached, as among the Apingi, this great beast roamed unmolested, the monarch of the forest."

"The Fernan Vaz District . . . is considered the best region for both the gorilla and the chimpanzee." One "family party of five or more gorillas" was encountered, and on another occasion "a large family" was reported. The animal will occasionally advance to attack when not wounded. (Aschemeier, 1921, pp. 90-92.)

"The majority of the Gaboon skulls have come out from the region of the Ogowe River" (Coolidge, 1929, p. 303).

A. R. Maclatchy (*in litt.*, February 5, 1937) gives the following report for Gabun: "The decree of 1929 classed the gorilla among the protected species. Its great vulnerability makes it an adversary much less dangerous than the buffalo and the elephant. It rarely pushes its attack to the limit. Sometimes it visits the native plantations by night. Its food consists of various plants. I do not see the reasons for a protection as strict as that which the gorilla enjoys. It is little hunted, except in legitimate defense, by the natives, who have a superstitious terror of it, and by a few hardy European sportsmen. It scarcely seems to be threatened with destruction. It really abounds, and is protected by its habitat and by its natural shyness. More specimens could be allowed on hunting permits without the risk of diminishing its numbers."

Cameroons.—In the southeastern corner of Cameroons, and perhaps also across the boundary in French Equatorial Africa, the Gorilla appears quite common, and almost entirely inoffensive as

to attacks on man. The forest is so dense, and the animal so shy, that it is extremely difficult for the hunter to get sight of it. Thus the Gorilla seems fairly well protected. Bands numbering up to more than 20 individuals are reported. (Ramecourt, 1936, pp. 217-247.)

Raven (1936*a*, 1936*b*) gives a most interesting and detailed account of hunting Gorillas during more than a year spent at various places in southern Cameroons. The natives here are very keen to eat Gorilla meat, being generally faced with a deficiency of meat in their diet. A missionary reported many of the animals at Djaposten, in southeastern Cameroons, where "in one morning's walk of perhaps two hours he had counted more than 100 gorilla beds." Although Raven himself found the animals quite common in this region, it was extremely difficult to obtain a good view of them in the dense forest, and only three adults were collected during his entire sojourn, despite assiduous hunting. Raven writes further (1936*b*, pp. 529-530):

For centuries past the gorillas and natives have been competitors. As the native population increased, new villages would be formed and more clearings made. Then epidemics would occur, killing off great numbers of natives, and their gardens would be neglected to run into second growth. The gorillas, with a constitution so nearly like that of man that they can find more food in human plantations than in the virgin forest, would move into these deserted clearings. There with an abundance of food they thrived and congregated, to such an extent eventually that if only a few natives remained they were actually driven out because of their inability to protect their crops against the gorillas. But with the advent of the white men's government, with the distribution of firearms among the natives, preventive medicine and the treatment for epidemic and infective diseases, man has the upper hand at present in this age-long struggle.

"Mr. Raven had opportunity to witness the unfortunate effect, so far as the protection of the gorilla was concerned, of the demand for gorilla skulls on the part of scientists, to such a degree that white men as well as natives had in the past often done a profitable business in killing the animals and selling their skulls. The result had been a rapid decrease in the gorilla population, so that Mr. Raven, although by his record known to be a hunter and collector of the first rank, was compelled to hunt week after week in a desperate effort to come up with the nervous survivors of the race in this district. . . .

"Mr. Raven's experience leads him to believe that . . . the gorilla is being rapidly exterminated in many localities." (Gregory, in Raven, 1936*b*, p. 540.)

It is doubtful if the protective laws have stopped the killing of Gorillas by natives to any extent. Most of the museum specimens of skulls, etc., are from native-killed animals and have been turned

in to traders. Natives capture them by spearing and by snaring. (H. C. Raven, oral communication, March 17, 1937.)

The Gorilla is utilized for experimental purposes in the study of human diseases (Ministry of Colonies, Paris, *in litt.*, November 7, 1936).

Gorillas are decreasing but not disappearing. The cause of depletion is native hunting for food. (Inspection of Waters and Forests, Yaounde, *in litt.*, January 12, 1937.)

The number in French Cameroons is estimated at some thousands. They are partially protected by law, one head being allowed on a full license. (Paris Agency, *in litt.*, November, 1936.)

Nigeria.—Coolidge (1929, p. 303) refers to the range as including "the Western Cameroons [part of Nigeria], which is a comparatively limited section centering around Mamfe or Dakbe and extending west as far as the Cross River. A great many skulls come from this region."

Haywood (1932, p. 32) reports the species from the borders of Ogoja and Cameroons Provinces.

In British Cameroons, Sanderson (1935, p. 26) reports Gorillas from the mountains of Assumbo, about the headwaters of the Cross River. They "are numerous in the Mountain Moss Forest belt, where the natives record their movements minutely."

"In Nigeria where a few exist the natives take an annual toll and I do not think there are many" (C. W. Holey, *in litt.*, August 18, 1936).

French Equatorial Africa.—The Gorilla does some damage in the banana plantations, but it is not important. It seldom attacks man without provocation. There is no reason why it should not be absolutely protected. Its northern and western limits are unknown; its southern seems to be the Congo. (Lavauden, 1933, p. 30.)

"Four complete specimens of the Coast Gorilla were procured by the Vanderbilt Expedition of the Academy of Natural Sciences of Philadelphia in the winter of 1934." Three "were killed by natives in the neighborhood of Aboghi, forty miles southwest of Nola near the west bank of the Sanga River." The fourth was secured "near Barundu, about 15 miles east of the Sanga River and 22 miles northeast of Nola." (Coolidge, 1936, p. 479.)

Green (in Coolidge, 1936, pp. 491-492) reports Gorillas as abundant in the region of Aboghi. "The old males appear to be somewhat solitary, but small bands of four to ten were noted from tracking."

"The expedition reported that gorillas were frequently killed on the left bank [of the Sanga]. . . .

"The field notes of Mr. Rehn and Mr. Green give us the impression that gorillas were plentiful in the region from which these specimens

came, and that they are frequently hunted by the natives." (Coolidge, 1936, pp. 493, 499.)

According to all accounts, Gorillas still occur in fair numbers in the Sanga River region, though not so commonly as 25 years ago. A local French doctor, in the course of two years, had treated nine natives for Gorilla attack, one of the cases being fatal. (J. A. G. Rehn, oral communication, March 22, 1939.)

Belgian Congo.—Schouteden (1930*b*, pp. 298-299) presents evidence of the rare occurrence of Gorillas in the Mayumbe forest, north of the lower reaches of the Congo River. Later (1936*b*, pp. 15-16) he records a skull from the Haut Mayumbe. Here the animal had seemed to have disappeared, or to occur only occasionally, coming perhaps from Gabun. But it appears to occur still in certain parts of Mayumbe, thanks, perhaps, to the protection it has enjoyed for some years.

Use in research.—Yerkes and Yerkes point out (1929, p. 590) that the Gorilla and other anthropoid apes "must inevitably become the preferred substitutes for human subjects in investigations which may not be carried on with the latter and which have as objectives the extension of knowledge and control of human life." They also stress (p. 589) the greater availability and controllability of these animals for use in the investigation of various problems in genetics, physiology, neuro- and psychopathology, psychology, sociology, pedagogy, and experimental education.

Survival.—Yerkes and Yerkes (1929, p. 396) quote Keith (1896) as follows: "From accounts furnished by travellers and hunters, one infers that the total population [of the species as a whole]—males, females, and young—is well under 10,000." Eventually (1914) Keith raised this estimate to 20,000 to 30,000 individuals, but Yerkes and Yerkes remark (p. 397) that it is difficult to decide how seriously this estimate should be taken. They also say (p. 397):

"Concerning abundance or frequency little is known. Both early and late in the last century the relative rarity of the gorilla suggested to investigators its disappearance and probable extinction. From limited distribution, difficulty of negro hunters in procuring skins of adults, and the small number of captive specimens sent to Europe, Deniker (1891, pp. 369-370) infers that the process of extinction is under way. . . .

"For nearly a century it has been known that the gorilla is the rarest of the manlike apes."

H. C. Raven (oral communication, March 17, 1937) estimates the total number of all Gorillas now living at more than 1,000 and at less than 10,000.

Mountain Gorilla. Gorille des montagnes (Fr.)

GORILLA GORILLA BERINGEI Matschie

Gorilla beringeri [misprint for *beringei*] Matschie, Sitz.-Ber. Ges. Naturf. Freunde Berlin 1903, no. 6, p. 257, 1903. ("Auf der Spitze des Vulkans Kirunga ya Sabinyo in einer Höhe von 3000 m," German East Africa; *i. e.*, Mount Sabinyo or Sebyinyo, at the boundary point of Ruanda, Uganda, and the Belgian Congo. Not at the summit, but on the south or southeast flank, at about 2800 m. (Derscheid, 1928, p. 150).)

FIGS.: Lönnberg, 1917, pl. 1; Barns, 1922, frontisp. and pls. facing pp. xvi, 83, 86; Barns, 1923, figs. 43, 44, 52; Akeley, 1923a, pp. 428, 438, 440, 444, figs.; Akeley, 1923b, frontisp. and pls. facing pp. 190, 206, 222, 230; Yerkes and Yerkes, 1929, numerous figs.; Coolidge, 1929, pl. 1, and 1930, pp. 626-627, figs. 454, 454b; Raven, 1931, cover and p. 241, fig.; Bingham, 1932, pls. 18, 19, 22; Jour. Soc. Preservation Fauna Empire, n. s., pt. 18, frontisp., 1933.

The Mountain Gorilla is now well protected in its range centering in the Parc National Albert in the eastern Belgian Congo, and its chances for survival appear to be excellent.

Face, ears, breast, back, hands, and feet naked; breast brownish, like worn leather; back somewhat lighter; face, ears, and naked parts of the limbs black; hair black, long, and thick, and forming a pronounced beard on cheeks and chin. Height 1.5 m.; weight 100 kg. (Matschie, 1903a, p. 254.) "The external characters that distinguish the Mountain from the Coast Gorilla are, besides a longer palate and a generally narrower skull, the thicker pelage, shorter arms and longer legs, large amount of black hair, and fleshy callosity on the crest" (Coolidge, 1929, p. 375). "The large patch of silver-gray fur covering the back of the adult male gorilla is the most remarkable part of his coloration; the female is entirely black, and very much smaller than her mate" (Barns, 1923, p. 130).

Coolidge (1929, p. 363) says of its range:

The Mountain Gorilla is found in a comparatively narrow strip of the eastern Congo. Its principal habitat is the mountain forest as distinguished from the lowland forest of the Belgian Congo. Its northern limit is Mulu, 0° 10' south, 29° 10' east (Absil and Chapin). We find it as far west as Walikale, 1° 20' south, 28° 1' east, where it strays a little into the lowland forest. The eastern limit seems to be close to Kigezi in Uganda, 1° 15' south, 29° 45' east. The southern limit is Baraka on Lake Tanganyika, 4° 19' south, 29° 2' east. In this entire region the gorillas that are most known and accessible are the troops that inhabit the volcano regions where Akeley died while studying them. Whether they are entirely isolated from contact with outside gorillas at the present time is doubtful and has not yet been established. In the mountains back of Baraka, Boko, Uvira, and Katana large troops have been recently found in the upland forests.

"I have examined . . . the sources of evidence for the existence of gorillas in the intervening area between (longitude 17° east) the eastern limit of the known range of the Coast Gorillas and (longi-

tude 28° east) the western limit of the known range of the Mountain Gorillas. With a single exception, I attach no great importance to this evidence. The exception refers to the four skulls from Bondo on the Uelle River collected by Lemarinel in 1908. These furnish us with definite proof for the existence of gorillas in the Djabbir region as late as 1908. Except for these skulls no other tangible evidence of gorillas in a forest belt of 650 [= about 750] miles has turned up." (Coolidge, 1936, p. 500.) Coolidge considers (p. 497) that the affinities of the Bondo skulls are with the Coastal Gorilla, but G. M. Allen (1939, p. 177) refers *G. uellensis* Schouteden, which was based upon these skulls, to the synonymy of *beringei*.

The Mountain Gorilla was first made known to science through a specimen shot by Capt. Oscar von Beringe on Mount Sabinio about 1902 or 1903 (Matschie, 1903*a*, p. 253).

In 1913 and 1914 seven specimens were obtained by E. Arrhenius on the volcano Mikeno, Virunga Mountains. "According to Captain E. Arrhenius the Gorillas are rather numerous They live in bands consisting of 20-30 individuals

"The natives hunt the Gorillas to obtain their skin which they use for wrapping up their copper thread etc., or for revenging some relative. Thus when a man from Sangana had been killed by a Gorilla his family killed five Gorillas in revenge. The natives hunt Gorillas with the aid of dogs. The dog bites the Gorilla and returns to his master who waits for the Gorilla with the spear ready. He throws the spear at the Gorilla and runs away. The dog repeats the manoeuvre, until the animal is killed. The natives do not eat the meat of Gorillas, nor that of Chimpanzees." (Lönnerberg, 1917, pp. 7, 17-18.)

Barns (1922, pp. 81-88) encountered a band of Gorillas between the volcanoes Mikeno and Karisimbi, and secured a specimen, which his hungry native porters refused to eat. "This monster ape would seem to have no enemies, failing man; and even man, the most dreaded of all the animal world, holds little fear for the gorilla in his inaccessible home" (p. 87).

"Its food consists, apart from bamboo shoots, entirely of herbage—docks, sorrels, hemlocks, etc.—although honey may be part of the menu. He does not grub for roots, neither does he eat fruit as a general rule

"Savage man, through superstition as much as anything else, but also on account of the inaccessibility of the gorilla's mountain home, has left this ape unmolested; we therefore find him and his family habitually and fearlessly sleeping on the ground." (Barns, 1923, pp. 129-130.)

"As regards longevity, gorillas, on account of their life free from molestation, famine, or disease, and also judging by the worn teeth

of one animal I secured, live, in my opinion, to be a much greater age than man" (Barns, 1923, p. 132).

"The natives of this region have no fear of the gorilla. . . . Some of my guides and my gun bearer were trappers and hunters in the gorilla forests and were thoroughly familiar with them. At no time did the guides or gun boys show any indication of anything more than casual interest even when we approached very close to gorillas." (Akeley, 1923*a*, pp. 438-439.) Akeley continues (p. 447):

After my first expedition into the gorilla country, I am more convinced than ever not only that the gorilla is one of the most fascinating and important objects of study in the realm of natural history, but also that his disposition is such as to permit the most intimate observation of his habits. . . . A few weeks of casual acquaintance and one is fired with a desire to ferret out the answers to a hundred questions about this little-known relative of man—questions of increasing importance to scientists and physicians in their efforts to understand and aid man himself. Probably no other project of so moderate a size is likely to lead to such immediate and valuable scientific results as that which will make of the Kivu region a sanctuary, where the gorillas under the protection of man may grow more and more accustomed to human beings and where through a series of years they may be observed and studied.

On the three mountains, Mikeno, Karisimbi, and Visoke, "I judge that there are between fifty and one hundred animals altogether" (Akeley, 1923*b*, p. 248).

Akeley's efforts led to the establishment of the Parc National Albert, comprising the Kivu volcanoes and providing for the special protection of the Mountain Gorillas. Meanwhile Burbridge had estimated their numbers at 1,000 to 2,000 individuals. Their range extends beyond the volcano region to the bamboo forests dominating the highlands of the Great Lakes. (Leplae, 1925, pp. 15, 19.)

According to Derscheid (1928, pp. 154-159), the animals are especially numerous at elevations between 2,700 and 3,500 m., with extreme occurrences at 1,900 and 3,900 m. He has met with a few solitary old males, but more usually with bands of 7 to 43 individuals. He estimates the number on the central massif (Mikeno-Karisimbi-Bishoke) at 350 to 500; on the eastern massif (southern slopes of Muhabura, Sebyinyo, and Mugahinga) at 150 to 200; and in the Uganda portion of the region (northern slopes of the three volcanoes just mentioned) at 100 to 150. He also remarks on the surprisingly small proportion of young animals among the Gorillas observed.

"During our two months stay among the different peaks of the Birunga Range we observed several herds of Gorillas. The largest of these herds consisted of about 20-30 individuals. . . . In all about 70 examples were seen by the members of the Expedition. . . . Their stronghold seems. . . to be the mountain triangle composed of Mikeno, Karissimbi and Visoke. They are mostly found

in the Bamboo Region, but they also live higher up the steep mountain slopes with their beautiful vegetation of *Hagenia*-trees." (Gyldenstolpe, 1928, p. 23.)

"There is a spotted menace, a potent factor too, in the leopard, who destroys numbers of young animals" (Burbridge, 1928, as quoted in Yerkes and Yerkes, 1929, p. 398).

Pitman (1935, pp. 477-494) gives an excellent account of Gorillas in Uganda, and the following excerpts are taken from his paper:

The occurrence of Gorillas in the Kayonsa region of Uganda [about midway between the Birunga volcanoes and Lake Edward] has been known for many years (p. 477).

There is in the Kayonsa a complete absence of bamboo, wild celery, dock, and similar juicy-stemmed plants such as abound in the humid, high altitudes, forcing the Gorilla to confine its diet to a mixture of leaves, berries, ferns, the tender fronds of tree-ferns, parts of the wild banana stems, and leaves, and fibrous bark peeled off a variety of shrubs in the undergrowth. . . .

Owing to a lack of what apparently are normal food constituents the Gorilla has become more enterprising in search of food, and in consequence climbs trees freely to a known height of at least 50 feet. (P. 478.)

The "beds" of the Kayonsa Gorilla are large platforms built in the trees, and often at a considerable height above the ground.

[The altitude of the habitat varies between 6000 and 7900 feet.] (P. 479.)

The forest region to the east of the Kishasha river [where some Gorillas are known to occur] is a gazetted forest reserve and, in consequence, not open for human settlement. There is little likelihood in the immediate future of serious conflict between Man and Gorilla in the dense uninhabitable valleys to the west of this river and in the vicinity of the Belgian Congo border

It was calculated that this western area harboured forty to fifty Gorillas. [In the entire region there were possibly at least eighty.]

Normally the troops vary in size from five to eight or nine, [but one troop was said to include nearly two dozen]. (P. 480.)

The [Kayonsa] Gorilla normally is peaceably disposed and not aggressive (p. 483).

The Wambutte [Pygmies] are extremely tolerant of the Gorillas, but not so the other local natives, who would readily endeavour to exterminate the lot, were it not for the fact, of which they are well aware, that these splendid animals are absolutely protected (p. 484).

The animals are said to sometimes raid the native gardens but not to attack the natives.

The Chimpanzees

In spite of the multiplicity of names that have been applied to the Chimpanzees, it seems probable that only four valid forms are recognizable, representing probably two distinct species, as follows:

Common Chimpanzee

PAN TROGLODYTES TROGLODYTES (Blumenbach)

Simia troglodytes Blumenbach, Handb. der Naturgesch., p. 65, 1799. ("Angola.")

Long-haired Chimpanzee; Eastern Chimpanzee

PAN TROGLODYTES SCHWEINFURTHII (Giglioli)

Troglodytes schweinfurthii Giglioli, Ann. Mus. Civ. Stor. Nat. Genova, vol. 3, p. 114, footnote, 1872. (Upper Uele drainage, Niam-niam country, eastern Congo Belge.)

Western Chimpanzee

PAN TROGLODYTES VERUS Schwarz

Pan satyrus verus Schwarz, Ann. Mag. Nat. Hist., ser. 10, vol. 13, p. 578, June, 1934. ("Sanda Magbolonto chiefdom, Karima district, Sierra Leone.")

SYNONYMS: For list of synonyms of these three races, see G. M. Allen (1939b, pp. 172-175).

FIGS.: Elliot, 1913, vol. 3, pls. 7, 8, 8 bis (animal); pls. 36-39 (skulls); Yerkes and Yerkes, 1929, figs. 69-118.

Yerkes and Yerkes (1929) write that the "description of the configuration of the type chimpanzee is as difficult as description of man, so numerous and pronounced are individual, sex, and species differences and developmental changes." In general, of anthropoid form, the forelimbs proportionately long, reaching below the knee when the animal stands erect. Form stocky, shape of ear much as in *Homo*, forehead heavily ridged, nose flattened. Face usually bare or nearly so, and in the adult black like the skin of the body, except in the race *verus*, in which it is paler. Hair of the head directed backward in the typical race, but usually with a parting in *verus*. In the eastern race, *schweinfurthii*, the hair is longer than in the others. The maximum (standing) height of the male is about 5 feet, of the female 4 feet. Weight of male 125 to 175 pounds; of female 100 to 150 pounds. The skull is distinguished readily from that of a Gorilla by the smaller teeth and by the fact that when viewed from in front the summit of the brain case is visible above the brow ridges instead of being hidden by them. Color usually black, with often a whitish pygal patch.

Throughout the vast extent of the tropical rain forest from the Gambia and adjacent French Equatorial Africa, south to the Congo, and eastward to the borders of Uganda and Tanganyika, Chimpanzees are found, but they vary greatly in local abundance. They seem much given to wandering about over circumscribed areas, and so it is difficult to make censuses or to estimate populations. Moreover, the nature of their habitat in rain forest of dense growth makes their observation uncertain. Thus in our journey across Liberia in 1926, a country in which they are believed to be rather common, I saw none, and H. J. Coolidge, Jr., came upon them but once in the eastern border of the country. Yet they are common in the region about Kindia, in French Guinea, and occur in

numbers in Sierra Leone and in the forests of the Belgian Congo and in the Cameroons. The original specimen was said to have come from "Angola" but probably was not native there, for the larger species is not now known from south of the Congo. If it was actually brought from there, it was no doubt purchased of natives who had captured it as a young animal farther north.

The Chimpanzee offers no trophy for the sportsman and should not be killed or captured except for scientific purposes. It is thus included in Schedule B of the London Convention of 1933. Its natural enemies must be few and, except for man, probably include only the Leopard. Native peoples seldom molest them, except where there is inducement from whites to capture them for "pets" or to secure specimens. Many tribes believe that "every chimpanzee is linked with the soul of a man, so that if one is killed the man too will die," or some other calamity will ensue. At Kindia in French Guinea, the Pasteur Institute maintains a laboratory for the observation and medical study of these animals, where individuals may be accustomed to captivity before being sent to institutions in Europe or elsewhere. "From the medical point of view, we have no need of emphasizing the advantage to be derived to-day from anthropoids, and especially the Chimpanzee, in the study of human diseases; the experimental inoculations of serums, vaccines, and medications of all sorts, find in the Chimpanzee a very valuable subject" (Lavauden, 1933, pp. 30-31). Psychological studies of this animal have already thrown much light on the evolution of intelligent behavior; for a review of such work the reader is referred to the volume by Yerkes and Yerkes (1929).

While the reports of comparative abundance, as noted by travelers or persons stationed in parts of its range, are of only relative value as often recording mere casual impressions, nevertheless the following notes are here added as providing a brief survey of its occurrence in selected stations. In the Gambia it is said no longer to exist near the coastal towns, but according to E. Johnson (1937, p. 62) every year "about fifty animals are brought in for sale from Futa Jalon, some 70 miles southeast of Fatoto, 280 miles from Bathurst." They are found in the Gola Forest Reserve of Sierra Leone, and small troops may be met with by good fortune in the great forests of Liberia. On the Gold Coast, according to Haywood (1933), "they are only reported from the Western Forest belt, but it seems quite possible they are spread over a large area, although by no means in large numbers." The Director of Agriculture of the Gold Coast writes (*in litt.*, 1937) that the "chimpanzee is now rare and confined to the extreme western border of the forest country, but whether it was ever plentiful is not known." In Nigeria it is reported from forest regions of Oyo, Onitaha, Owerri, Ijebu Ode, and Abeokuta

Provinces, so probably is present in Benin, Ondo, Calabar, and Warri Provinces (Haywood, 1932). It is apparently common in the Gabun, and in the southern Cameroons. It is "numerous" in the equatorial forests of the Belgian Congo but in the Ubangi-Shari district is found only in the Ubangi Basin, in small numbers (at most a few hundreds), localized in Haute-Sangha, Lobaye, Ouaka, and Haut-Mbomou. It does not seem to have diminished except in the Ouaka. In this region it was completely protected since 1916, then partly in 1931, and once more completely in 1936. It occurs also in the Parc National d'Odzala in the Middle Congo and in general appears to be threatened not with extermination but with diminution (L. Blancou, in letter of 1937). A. J. Jobaert, in response to queries, writes that in the Belgian Congo very few are now killed by Europeans, "but certainly the natives, and especially the pygmies, destroy a considerable number, although it is totally protected by law; they were certainly quite numerous a few years ago."

In the eastern part of its range, the race *schweinfurthii* is locally common as far as the border of the rain-forest area in Uganda and extreme western Tanganyika. In the upper Congo region, Lang and Chapin found it common, as about Aba and Faradje on the north-eastern border of the rain forest, and at Avakubi, Niapu, and Medje within the forest. On the other hand, reports from the Uganda Game Department (1928) indicate that in Kigezi "it would appear that the numbers of this species are diminishing. It is, however, likely that a permanent change of quarters has resulted in its disappearance from localities where it was previously known. It has been ascertained from Ankole that the parties or families of Chimpanzees are great wanderers and not confined to specified localities. However, information both from Toro and Bunyoro districts also records a recession from areas in which till recently these animals were seen and heard." In Tanganyika, Chimpanzees have been recorded as far south as the eastern shore of Lake Tanganyika, south of Kigoma, in the Mahare Mountains. Footprints and about a dozen sleeping platforms were noted by B. W. Savory. They have also been found on the west side of the lake as far south as the Marungu district. Mr. Savory found collecting of Chimpanzees very difficult here, not only on account of the nature of the country but also on account of the superstitious fear of the natives, who believe these apes are reincarnations of human beings and that a gun fired at one of them will surely burst (Dollman, 1935*b*, pp. 15-16). On Mount Kivu Chimpanzees are said to be found but are extremely localized. Derscheid records them from Mount Henu and in the bamboo forest south of the Karissimbi Volcanoes.

While such areas of rain forest as are found on some of the more eastern isolated mountains, as Kilimanjaro, Kenya, and Elgon,

might apparently be suitable for Chimpanzees, and in some future time might serve as sanctuaries for transplanted stock, they are at present uninhabited by these apes. In the distant past, however, they may have sheltered them. There is much evidence that in eastern Africa the lowlands and slopes of mountains were anciently clad with heavy forest but that native races of man have in the course of centuries gradually, by burning and cutting, beaten back this forest, and that it has given place to scrubby growth or finally to scattered thorn scrub. A similar process is slowly going on both within the rain forest and at its edges, with slow but gradual clearing of trees for agriculture, and subsequent abandonment. Continued long enough, this results in final destruction of the high forest, first in spots, then in local areas, and finally over larger tracts, all of which will eventually much curtail the available living areas for Chimpanzees.

G. M. A.

Lesser Chimpanzee; Pygmy Chimpanzee

PAN PANISCUS Schwarz

Pan satyrus paniscus Schwarz, Revue Zool. Africaine, vol. 16, p. 425, April 1, 1929. (South of the upper Maringa River, 30 km. south of Befalé, south bank of the Congo, Congo Belge.)

Figs.: Coolidge, 1933, pl. 1, figs. A, B; pl. 2, fig. A.

Present evidence seems to indicate that this is a smaller species than the Common Chimpanzee and distinct from it. Its known range is in the Middle Congo forests, on the *south* side of the river, here supposed to form a physical barrier to northward extension.

Coolidge (1933) has summed up our knowledge of this animal and has made a comparative study of its skeleton. An adult female (containing a fetus) had a head and body length of 630 mm.; height from crown to sole, 1,010; spread of arms, 1,510. It is thus much smaller than the other species. The hair is fine in texture and glossy black throughout except for a small white pygal tuft, and is long and dense, without a parting on the head. The skull has a rather juvenile appearance in its inflated forehead and small brow ridges.

Although the existence of a Chimpanzee on the south side of the Congo had been several times reported, it was not until 1928 that a M. Ghesquière obtained specimens for the Congo Museum in Tervueren and the animal was described. Previously a specimen had been in the British Museum, collected in 1895. Other specimens have since been secured, and more information is likely soon to be placed on record. Dr. James P. Chapin, who secured a specimen in 1930 near Lukolela, describes the voice as neither so loud nor so shrill

as that of the larger Chimpanzee. Dr. R. M. Yerkes had a specimen in captivity for over a year in 1923-24 and has written of its behavior. Very little is known of its abundance, but one may suppose its distribution includes the rain-forest area between the Congo and the Kasai.

G. M. A.

Order EDENTATA: Edentates

Family MANIDAE: Pangolins

Three genera of this family, represented by four species, occur in Africa south of the Sahara, and all of them are treated in the following pages. Two other genera (*Manis* and *Phatages*), represented by five forms, occur in the Oriental region (India, China, Siam, Indo-China, Malaysia); while subjected to some persecution by reason of their supposed medicinal value, these Oriental pangolins are not included in the present report.

Giant Pangolin or Scaly Anteater. Pangolin géant (Fr.). Riesenschuppentier (Ger.)

SMUTSIA GIGANTEA Illiger

Manis gigantea Illiger, Abhandl. K. Akad. Wissen. Berlin, physik. Kl., 1804-1811, p. 84, 1815. (Guinea = West Africa.)

Figs.: Büttikofer, 1890, vol. 2, p. 394, fig.; Beddard, 1902, p. 190, fig. 109; Schubotz, 1912, p. 357, fig.; Bequaert, 1922, pl. 24, fig. 2, pl. 25, fig. 2; Schouteden, 1930, p. [14], fig. 3a; Hatt, 1934b, pls. 32-34, and 1934c, p. 727, upper fig., p. 729, fig.; Rosevear, 1937, p. 12, fig. 2.

The various species of African pangolins do not appear to be numerous anywhere. They are in considerable demand among the natives, and active hunting keeps down their numbers. All forms are placed in Schedule B under the London Convention of 1933.

In all African pangolins "no hairs project between the scales, the median dorsal row of scales does not extend to the tail tip, and there is no external pinna of the ear." In *S. gigantea* and *S. temminckii* "the belly is naked, the preaxial surface of the fore limb bears scales to the base of the claws, the tail is massive and bears no naked subterminal pad." In the former "there are 12 to 15 scales in the median dorsal row of the tail. . . . The scales of the head, neck, shoulders, arm, and hind legs are dominantly dark olive-brown. This color shades gradually into avellaneous over the dorsal region. . . . Over the tail a deep Roman green assumes increasing prominence in the apical part of the scale. . . . The species is hairless, except for a dense ring of short, circumorbital bristles and a patch of similar hairs in front of the auditory meatus." The tail

length averages a little less than half of the total length. (Hatt, 1934*b*, pp. 646-649.) The species attains a total length of 1,710 mm. and a tail length of 830 mm. (Allen and Coolidge, 1930, p. 606).

The range appears to extend from Sierra Leone and Liberia east to the Ubangi-Shari Territory of French Equatorial Africa and northeastern Belgian Congo. It corresponds rather closely to the Upper and Lower Guinea Forest District of Chapin (1932, p. 90) and of Bowen (1933, pp. 256, 258). "*M. gigantea* is known from the West African Rain Forest and the adjoining wooded galleries" (Lang, in Bequaert, 1922, p. 325). Matschie (1894*a*, p. 5) seems to extend the range as far as Senegambia.

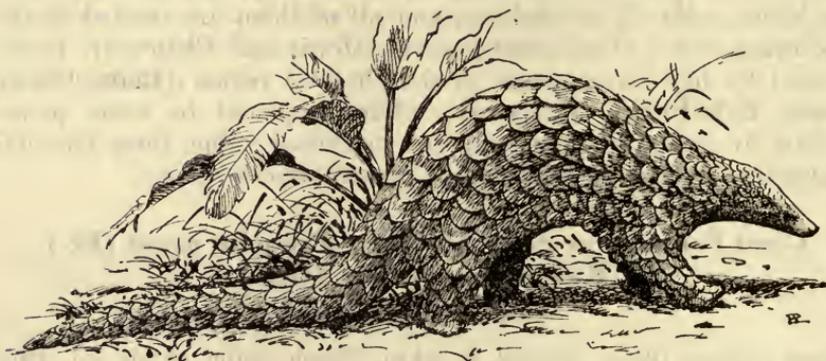


FIG. 20.—Giant Pangolin or Scaly Anteater (*Smutsia gigantea*). After photo by Lang.

Sierra Leone.—A species of pangolin, said to be *Smutsia gigantea*, is of fairly general distribution but is not commonly seen. It provides food for the natives. There is no evidence of depletion, and no protective measures are taken. (Colonial Secretary's Office, *in litt.*, July, 1937.)

Liberia.—This is a very rare animal in Liberia. A specimen secured by Jackson at Cape Mount had consumed a large quantity of termites and driver ants. The flesh is very tough and has a flavor of formic acid. (Büttikofer, 1890, vol. 2, pp. 395-396.)

Another specimen is recorded by Jentink (1888, p. 56) from Little Bassa.

A male of record size was obtained from natives at Paiata (Allen and Coolidge, 1930, p. 606).

Gold Coast.—This species "is found in the savannah areas of N. Ashanti and the Northern Territories.

"There is little doubt that all [the species of pangolins] are now much less common than formerly, though it is probable that their range has not decreased.

"Night hunting and the use of wire snares are the main causes of depletion. Their meat is considered one of the greatest delicacies." (Assistant Conservator of Forests, Gold Coast, *in litt.*, July 22, 1937.)

Nigeria.—The species is reported from Nigeria, but without a definite locality record (Rosevear, 1937, p. 13).

French Cameroons.—It occurs in the forest region and is absolutely protected except under scientific permit (Paris Agency, *in litt.*, November, 1936).

Gabun.—The Giant Pangolin is confined to the great forest. Only a skin has come under personal observation. It was, however, abundant at Mimongo in the region of Akelai. (A. R. Maclatchy, *in litt.*, February 5, 1937.)

Ubangi-Shari district, French Equatorial Africa.—It appears to be localized in the forested region. It is not threatened, and has been totally protected since 1929. (L. Blancou, *in litt.*, December, 1936.)

Belgian Congo.—Schubotz (1912, p. 356) records a specimen from Angu, on the Uele River.

Lang (in Bequaert, 1922, p. 320) says of the several local species of pangolins:

"The signs of their fossorial practice are as often a cause of their discovery as is the strong odor they emit, and dogs of native hunters never fail to challenge their presence. Various highly valued talismans, which their captors obtain from the claws, scales, hairs, and other parts of some of the scaly ant-eaters, suffice to make them an always welcome prize and their meat is an additional incentive for their destruction."

Lang also describes (p. 325) a Pygmy method of capturing the present species: "Pygmy boys, with one end of a strand of rattan fastened to the waist and the other held by friends waiting outside, entered the burrows without hesitation . . . These boys, armed only with a knife, merely fastened the rattan around the live pangolin, which they prodded from behind while their companions pulled it out of the hole. These otherwise harmless beasts, when touched while rolled up, suddenly switch their tail sidewise with such force that, if one's hand is caught between the rough body scales and the tail, it is seriously mutilated by the shearing action."

Lang records (p. 325) specimens from Bafuka, Niangara, Poko, and Niapu in northeastern Belgian Congo.

"The only specimen I was ever able to obtain was dug out for me by natives, with the expenditure of much labor and time, on the Semliki side of the forest" (Christy, 1924, p. 228).

Schouteden states (1930, p. [95]) that the species ranges from

the Lower to the Upper Congo. He also records (1935, p. [62]) a specimen from the Kivu region.

The several species of pangolins do not appear numerous anywhere in the Belgian Congo. The natives do not hunt them especially, and the Europeans not at all. Brush fires alone destroy a great many. (A. J. Jobaert, *in litt.*, November 10, 1936.)

South African Pangolin; Scaly Anteater. Ijzer Magauw; Ietermago (Boer)

SMUTSIA TEMMINCKII (Smuts)

Manis temminckii Smuts, Enumeratio Mammalium Capensium, p. 54, pl. 3, figs. 6-7, 1832. ("E regionibus, ultra *Latakou* sitis" = probably the region north of Litakun, British Bechuanaland.)

FIGS.: A. Smith, 1849, pl. 7; Royal Nat. Hist., vol. 3, p. 229, fig., 1894-95; Matschie, 1895, p. 143, fig.; W. L. Sclater, 1901, vol. 2, p. 217, fig. 148; Fitzsimons, 1920, vol. 4, pl. facing p. 233.

Though widely distributed in South and East Africa, this seems to be a decidedly scarce animal.

"General form somewhat elongated and lizard-like, covered everywhere, except on the lower surface of the head and body and inside the limbs, with a series of over-lapping broad scales of a dark horn-brown colour with paler edges and tips; head very small and pointed," covered above with small scales; "no external ear Across the middle of the back eleven rows of scales . . . ; limbs short each with five toes and claws Tail very broad," covered above and below with 4-5 rows of scales. Head and body, 24 inches; tail, 18. (W. L. Sclater, 1901, vol. 2, pp. 217-218.)

"The scaly ant-eater is chiefly found to the north of the Orange River, though said to occur rarely in Prieska and the other districts just south of the river; from here it extends through the Orange Free State, the Transvaal, Bechuanaland, the Kalahari and German South-west Africa to Rhodesia; north of the Zambesi it occurs in South Angola, Nyasaland and East Africa as far as Somaliland." (W. L. Sclater, 1901, vol. 2, p. 218.) Matschie (1894, p. 5) extends the range north to southern Kordofan (about lat. 17° N.).

"Well known in the Orange Free State (Ventersburg—Albany Museum), the Transvaal, Bechuanaland, Ngamiland, and Southern Rhodesia." Also "recorded from Northern Rhodesia, Nyasaland, and—according to Sclater—Uganda, East Africa and Somaliland." (Shortridge, 1934, vol. 2, p. 665.)

Cape Province and British Bechuanaland.—At Litakun, British Bechuanaland, Burchell (1824, vol. 2, pp. 423-424) observed a skin lying on the hedge of a native cattle enclosure, "placed there . . . to preserve the cattle from the evil effects of sorcery. . . . When-

ever a recent track is met with, the animal is traced to its hole and dug out if possible, as the flesh, which is extremely fat, is esteemed so great a delicacy that the law requires that every *khaaka* which is killed shall be brought to the Chief."

Referring to this same general region, A. Smith says (1849, text to pl. 7): "Only one solitary specimen of this species was obtained by the expedition before reaching 26° south latitude, and but two more between that parallel and the tropic of Capricorn Its extreme scarcity probably arises from its having long been zealously sought after by the natives Whenever a specimen . . . is secured, it is immediately burned in some cattle pen, which, according to the opinion of the sacrificer, tends to increase the health and fertility of all cattle who may afterwards enter the fold. Not many years ago a specimen was captured in the northern part of the Cape colony."

"I have seen a dry skin from Upington" (Shortridge, 1934, vol. 2, p. 665). In Griqualand West the animal is now very scarce, and the scales are used by the natives as medicine (McGregor Museum, Kimberley, *in litt.*, June, 1937).

South-West Africa.—In the Omaheke and the Kaukauveld it is widespread but rather rare; skins are seen occasionally among the natives. It is also reported by Bushmen in the Hukweveld. (Zukowsky, 1924, p. 68.)

"The Pangolin occurs throughout South-West Africa," but is "never plentiful. . . .

"It is apparently most numerous north of the Tropic of Capricorn and in the sand-plains adjoining Bechuanaland.

"Rare in the vicinity of the Orange River and in the southern parts of Great Namaqualand. . . .

"Pangolin scales (used as charms) were not infrequently seen in the possession of Bushmen and other natives." (Shortridge, 1934, vol. 2, p. 665.)

Angola.—Monard (1935, p. 183) records two specimens from the region between the upper Kului and the Kubango, where the natives report the animal as rather common. Monard also mentions (p. 185) specimens recorded by Bocage from Caconda and Mossamedes.

Transvaal.—"A number of examples have been sent to the National Zoological Gardens, chiefly from the Rustenburg and Marico districts of the Transvaal" (Haagner, 1920, p. 237).

"Never very common and probably scarcer now as a result of closer settlement. There is a demand for its scales by native witch doctors for 'medicine,' as much as six pence per scale being paid, so that this leads to a considerable amount of destruction of the animal. Being entirely useful and harmless it should receive more protection than is actually accorded it (Not included in the

game laws, i. e., without any special protection.)" (A. Roberts, *in litt.*, November, 1936.)

Portuguese East Africa.—Peters (1852, p. 174) records specimens from Quitangonha, from near Cape Delgado, and from the vicinity of Quelimane. He adds that the scales are made into finger rings and worn as a protection against the "evil eye."

Kirk states (1865, p. 654) that it occurs near Sena.

Southern Rhodesia.—Chubb (1909, p. 125) records a specimen from Wankie, Matabeleland.

The species is by no means common. Most Rhodesian natives use the skin as a charm, and for this reason the animals are in great demand. Were it not for their retiring nature and strictly nocturnal habits, they would be in danger of extermination. They will be protected in the near future. (Game Warden, Wankie Game Reserve, *in litt.*, March, 1937.)

Northern Rhodesia.—Pitman notes (1934, p. 173) that this pangolin is "recorded from Batoka Province and Barotse." The natives do not "seem to know of it in the areas I have toured (with the exception of the Kafue Hook)." He quotes Neave (1906) to the effect that it is not unusual to see the scales worn as charms by natives of the mid-Zambesi Valley.

Tanganyika Territory.—Holmwood (1878, p. 632) records a specimen "from the coast opposite Zanzibar, lat. 6° S.; but I have seen what I took to be the same animal, both in Somali-land under the equator and as far south as the Makna country opposite Mozambique."

Matschie (1895, p. 143) records the animal from Wahumba, Bagamoyo, Massai Nyika, and Mandera.

The Game Preservation Department (*in litt.*, December, 1936) reports no danger of extinction.

Kenya.—The Game Warden (*in litt.*, November, 1936) reports no decrease, though the animal is not protected.

Three-cusped Pangolin; White-bellied Pangolin; Pale-bellied Pangolin; Pointed-scaled Pangolin. *Pangolin tricuspide* (Fr.). Dreizackige Schuppentier (Ger.)

PHATAGINUS TRICUSPIS (Rafinesque)

Manis tricuspis Rafinesque, Annales Gén. Sci. Physiques [Bruxelles], vol. 7, p. 215, 1821. (Type locality not stated; restricted by Allen and Coolidge (1930, vol. 2, p. 606) to "West Africa.")

FIGS.: Royal Nat. Hist., vol. 3, p. 230, fig., 1894-95; Johnston, 1906, vol. 2, p. 749, fig. 292; Schouteden, 1930, p. [88], fig. 1; Hatt, 1934*b*, pls. 36-37, and 1934*c*, p. 727, lower fig., p. 730, upper fig., p. 731, right-hand fig.; Rosevear, 1937, p. 12, fig. 1.

This species occurs in apparently larger numbers than the other African pangolins.

It is "an arboreal species with a tail constituting over half the total length. The characters of the tail tip and the fore limbs are like those of *Manis longicaudatus*. The scales, however, are small and numerous, brown, and during mid-life, tricuspid. The post-scapulars are not enlarged." Under parts grayish white. In young animals "the margins of the scales are even, but with ensuing wear . . . the scales become sharply dentate, or, usually later, tridentate." In old age the animals have "cusplless, worn, elongate scales." In half-grown and mature animals the unscaled parts of the skin are covered with hair, attaining a length of 20 mm. Longitudinal rows of scales, 21-25; marginal caudal scales, 35-40. Total length, up to 1,027 mm.; tail, 607 mm. (Hatt, 1934*b*, pp. 655-658.)

This pangolin is not confined to the Upper and Lower Guinea Forest Districts but ranges southward into the Southern Congo Savanna District and eastward into the Uganda-Unyoro Savanna District of Chapin (1932, p. 90) and of Bowen (1933, pp. 256, 258). Hatt (1934*b*, p. 656) records specimens from Liberia, the Ivory Coast, Cameroons, Fernando Po, Gabun, the lower Congo, Kasai district, and central Angola. According to Matschie (1894*a*, p. 6), the range extends west to Gambia, and Jentink (1882, p. 208) has a record from Sierra Leone.

Liberia.—The species appears to be distributed over the entire region. Specimens are recorded from Buluma, Schieffelinville, Junk River, Hill-town, and Farmington River. The animal can be tamed and kept a long time in houses, where it runs free and preys upon ants, cockroaches, and other troublesome insects. (Büttikofer, in Jentink, 1888, p. 57.)

Allen and Coolidge (1930, vol. 2, p. 606) record "a native-made skin bought at Sinoe."

Gold Coast.—Hayman (1936, p. 937) records specimens from Goaso and Mampong.

The species is found through much of the forest country, but is doubtless much less common now than formerly (Assistant Conservator of Forests, Gold Coast, *in litt.*, July 22, 1937).

Fernando Po.—Fraser (1848, text to pl. 28) records the species from this island, where "the flesh is said to be exceeding good eating, and is in great request among the natives."

Gabun.—This pangolin is confined to the great forest. Although legally protected, it is actively hunted by the forest natives, who capture great quantities. To prevent this is difficult, for the animal is taken in trigger traps set for small game. The real safeguard would be the prohibition of this type of trap; but those who know

the brush know how much such prohibition would be worth. (A. R. Maclatchy, *in litt.*, February 5, 1937.)

French Equatorial Africa.—Matschie (1894a, p. 6) records the species from Loango.

It is common almost everywhere in the Ubangi-Shari district. It has been totally protected since 1929, and is not threatened. (L. Blancou, *in litt.*, December, 1936.)

Angola.—Monard (1935, p. 185) quotes Bocage to the effect that this pangolin is rather common at Bembé and Malangé; he also gives records for Bimbi and Cazengo.

Belgian Congo.—Schwarz (1920b, p. 1061) records specimens from Libenge on the Ubangi, Panga on the Aruwimi, Angu on the Uele, and Avakubi on the Ituri; also from Kudurma and Kabayendi in the Niam-Niam country (not far from the Congo-Sudan boundary).

Lang (in Bequaert, 1922, pp. 320-323) remarks that *tricuspis* is the commonest of the African pangolins. "Being timid, they readily make use of their natural safeguard and, when even slightly annoyed, roll up in a ball When forcibly unrolled, they may succeed in driving off their tormentors by well directed jets of an ill-smelling, acrid liquid from the anal region; native dogs suffer for a considerable time from the effect of this substance, which greatly irritates their mucous membranes. . . .

"If unmolested and placed near their favored prey, they uncoil readily One soon realizes how thoroughly they are specialized as ant-eaters, for their methods of attack and disposal of ants are as effective as their ways of guarding themselves against the defensive means of their prey. In the regions we visited, the pangolins preferred true ants, as stomach contents clearly showed, though many of our captives would plunder termitaria with great eagerness. . . .

"One taken near a column of army ants (*Dorylus*) merely made good its escape, another quickly broke up the well-ordered line. . . . Lashing its sticky tongue through the confused crowds, the ant-eater lost no time in moving back and forth along the ant column as quickly as the dense clusters vanished into its mouth. Its hunger satisfied, it at once retreated, freeing itself of the few army ants that had managed to dig their mandibles into the soft parts of its hide. *M. tricuspis* fed freely on many other kinds of ants. Those we had alive at Avakubi, Medje, and Niapu were particularly fond of ants of the genus *Myrmicaria*. . . .

"African pangolins have helped to enrich the stores of witchcraft."

Hatt (1934b, p. 645) records 66 specimens from Akenge, Avakubi, Faradje, Gamangui, Medje, Ngayu, Niangara, Niapu, Poko, and Stanleyville.

Uganda.—An arboreal pangolin (presumably *tricuspis*) is reported by Johnston (1902, vol. 1, pp. 395-396).

"Two or three species occur in Uganda, the common representative being *Phataginus tricuspis*, a forest species. There is no reason to believe that Pangolins are any less plentiful than formerly. In the Mabira Forest *P. tricuspis* is abundant. All species of Pangolins are completely protected in Uganda." (Game Warden, Uganda, *in litt.*, December, 1936.)

**Long-tailed Pangolin; Black-bellied Pangolin. Pangolin à
longue queue (Fr.). Langschwanzige
Schuppentier (Ger.)**

UROMANIS LONGICAUDATA (Brisson)

Pholidotus longicaudatus Brisson, Règne animal, vol. 3, Quadr., p. 19, 1762.
(“Probably West Africa” (Allen and Coolidge, 1930, p. 606).)

SYNONYMS: *Manis tetradactyla* Linnaeus (1766); *Manis macroura* Erxleben (1777); *Manis hessi* Noack (1889).

FIGS.: Noack, 1889a, pl. 1; Johnston, 1906, vol. 2, p. 753, fig. 295; Bequaert, 1922, pl. 25, fig. 1; Allen and Coolidge, 1930, pp. 603-605, figs. 447-449; Schouteden, 1930, p. [94], fig. 3a; Hatt, 1934b, pl. 35, figs. 1-2, and 1934c, pp. 726 (both figs.) and 731 (lower fig.); Rosevear, 1937, p. 12, fig. 3.

The very limited amount of information available concerning this species suggests that it is one of the rarest of the African pangolins.

This is “an arboreal species with a long prehensile tail, equaling about two-thirds of the total length. . . . The forearms bear no scales, but are covered with hair. The scales are large, yellow, and on the flanks are keeled. The two inferior postscapular scales are markedly larger than those adjacent to them. . . . The belly hair is black in most individuals The whole face . . . dark brown, nearly black.” Total length up to 937 mm.; tail, 645. (Hatt, 1934b, pp. 651-652.) Thirteen rows of scales on the body; 44 marginal scales on the tail; two rows of 9-10 scales before the tail tip (Matschie, 1894a, p. 7).

The range appears to be more or less coextensive with the Upper and Lower Guinea Forest Districts of Chapin (1932, p. 90) and of Bowen (1933, pp. 256, 258). Jentink (1882, p. 207) records specimens from as far west as Senegal and Sierra Leone. Otherwise the species is known from Liberia to Gabun and the northeastern Belgian Congo.

Liberia.—The animal is pretty rare, though a number of living specimens were received, including one at Soforeh Place. (Büttikofer, 1890, vol. 2, pp. 393-394.)

Jentink (1888, p. 56) records additional specimens from Hill-town and Farmington River.

Live specimens were brought to Allen and Coolidge (1930, vol. 2, p. 606) at Lenga Town on the Farmington River and at Paiata.

Gold Coast.—Specimens are recorded from Dabocrom and Elmina (Jentink, 1882, p. 207); also from Goaso (Hayman, 1936, p. 937).

The species is found through much of the forest country, but there is little doubt that it is now much less common than formerly (Assistant Conservator of Forests, Gold Coast, *in litt.*, July 22, 1937).

Cameroons.—Hatt (1934*b*, p. 653) records the species from this country, without stating the exact locality.

Gabun.—Hatt (1934*b*, p. 652) records a specimen from Fernand Vaz.

Belgian Congo.—Noack (1889*a*, p. 100) based his name *Manis hessi* upon a specimen from the vicinity of Banana, at the mouth of the Congo.

Hatt (1934*b*, pp. 651, 653) records specimens from Bolobo and Lukolela on the Lower Congo, and from Akenge, Gamangui, Medje, and Niapu in the northeastern part of the country.

Order RODENTIA: Rodents

Family LEPORIDAE: Hares and Rabbits

This family is of nearly cosmopolitan distribution; but it is absent from Madagascar and part of the Malay Archipelago, and it was lacking in Australia until introduced. There are about 11 genera and over 200 species and subspecies. There is generally an abundance of individuals, and only a single species, the insular Amami Hare, comes within the scope of this report.

Amami Hare; Liu Kiu Hare

PENTALAGUS FURNESSI (Stone)

Caprolagus furnessi Stone, Proc. Acad. Nat. Sci. Philadelphia 1900, p. 460, 1900. ("Liu Kiu Islands.")

This remarkable insular hare, unique representative of its genus, has been suitably recognized and protected by the Japanese Government as a "Natural Monument."

Size approximately that of *Lepus americanus*; hind foot, tail, and ears remarkably short; claws very large and strong; soft underfur plumbeous; long hairs coarse and hispid, brownish black, many with buff annulations; a median black stripe from neck to rump; under parts mostly pale buff. Total length of flat skin, 550 mm.; tail, about 8 mm. (Stone, 1900, pp. 460-461.) "*Pentalagus* is the most marked of any of the genera of the Leporidae, the tooth

formula, the structure of the teeth, the relative size of the radius and ulna, and the very short tarsus and metatarsus being peculiar to the genus and unlike anything in the rest of the family" (Lyon, 1904, p. 430).

In the original description Stone (1900, p. 460) records two specimens.

Thomas (1906a, p. 357) records a specimen from "Oshima, Okinawa, Liu-Kiu Is.," and adds: "Another specimen is now living in the Duke of Bedford's menagerie at Woburn."

"The distribution of this species . . . is restricted to the Islands of Amami-Oshima and Tokuno-shima in the Loochoo archipelago where it is endemic" (Kaburaki, 1934, p. 4183).

"Number is unknown, but as it is carefully protected as one of the 'Natural Monuments,' by the Law for Preserving Scenery, Historic and Natural Monuments, and it is also strictly prohibited to capture the species without special permission, and besides it is forbidden by the game law, it will never become extinct" (Nagamichi Kuroda, *in litt.*, July 5, 1938).

Family CASTORIDAE: Beavers

The single genus of this family is represented by one species (*Castor canadensis*), with 20 subspecies, in North America, and by another species (*fiber*), with perhaps four subspecies, in Europe and northern Asia. All the American forms have been treated by Dr. Allen in the preceding volume (1942), and an account of *Castor fiber* and its subspecies follows here. It is primarily the demands of the fur trade that have brought about the deterioration in the status of the Beavers.

European Beaver. *Castor*; Bièvre (Fr.) Biber (Ger.)

CASTOR FIBER Linnaeus

[*Castor*] *fiber* Linnaeus, Syst. Nat., ed. 10, vol. 1, p. 58, 1758. (Sweden.)

Figs.: Geoffroy and Cuvier, Hist. Nat. Mamm., vol. 6, pl. 275, 1824; Brandt and Ratzeburg, 1829, pl. 3; Blasius, 1857, p. 403, fig. 224; Royal Nat. Hist., vol. 3, p. 97, pl., 1894-95; Collett, 1898, pl. 12; Martin, 1910, pl. 10; Didier and Rode, 1935, p. 188, fig. 98.

While treated here as a specific unit, *Castor fiber* has been divided into a number of forms, including the following which are considered by Kuntze (1935, p. 64) to be more or less tenable:

- C. f. fiber* Linnaeus (Sweden);
- C. f. vistulanus* Matschie (western Poland);
- C. f. albicus* Matschie (Dessau, Anhalt, Germany); and
- C. f. galliae* Geoffroy (the Rhone, France).

The former range of the Old World Beaver included the forested regions of Europe and northern Asia. The original colonies are now extinct in all save a few localities in France, Germany, Norway, Poland, Russia, and Siberia. In recent times the animal has been reintroduced into England, Sweden, and Latvia.

The general form is heavy and thickset; eyes and ears small; hind feet large, broad, and webbed, the claw of the fourth digit with a horny, compressed supplement; tail scaly, mostly naked, broad, depressed; general color a peculiar and very uniform clayey buff, the under parts a little more yellowish. Head and body (female), 820 mm.; tail, 380 mm. (Miller, 1912, pp. 948-952.) Weight, 15 to 25 or even 36 kilograms (Didier and Rode, 1935, p. 188).

Great Britain.—In Wales, in A. D. 940, Beaver hides were requisitioned for making the borders of the king's garments; it was evidently then a rare animal. In 1188 it was still found on at least one river in Wales and on a single river in Scotland, though it had apparently died out quite generally in other parts of Great Britain. "The written records we have of its occurrence are very fragmentary, and not wholly satisfactory." Remains have been exhumed in both England and Scotland. Various place names in England indicate the former occurrence of Beavers there. (Harting, 1880, pp. 33-46.)

Their skins were exported from England and Scotland until the middle of the twelfth century. Beavers¹ were reintroduced on the island of Bute, Scotland, in 1874, but died out about 1890. There were similar introductions in Suffolk, England, in 1870, and in Sussex at some time prior to 1905. (Millais, 1905, pp. 162-163.)

In 1663 a good Beaver hat in England cost 85 RM. in German currency (Krüger, 1931, p. 54).

Spain.—Strabo, writing of this country in the first century B. C., is said to mention the Beaver as a well-known animal (Blasius, 1857, p. 407; Krüger, 1931, p. 52).

France.—The Beaver was once widely distributed in France, being found on many watercourses in various basins. It gradually became rare, but in the sixteenth century was still found on many rivers, principally the Oise, the Somme, and the Marne. Today it is found only on the Rhone and its tributaries, below Valence. The principal habitats are: (1) the mouth of the Ardèche; (2) the mouths of certain small watercourses—the Cèze, the Tave, and the Aigues; (3) the vicinity of Roquemaure and the Île de Miémas; (4) the vicinity of Avignon and the Île de Barthelane; (5) along the course of the Gardon; (6) between Tarascon and Beaucaire; (7) on

¹ According to Krüger (1931, p. 53), Scottish importations at this period were of Canadian Beavers.

most of the course of the Petit-Rhône, in rather numerous colonies; (8) on the Grand Rhône, beginning at Arles, in less numerous colonies.

The 60 or 70 known stations are certainly not the only ones. A rough estimate of the total population is 300 individuals.

The reasons for depletion are numerous and diverse. Although the Beaver was always hunted for its valuable fur, it was long considered, up to recent years, as harmful and thus was under official ban. Trapping in submerged nets has been particularly fatal. The frequent floods on the Rhone have been a serious factor in destruction.

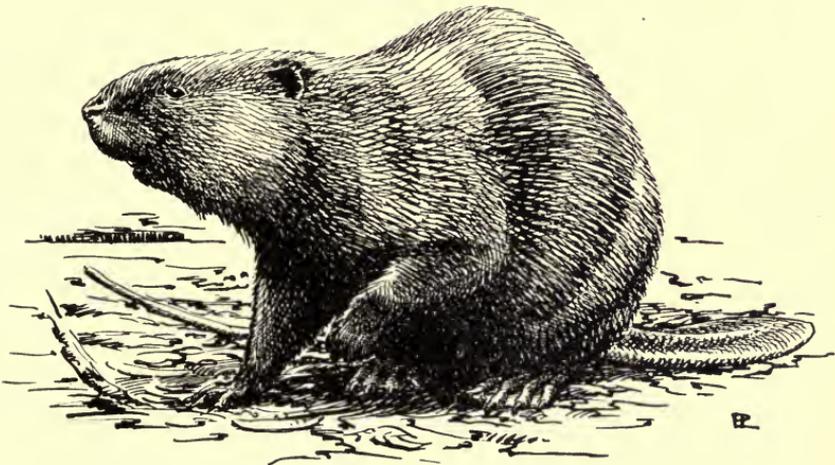


FIG. 21.—European Beaver (*Castor fiber*). After Brehm.

Perhaps pollution of the watercourses in certain areas is to be blamed, for autopsies have revealed tubercular lesions. It does not appear from the autopsies, however, that the fecundity of the species has been diminished.

When its existence was threatened a dozen years ago, the warning issued by certain naturalists rapidly bore fruit. Restrictions on hunting, establishment of reserves, warden service, propaganda in favor of the Beaver, and appreciation of this rare animal by the local population, have been effective in its conservation. Its future seems brighter, and in general the colonies seem more prosperous than a little while ago. It would be easy to improve the situation by the creation of more reserves, by the establishment of zones of refuge at the time of floods, and by the repopulation, if possible, of old abandoned colonies. (E. Bourdelle, *in litt.*, March 6, 1937.)

Since 1909 the hunting and capture of Beavers have been prohibited for all time. Twenty kilometers of the Rhone have been

declared a protected reserve. As a result of persecution the species has lost the habit of constructing dams and lives in burrows in the banks of the streams. (Didier and Rode, 1935, pp. 192-193.)

Trouessart wrote in 1884 (pp. 119-121) that its northern limit in the Rhone Basin was approximately Valence (as it is now). He added that it was becoming rarer each year, owing to relentless persecution. Also that its flesh is excellent, and since it is hunted for its hide and for its castor, as well as because of its depredations in young plantations, its early extermination in France could be predicted. But such a fate has been happily warded off.

A few years ago its castor was worth more than 250 francs a pound. For a long time the Syndicat des digues du Rhône paid a bounty of 15 francs on Beavers, on account of the alleged damage to dikes. But with better information the bounty was abandoned. (Martin, 1910, p. 10b.)

Italy.—Gesner (1551, vol. 1, p. 337) mentions the Beaver as occurring at the mouth of the Po.

Yugoslavia.—The species is entirely exterminated, the last specimens having been observed in 1859 at Syrmia on the Danube and at about the same time in Bosnia on the River Ukrina. A good many fossil remains have been found in Croatia and Slovenia. (M. Hirtz, *in litt.*, December, 1936.)

Rumania.—The species existed in Transylvania up to about 1500, and in Moldavia to 1823 (Calinescu, 1931, p. 82).

Hungary.—Extermination took place in the first half of the nineteenth century (J. Schenk, *in litt.*, November, 1936).

Austria.—In 1867 Beavers still lived northwest of Salzburg, where the Sur discharges into the Salzach, but by 1870 only disused burrows could be found. There was formerly a protected colony in the plains of the Danube near Wien. But now the Beaver is no more to be found in the Danube region. In 1861 the castor fetched 600 Gulden in Salzburg. (Krüger, 1931, pp. 52-54.)

Czechoslovakia.—Under the protection of the Princes of Schwarzenberg, Beavers survived long in the tributaries of the Moldau, but the last of them died in 1883 (Krüger, 1931, p. 53).

Switzerland.—Gesner (1551, vol. 1, p. 337) reports the Beaver as a very common animal in the large rivers. But it could not survive strong persecution (Krüger, 1931, p. 52). Millais (1905, p. 160) quotes Harting to the effect that "Beavers were to be found in the Aar, the Linnet, and the Reuss, and up to the last century [eighteenth] a few still lingered on the banks of the last-named stream, on the Thiele, and the Byrse."

Germany.—On the Rhine the animals died out more than 300 years ago. In Westphalia they occurred up to the middle of the nineteenth century, and the very last was killed apparently in 1877.

In the Province of Hannover they disappeared more than a hundred years ago.

Beavers now find refuge only on the middle course of the Elbe between Wittenberg and Magdeburg, together with its tributaries the Mulde, Saale, and Nuthe, and the adjacent Altwässer. The population was estimated in 1890 at 200; in 1913, at 188; in 1919, at 42; in 1922, at 200; in 1926, at 164; in 1929, at 263.

The almost total destruction of the Beaver in Europe is to be explained only by avaricious persecution. It was pursued because of its tasty flesh, its valuable pelt, and especially its castor, which commanded a very high price as a panacea.

The presence of the Beaver today on the middle Elbe is due to certain protective measures. Formerly it enjoyed no protection. The Prussian Game Law of 1907 gave it a 10-month closed season. In 1921 and again in 1929 it was given complete protection. Along the Elbe mounds are constructed to furnish a refuge during floods, and some willow plantations are provided as food. There are restrictions on fishing and trapping in the immediate vicinity of the Beaver burrows. The Provincial Assembly has made an appropriation of 1,000 RM. for settlement of claims for damage by Beavers. Despite these protective measures, the Beaver stand increases only slightly or not at all.

Owing to the penalties involved and the difficulty of disposing of the skin, deliberate killing for profit has practically ceased. But some animals still fall victims each year to the human lust for killing. More serious is the killing for protection against damage. In the eyes of the country people and the fishermen the Beaver is injurious. It steals their potatoes and turnips and destroys their fruit and forest trees. Some are caught and drowned in fish nets and traps. They are also endangered by steel traps set for Otters.

Floods and drifting ice constitute the greatest menace to the Beaver. Tuberculosis was found in a dead animal.

Introduction of Beavers into other parts of Germany, where they may find suitable living conditions and safety, is being considered. (Krüger, 1931, pp. 53-56.)

The present range in Germany is on the Elbe between Torgau and Magdeburg, and on the adjacent tributaries. Tuberculosis has been found the cause of death of a number of animals. Some Beavers have been introduced in the Schorfheide, near Berlin. (Reichsstelle für Naturschutz, *in litt.*, October, 1936.)

In Württemberg the last specimen was killed in 1869 on the Danube at the mouth of the Iller River (Württembergische Naturaliensammlung, *in litt.*, October, 1936.)

Blasius refers (1857, p. 407) to the former occurrence of Beavers in northwestern Germany on the Moselle, the Maas [now in the

Netherlands], and the Weser; in the Lüneburg area; and on the Schunter near Braunschweig. He also speaks of their more recent occurrence on the Havel and the Oder, in the Altmark, on the Vistula [now in Poland], in East Prussia, and at Schwenckfeld in Silesia.

"Harting says that 'at the close of the last century [eighteenth] many localities are reported to have been frequented by Beavers,' notably in Altmark, Preignitz, Middlemark, on the rivers Spree and Haxel and in the vicinities of Berlin, Potsdam, Oranienburg, Liebenwalde, Trebbin, Nauen, and Königshorst. . . . Wagner in 1846 mentions Beavers as living on the Danube, Amper, Isar, Iller, Salzach, and the Oder." (Millais, 1905, p. 161.)

Denmark.—The species was formerly distributed all over Denmark, including Bornholm (Winge, 1908, p. 96).

Norway.—Trade in Beaver skins was carried on early in the Middle Ages. Probably most of the Norwegian furs were exported to England. The species had begun to decrease by the close of the seventeenth century. In the middle of the eighteenth century it was probably still distributed throughout most of the woodland valleys, from the southernmost parts of the country to the farthest confines of Finmarken.

In 1896 its range was chiefly in the Stifts of Christiania and Christiansand. The largest colony was located on the Nisser River in Nedenaes Amt.

The trees felled are used both for food and for building material. The Beaver prefers the aspen (*Populus tremula*) and after that the birch, oak, and alder.

According to an old superstition, the castor has the power to frighten away whales approaching a boat. In some parts the castor is worn from the garter as a specific for worms. In the sixteenth century the tail was regarded as a table delicacy. The teeth are worn as amulets in Finmarken, partly for ornament, partly as a protection against sickness, and were offered to the gods at the place of sacrifice and buried in the graves of heathen Lapps.

By the middle of the nineteenth century the Beaver was fast becoming extinct, but the Game Laws of 1845 checked the decrease. By the end of the century it was on the increase and had extended its range by migration. The number was estimated at about 60 in 1880, about 100 in 1883, and perhaps a few more in 1896. By this time Norwegian Beaver skins were very rarely in the market, and the castor was of little value.

For a period of about 40 years after 1855 Beavers were allowed to be killed under certain restrictions. Then a closed season of 10 years was declared for the entire Amt of Søndre Bergenhus and for the whole of Aamli. (Collett, 1898, pp. 105-126.)

By 1931, as a result of state protection, the numbers on the Nidelf River had increased to 12,000 (Krüger, 1931, p. 53).

A limited amount of hunting is now allowed. During late years Beavers have been transplanted to the northern parts of the country, where they seem to thrive well. In some districts the farmers complain of damage to the forests by the Beavers. (Hj. Broch, *in litt.*, December, 1936.)

Sweden.—The Beaver was formerly distributed all over the country, but gradually it became extinct. The last specimen in Smolandia was probably killed about 1800; that in Jemtland probably about 1870. It was the value of the fur and the castor that caused its extermination. Beavers of the same race from Norway were first introduced in Jemtland in 1922, in Westerbotten in 1924, and in Wermland in 1925. These have all increased, and the number in Jemtland is now estimated at several hundred. There have also been introductions in other provinces, and further trials of this kind are planned. The animal is now very popular in Sweden, and its future appears to be rather promising, especially since it is protected throughout the year. (Einar Lönnberg, *in litt.*, 1937.)

Latvia.—In former times the Beaver was found on many of the smaller rivers, but owing to excessive hunting it was exterminated about 1870. In 1927 the Government introduced four Norwegian Beavers in the State Forest of Kurland, and in 1936 two others in Smiltene in Livland. They have now increased in number to about 40. Hunting is forbidden. (Forest Department of Latvia, *in litt.*, March, 1937.)

Lithuania.—The species is probably exterminated. Since the World War two specimens have been illegally captured: one in 1921 on the Dubisa, and one in 1935 on the Nemunas. Hunting is forbidden. Reintroduction from neighboring countries is desirable. (T. Ivanauskas, *in litt.*, November, 1936.)

Poland.—Game protective measures were instituted as early as the beginning of the eleventh century, when Boleslaus I the Great proclaimed an act for the protection of the Beaver (Benedyct Fuliński, MS., 1933).

In ancient times and perhaps even in the seventeenth century the Beaver was quite common in all Poland. Owing to the reduction of forest areas and especially to the regulation of rivers, it retired to the eastern and northeastern parts of Poland, where it is still found. (M. Siedlecki, *in litt.*, October, 1936.)

Three preserves in the state forests, aggregating 684 hectares, are sanctuaries for Beavers. Another, the Bucharzewo Preserve, of about 5 hectares, contains Canadian Beavers. (Benedyct Fuliński, MS., 1933.)

The present colonies of *Castor fiber vistulanus* all lie in the river basins of the Niemen, the Pripet, and the Dnieper, and perhaps also the western Dūna. A map shows the present distribution at 14 stations in the Niemen Basin and at 16 stations in the Pripet Basin. The last records on the middle course of the Vistula were in 1850; on the headwaters of the Vistula system, in 1861; on the headwaters of the Bug, in 1861; on the headwaters of the Dniester, in 1851. The largest colony in Volhynia in 1928 was estimated to contain 100 individuals. In 1928-29 the total number in Poland was estimated at 235. The animals are now very strictly protected. (Kuntze, 1935, pp. 65-68.)

Russia.—Various early records are summarized by Nehring (1890, p. 105) as follows: Pallas (*ca.* 1770) reported that Cossack hunters sought Beavers on the steppe rivers of the Samara region, where the animals occurred very sparingly. According to Rytshkov, Beavers still existed in 1760-70 in the Bashkiri region; according to Eversmann, about 1850 in the Perm Government; according to Kessler, at the same period in many rivers of the Kiev and Poltava Governments; according to Krynitzki, about 1835 near Kherson on the lower Dnieper.

Trouessart (1910, p. 130) includes northern Russia and southern Russia (Caucasus and rivers of the Caspian) in the range of the species. Millais states (1905, p. 161) that "Beavers were found on the Petchora and the Dwina in Russia until 1842, and possibly a few may still exist in their unfrequented tributary streams."

Of Russian Beavers we know comparatively little. In 1884, 566 individuals were counted in the Rokitno Swamps. But by the time of World War I this number had greatly decreased, despite protective measures instituted in 1911. It is doubtful if the colony set out on the Voronesh in 1886 still exists. (Krüger, 1931, p. 53.)

The species was formerly widely distributed in the forested areas but is now almost exterminated and exists only in some reserves. These are in the Ukraine (on the Rivers Teterev, Soge, and Desna, on the tributaries of the Pripet, and in the former Government of Chernigov); in the Western Area and in White Russia; and on the Usman in the former Government of Voronesh. In 1935 the total number of Beavers in the U. S. S. R. (including Siberia) was estimated at 2,500-3,000. (W. G. Heptner, *in litt.*, December, 1936.)

Siberia.—According to Eversmann (as reported by Nehring, 1890, p. 105), Beavers still existed about 1850 in the Baraba Steppe (between the Irtish and the Ob Rivers). "Gone from the Yenisei and Irtish, where formerly they were common, they were reported from the Pelyn, a tributary of the Obi, in Western Siberia, until 1876, and they may still exist there" (Millais, 1905, p. 161). Trouessart (1910, p. 130) includes Turkestan as well as Siberia in the

range of the species. According to Millais (1905, p. 161), it was found even "as far east as Behring Straits." Krüger states (1931, pp. 52-53) that it once ranged from the Urals to the Pacific Coast, but that the white examples with yellowish backs on the farther side of the Urals probably have not survived, and that there are reports of the complete extirpation of the species in Siberia. According, however, to W. G. Heptner (*in litt.*, December, 1936), it exists on the Rivers Konda and Sosva and their tributaries in the Ob Basin.

Schrenck (1859) reported the Beaver from Sakhalin, and he is quoted as authority by Aoki (1913, p. 298) and by Hatta (1928, p. 1036). The record is questioned, however, by Kuroda (1928, p. 224), who calls attention to the lack of specimens.

The paucity of beaver records from the Siberian wilderness suggests that the animal may never have been very abundant or thoroughly distributed over that country. Perhaps the Siberian taiga, with its predominant coniferous growth, does not provide a sufficient quantity of the Beaver's favorite food trees, such as the aspen and other deciduous species, to support the animal in large numbers.

Turkey, Syria, and Iraq.—Danford and Alston (1880, p. 60) give an unsubstantiated report of a beaverlike animal in the marshes between Kaisariyeh and Indjesu, Turkey. They also cite reports by Helfer and Helfer (1879) of Beavers on the Euphrates near Aleppo, and by Schmarda (1853) in Mesopotamia.

Persia.—"The beaver, according to Eichwald, is common in the Araxes I insert it in the Persian fauna with some doubts." (Blanford, 1876, p. 51.) The above-mentioned report from the Araxes is categorically denied by later authors (Satunin, 1906, p. 374).

Mongolia.—In the upper Yenisei Basin, Tannu-Tuva, "a few beavers still exist in the upper tributaries of the Bei-Kem; but they are very rare, and their skins are seldom brought down to the markets. In old days they were mentioned as being included in a tribute sent by the Khan of the Ubsa region, then paramount chief of the Uriankhai tribes, to the Czar of Russia." (Carruthers, 1913, p. 228.)

The species "still exists . . . , it is said, in the highest tributaries of the Black Irtish in the Mongolian Altai" (Carruthers, 1913, pp. 630-631).

Manchuria.—"An animal recorded by Schrenck, but which does not appear to belong to the Manchurian fauna, is the beaver (*Castor fiber*). It is true that skins of this animal have been secured from the natives in the Amur region, and that they find their way to the fur market in such places as Harbin and Mukden in Manchuria, but recent investigation tends to show that these skins have been brought

from Alaska, having been bartered from one tribe of natives to another till they came into the hands of Russian or Chinese fur traders." (Sowerby, 1923, p. 170.)

India.—The Beaver may have occurred even in India, since, according to Buffon, the religion of the Magi forbade them to kill this animal (Blasius, 1857, p. 407).

Egypt.—Since the species is supposed to be represented in the Egyptian hieroglyphs, it may have occurred in Africa (Blasius, 1857, p. 407).

Economics.—"Had not the use of its hair in the manufacture of hats been superseded by that of silk, there is little doubt that the beaver, both in the Old World and in America, would by this time have been numbered among extinct animals. As it is, the creature has but a hard time of it at best, for although there is no longer a demand for its hair by the hat-manufacturer, yet beaver-fur is an article highly valued by the furrier, and equally highly esteemed by the fair sex." (Lydekker, 1903, p. 244.)

Family CRICETIDAE: Hamsterlike Rodents

While various authors are not in accord on the limits of this family, it is probably safe to say that it consists of more than a hundred genera and more than a thousand forms. Representatives occur over the greater part of the world, and in general their numbers are legion. However, 14 New World forms are included in the preceding volume by Dr. Allen (1942), and the 6 forms of the African genus *Lophiomys* are discussed here. A recent authority (Ellerman, 1941) makes a separate family (Lophiomyidae) of this genus.

Genus *Lophiomys* Milne-Edwards: African Maned Rats

The following remarks of the Committee of Experts (Hemming et al., 1938, p. 13), while naming only a single species, may be taken to apply to all known forms of this rare and peculiar genus:

No species of rodent was included in either class of the Annex in the Convention of 1933, presumably owing to the small size and insignificant appearance of the majority of the species involved, and to the fact that they do not fall into the category of game animals. We see no reason however why a species of this Order should not be placed in the Annex if owing to their rarity they are in danger of extinction.

A species of this Order which we should like to see protected is the Crested Bush Rat, *Lophiomys imhausi* Milne-Edwards, a very remarkable species living at altitudes of between seven and nine thousand feet in the mountains of Abyssinia and Kenya. This species which lives in pairs in dead trees and similar cover is peculiarly liable to attack and its numbers are known to have diminished considerably in recent years.

We accordingly recommend that this species should be included in Class A of the Annex which, owing to the fact that rodents are not game animals,

appears to us the most appropriate method of securing their protection. In the case of this particular species we shall hope to have received before the next meeting of the Conference the data to be collected by the Italian Scientific Mission.

Hollister remarks (1919, p. 37): "Although a few specimens of the maned rat find their way into collections from time to time, the animal is still so rare that no suitable series are available for study. If all the collections in various museums were combined it would still be impossible to form any correct idea of the relationships of the named forms, and it will doubtless be many years before sufficient material has accumulated."

Under these circumstances the classification and nomenclature in the following accounts of the known forms of *Lophiomys* must be considered as no more than provisional. Possibly all the forms so far described will eventually prove to be no more than subspecifically distinct. All exhibit the same general color pattern.

Sudan Maned Rat

LOPHIOMYS AETHIOPICUS (Peters)

Phractomys aethiopicus Peters, Zeitschrift Gesamten Naturwissens. Halle, vol. 29, p. 195, 1867. (Based upon a skull from Maman, north of Kassala, Anglo-Egyptian Sudan.)

FIG.: Anderson and de Winton, 1902, pl. 51.

This species seems to be known chiefly from single specimens collected at no more than about half a dozen localities in the Anglo-Egyptian Sudan and Eritrea.

Under the name of *L. imhausi*, Anderson (in Anderson and de Winton, 1902, p. 289) describes an adult female from Erkoweet(?), on the mountains between Suakin and Sinkat, Sudan, somewhat as follows: Denser fur generally gray at the base, with a broad white band and wide brown tip; the long hairs broadly tipped with white; a triangular white area on top of the head, prolonged backward below the ears to the side of the neck, where the adpressed lateral band of yellowish hairs commences; a white spot below the eye; front and sides of head, throat, and sides of neck blackish brown; under surface generally pale brown, with an admixture of white; tip of tail white. Total length about 40 cm. (The brownish rather than blackish tone possibly represents a discoloration that had developed since the specimen was collected in 1880. A similar discoloration is now observable in the type of *L. smithi* Rhoads.)

In writing of this specimen, Giglioli says (1881, p. 45): "The Natives told Count Marazzani that the *Lophiomys* is rare, that it lives in deep holes in the strangely fissured rocks of that country." He also records a specimen killed at Keren in the Bogos country, Eritrea, in 1870.

Oustalet (1902, p. 399) records a specimen from Massaua, Eritrea.

"This animal is said to occur in the Khor Baraka and also at Tamai [respectively south and west of Suakin], and it is stated that it burrows under the roots of trees like a rat" (Anderson, in Anderson and de Winton, 1902, p. 290).

All, or nearly all, of the above-mentioned specimens, except the type of *aethiopicus*, were recorded as "*L. imhausi*" before the plasticity of the genus was recognized, but all of the localities are much nearer to the type locality of *aethiopicus* than to that of any other described form.

Imhaus's Maned Rat; Imhaus's Crested Bush Rat

LOPHIOMYS IMHAUSII A. Milne-Edwards

Lophiomys Imhausii A. Milne-Edwards, L'Institut, vol. 35, p. 46, 1867. (Based upon a specimen secured alive at Aden, Arabia, but of unknown provenance (A. Milne-Edwards, 1867*b*, p. 115); Thomas remarks (1910, p. 222) that Aden is "a place to which Somali animals are very commonly brought for sale.")

SYNONYM: *Lophiomys smithi* Rhoads (1896) ("Sheikh Husein, West Somaliland" = Ethiopia).

FIGS.: A. Milne-Edwards, 1867*b*, pls. 6-10; Kull, 1894, p. 136, fig.; Rhoads, 1896, pl. 25; A. D. Smith, 1897, p. 64, fig.; Drake-Brockman, 1910, pl. facing p. 133.

This species is "found probably throughout the Somali country, but [is] undoubtedly a very rare animal" (Drake-Brockman, 1910, p. 134).

It is covered with very long silky hairs, of mixed white and black; those of the back rising in a crest from the crown to the tip of the tail, and separated from those of the sides by an area of much shorter hairs, brittle and grayish tawny; tail long, not prehensile, covered with hairs like those of the body (A. Milne-Edwards, 1867*a*, pp. 46-47). The general appearance is not ratlike. The dorsal crest is erectile. An adult male from British Somaliland measured: head and body, 11 inches; tail, 8 inches. (Drake-Brockman, 1910, p. 133.)

The known distribution includes British Somaliland and south-eastern Ethiopia.

Kull (1894) describes and figures two specimens from Somaliland.

A specimen (the type of *L. smithi*) secured by A. D. Smith (1897, p. 64) at Sheikh Husein, Ethiopia, in 1894 was the only one seen in a journey of 4,000 miles through British Somaliland, Ethiopia, and Kenya.

In British Somaliland "I have seen it at Sheikh and near Burao, but never lower than 4,000 ft. One specimen was killed by Somalis at Upper Sheikh and one caught alive, while an adult female and young male were caught near Burao

"Its custom of proceeding with crest erect is in all probability a protective measure to frighten its enemies, which might mistake it very easily for a young porcupine." (Drake-Brockman, 1910, p. 134.)

Goba Maned Rat

LOPHIOMYS BOZASI Oustalet

Lophiomys Bozasi Oustalet, Bull. Mus. Hist. Nat. [Paris], vol. 8, no. 6, p. 400, 1902. (Goba, southern Ethiopia; alt. 3,000 m.)

This species appears to be known only from some three or four specimens.

The female type is described as larger than *L. imhausii*; fur thicker; an elongate white spot over each eye, with a black band between; a white spot below the eye; muzzle and area about each eye black. Total length, 535 mm. (Oustalet, 1902, p. 401.)

De Winton (in Anderson and de Winton, 1902, p. 291) records (under the name of *L. imhausi*) a specimen from near "Het Marafia" (= Let Marefia) and another from the forest of Tikem; both localities are in Shoa, Ethiopia.

Hollister (1919, p. 37) refers to the present species a specimen from Let Marefia, Shoa.

Uaragess Maned Rat

LOPHIOMYS THOMASI Heller

Lophiomys thomasi Heller, Smithsonian Misc. Coll., vol. 59, no. 16, p. 4, 1912. ("Mt. Gargues (Uaragess), 6000 feet altitude, Mathews Range, British East Africa.")

This species appears to be known from only three specimens from the type locality.

"Allied most closely to *ibeanus*, differing chiefly in darker and more contrasting coloration General dorsal coloration deep black, the hairs everywhere broadly white tipped . . . ; the sides somewhat more extensively white than the median maned area; . . . lateral bands . . . olive-drab Head chiefly black with two prominent wide white bands over eyes, which meet on forehead, another large white spot below eye Underparts grayish, the hairs extensively white tipped . . . ; tail silvered like dorsal region, the extreme tip white. . . . Head and body, 270 mm., tail, 165." (Heller, 1912, p. 4.)

"These three specimens were caught in rock crevices Heller believes these *Lophiomys* to be strictly rock-dwellers, notwithstanding reports of their living in holes of trees." (Hollister, 1919, p. 37.)

Jackson's Maned Rat

LOPHIOMYS TESTUDO Thomas

Lophiomys testudo Thomas, Ann. Mag. Nat. Hist., ser. 7, vol. 15, p. 80, 1905.
("Ravine Station, [Mau Plateau,] British East Africa.")

"The type-specimen . . . remains to this date unique" (Hollister, 1919, p. 37).

This species differs from the others in skull characters; "line of glandular bristles on sides narrower and less conspicuous than in other species" (Thomas, 1910, p. 223). "Basal third of underfur dark brown, middle third white, tip black, the contrast between the colours more marked than in *L. Imhausi*. Suborbital white spot well marked. Dark band dividing the frontal from the auricular white patch scarcely perceptible. . . . Hairs of lateral line olive. Under surface hoary grey Tail with its underfur mixed whitish and black, the tip for a length of about half an inch sharply contrasted white. . . . Head and body 296 mm.; tail 176." (Thomas, 1905, p. 81.)

Mau Maned Rat

LOPHIOMYS IBEANUS Thomas

[*Lophiomys*] *ibeanus* Thomas, Ann. Mag. Nat. Hist., ser. 8, vol. 6, p. 223, 1910. ("Mile 513 of the Uganda Railway (between Londiani and Lumbwa Stations) in Mau region," Kenya.)

SYNONYM?: *Lophiomys ibeanus hindei* Thomas (1910).

FIGS.: A. B. Baker, 1912, pl. 1; Hollister, 1919, pl. 2.

This is perhaps the least rare species of *Lophiomys*. It occurs in the Mau region of Kenya, while the doubtfully distinct *L. i. hindei* has been recorded from the neighboring Aberdare Range and from Mount Kenya (Hollister, 1919, pp. 38-39).

This species "is coloured like the Abyssinian form referred to *L. bozasi*, and has equally prominent lateral stripes." It differs from other species in skull characters. (Thomas, 1910, pp. 223-224.)

In addition to the type, specimens of *L. i. ibeanus* are recorded from El-Burgon and from the Mau Forest near Njoro, Kenya, while three specimens of *L. i. hindei* are recorded from the Aberdare Mountains (Thomas, 1910, p. 224).

A. B. Baker (1912, p. 2) writes:

This species of *Lophiomys* occurs in the higher part of British East Africa and is known only to the Wanderobo, a tribe of expert hunters, who explore every corner of the forests. Mr. Goldfinch was well acquainted both with the game of that region and with its animals generally, but this one he knew only from descriptions given by the natives. At his urgent request they secured two specimens in the forest near Nakuru, at about 8000 feet altitude. . . .

Mr. Goldfinch states that *Lophiomys* is arboreal and lives in the thick forest of the high country, . . . also that the natives are averse to handling

the animal, believing its bite to be poisonous. It is he says, "very rare or only got by accident here." . . . It is strictly nocturnal.

Lönnerberg (1912, p. 100) records a specimen from Mau Escarpment.

Hollister (1919, p. 38) records specimens of *ibeanus* from the Naivashi Escarpment and from Nakuru, and one of *hindei* from Mount Kenya.

"The first one of these animals I got was when I was stationed at Nakuru; it came from the Aberdare side. It was taken out of a hole in a tree by a Wanderobo I had no difficulty in getting all I wanted, and at one time I had something like a dozen of them." (Goldfinch, 1923, p. 1091.)

Family MURIDAE: Old World Rats

The limits of this family, as of the Cricetidae, are not definitely settled. The two families are similar in the multiplicity of their genera, species, and subspecies. While the Muridae were originally confined to the Old World, several forms of *Rattus* and *Mus* have attained world-wide distribution through transoceanic shipping and are thoroughgoing pests. In the genus *Rattus*, two species endemic on Christmas Island in the Indian Ocean have become extinct, and an Australian subspecies has apparently met the same fate. Single representatives of two other Australasian genera (*Mastacomys* and *Zyomys*) are treated in the following pages.

South Australian Spiny-haired Rat

RATTUS CULMORUM AUSTRINUS Thomas

Rattus culmorum austrinus Thomas, Ann. Mag. Nat. Hist., ser. 9, vol. 8, p. 427, 1921. ("South Australia; type probably from Kangaroo Island." However, Iredale and Troughton (1934, p. 74) suggest "Port Lincoln" as the type locality.)

More than a century has elapsed since the type specimen of this rat was sent to the Zoological Society of London in 1841, and there seem to be no records of appreciably later specimens.

The fur is sparse, coarse, and more or less admixed with flattened spines; it is longer in this than in the other subspecies, the hairs of the back being commonly 20 mm. in length; general color above gray rather than fawn color; under parts equally gray. Head and body, 155 mm.; tail, 120 mm. (Thomas, 1921, p. 427; Jones, 1925, pp. 298-299.)

Thomas (1921, p. 427) mentions six specimens besides the type, and remarks: "Evidently a common rat in South Australia in the forties, but whether it still exists in any out-of-the-way part of the colony we have no evidence to show."

To this Jones adds (1925, p. 299): "I know of no recent records or specimens of the species. So far, the out-of-the-way place has not been found by collectors, and this fact should prove a stimulus to our field naturalists."

A. S. Le Souef writes (*in litt.*, February 15, 1937) that this particular race is probably extinct, but that one or more of the other subspecies are still numerous at times.

[The other subspecies are: *Rattus culmorum culmorum* Thomas and Dollman, of Queensland; *R. c. youngi* Thomas, of Moreton Island, Queensland; *R. c. vallesius* Thomas, of the interior of New South Wales.]

Captain Maclear's Rat

RATTUS MACLEARI (Thomas)

Mus macleari Thomas, Proc. Zool. Soc. London 1887, p. 513, 1887. (Christmas Island, eastern Indian Ocean.)

Figs.: Thomas, *op. cit.*, pl. 42 (colored); Andrews, C. W., 1900, pl. 2 bis, figs. 1, 3, 6, 7, 8 (skull and teeth).

This rat, isolated on Christmas Island, some 200 miles south of Java, the nearest land, is believed to have become extinct in the early years of this century. It is apparently nearest related to *Rattus xanthourus* of Celebes and *R. everetti* of the Philippines, which it somewhat resembles in appearance.

About the size of a Roof Rat, it is described as grizzled rufous brown above, the belly but little lighter, pale rufous; longer hairs black, feet dark like the body. A striking feature is said to be the prominent long black hairs of the lower back, which, as in the other related rats, project far beyond the shorter portions of the pelage. The tail, which equals or slightly exceeds the length of head and body, is dark in its proximal half, white in its distal portion, and scaly. The skull is large and strongly built, with beaded supra-orbital edges, and the anterior edge of the zygomatic plate projects forward conspicuously. Measurements: head and body, 235-240 mm.; tail, 246-267; hind foot, 48.5-50; ear, 17-17.5; basal length of skull, 47.5; zygomatic width, 26.2. Mammae four.

This island rat was first made known by Thomas (1887) from a specimen brought from Christmas Island by Captain Maclear of the British surveying-ship *Flying-fish*, who procured it on his visit there in 1886. In the following year additional specimens were secured by J. J. Lister, who, as naturalist, accompanied a second expedition to the island on H. M. S. *Egeria*. At that time the island was uninhabited and covered with jungle and forest. Of about 40 square miles in area, its highest point is about 1,200 feet above sea level; geologically, it is largely of coral limestone resting on a basis

of volcanic rock. The specimens brought back by this expedition indicated a deposit of phosphate rock, to exploit which a settlement was founded at Flying-fish Cove, the only anchorage. Shortly after this, Dr. Andrews made a three-months' visit (in 1897) in order to survey the natural conditions there. His account contains practically all that is known of the species, which was then by far the commonest of the mammals found in the island. He wrote:

In every part I visited it occurred in swarms. During the day nothing is to be seen of it, but soon after sunset numbers may be seen running about in all directions, and the whole forest is filled with its peculiar querulous squeaking and the noise of frequent fights. These animals, like most of those found in the island, are almost completely devoid of fear, and in the bush if a lantern be held out they will approach to examine the new phenomenon. As may be imagined, they are a great nuisance, entering the tents or shelters, running over the sleepers, and upsetting everything in their search for food. They seem to eat anything, and destroy any boots or skins incautiously left within their reach. Their natural food appears to be mainly fruits and young shoots, and to obtain the former they ascend trees to a great height. . . . In the settlement they utterly destroy all the fruit they can get at, and frequently come into conflict with the fruit-bats on the tops of the papaia-trees. A number of dogs is kept to keep them in check, and near the settlement they are certainly already less numerous than elsewhere. In the daytime these rats live in holes among the roots of trees, in decaying logs, and shallow burrows. They seem to breed all the year round.

After 10 years' absence, Andrews (1909) again visited Christmas Island for the purpose of ascertaining what changes had taken place in the interim as a result of white occupation. Such changes were "chiefly noticeable in the immediate neighbourhood of the settlement and quarries, while the rest of the island, although traversed by roads in several directions, is practically unchanged." The rats, however, had gone. For whereas 10 years earlier they were found everywhere all over the island in abundance, in 1908, in spite of continual search, not a single specimen of this tree-climbing species or of the other burrowing rat, *R. nativitatis*, could be found in any part of the island. He says further:

This complete disappearance of two such common animals seems to have taken place within the last five or six years, and to have been the result of some epidemic disease, possibly caused by a trypanosome, introduced by the ship-rats. These are a variety of *Mus rattus*, and have been introduced in considerable numbers, though they do not seem to have spread to the remoter parts of the island at present, at least to any great extent. The disappearance therefore of the native forms cannot be due to direct competition with the intruders, but must be the result of disease, a conclusion supported by an observation made by the medical officer, Dr. McDougal, who told me that some five or six years ago he frequently saw individuals of the native species of rats crawling about the paths in the daytime, apparently in a dying condition.

Since Andrews's second visit in 1908, one or two other zoölogists have visited Christmas Island for the study of its fauna, notably

M. W. F. Tweedie in 1932, but apparently no one has since found a trace of the two indigenous rats or of the shrew (*Crocidura fuliginosa trichura*) that were abundant before the settlement. No doubt the supposition that they were exterminated through the spread of some disease brought in by introduced House Rats is the most likely explanation of their disappearance. Chasen (1933), who has written of the birds of the island, adds that in addition to *Rattus rattus* (subsp. ?), the House Mouse (*Mus musculus*) and the small *Rattus concolor*, a member of a group adaptable to colonization as a human acolyte, have also been introduced in this island.

G. M. A.

Christmas Island Burrowing Rat; "Bulldog Rat"

RATTUS NATIVITATIS (Thomas)

Mus nativitatis Thomas, Proc. Zool. Soc. London 1888, p. 533, 1889. (Christmas Island, eastern Indian Ocean.)

Figs.: C. W. Andrews, 1900, pl. 2 (col. fig.); pl. 2 bis, figs. 2, 4, 5, 9, 10 (skull and teeth).

This rat and *Rattus macleari* (*q. v.*) are the only indigenous terrestrial rodents known from Christmas Island, Indian Ocean, and are both now believed to be extinct.

Rattus nativitatis was first collected by J. J. Lister in 1887, when as naturalist aboard H. M. S. *Egeria*, in the year following the visit of Captain Maclear, he explored part of the island. On this occasion, a landing party under Captain Aldrich cut a way through the jungle to the highest part of the island.

In contrast to the other species, *R. macleari*, this rat was a more stoutly built animal of burrowing habits. It is described as a large species about 17 inches in total length with a tail much shorter than head and body, of a thickset clumsy form, but having a peculiarly small and delicate head. In color it was a dark umber brown all over, the belly not or scarcely paler. The fur of the back, though long, thick, and coarse, was without the elongated piles characteristic of *R. macleari*. The claws were broad and strong, adapted for digging. Mammae abdominal, three pairs. There is a slight degree of variation in color, some individuals being a warmer brown than others, and occasional ones having a small irregular patch of white fur on the belly. Teeth relatively small and weak. Measurements: head and body, 275 mm.; tail, 182; hind foot, 50; ear, 24 (these for the largest of nine specimens). Skull: basal length, 46.8 mm.; zygomatic width, 24.8; nasals, 20.5; diastema, 15.5; upper cheek teeth, 7.6. A comparison of the forearm and hand bones in the two species is given by Forsyth Major (with figures) in Andrews's (1900) *Monograph of Christmas Island*.

This rat apparently was less generally distributed over the island than *R. macleari*, inhabiting hilly areas in the interior. Andrews's account supplies practically all that is known of it. He wrote:

Though very numerous in places, especially on the hills, e. g. Phosphate Hill, [it] is very much less common than *M. macleari*. I never saw one in Flying Fish Cove [the settlement], though they certainly have been killed there. They seem to live in small colonies in burrows, often among the roots of a tree, and occasionally several may be found living in the long, hollow trunk of a fallen and half-decayed sago-palm (*Arenga listeri*). The food consists of wild fruits, young shoots, and, I believe, the bark of some trees. [It is a] much more sluggish animal than *M. macleari*, and unlike it, never climbs trees; and it is difficult to avoid the belief that the former species is being supplanted by the latter in spite of the abundance of food. Both animals are strictly nocturnal, and *M. nativitatis*, when exposed to bright daylight, seems to be in a half-dazed condition. The Ross family in Christmas Island have given this species the name "Bull-dog Rat," and this has been adopted by the Malays.

This was in 1897. When, in 1908, Andrews revisited the island to see what changes had followed the planting of a settlement there, he found both species apparently quite gone. "In spite of continual search, not a single specimen of either species could be found in any part of the island." This disappearance, as detailed under *Rattus macleari*, was conjectured to have taken place about five or six years earlier, when the medical officer stationed there had frequently seen individuals of the native rats "crawling about the paths in the day-time, apparently in a dying condition." Andrews suggests that the introduced Roof Rat, by then already present in considerable numbers, had brought in some epizootic disease to which the native species had been susceptible, and in consequence they had been entirely wiped out in the brief space of a few years. (Andrews, 1909, pp. 101-102.)

At the time of Andrews's first visit he wrote (1900): "The conditions of life are apparently extremely favourable, food being always abundant, and the hawk and owl, which are the only possible enemies [of these rats], feeding mainly on birds and insects. The consequence of this is that all the species of mammals are extremely common, and the individuals are always exceedingly fat. Perhaps *Mus* [= *Rattus*] *nativitatis*, the bull-dog rat as the Cocos Islanders have named it, is the least numerous, probably because of some competition with the much more active and versatile *M. macleari*, but most specimens of *M. nativitatis* have a layer of fat from half to three-quarters of an inch thick over most of the dorsal surface of the body." Possibly this very abundance of individuals and their fat condition made them the more susceptible to any disease brought in from outside.

While conjecture as to the origin of the endemic fauna is more or less futile, Andrews nevertheless points out that on the whole its

relations are with "Austro-Malayan" rather than with Javan types. He noticed on several occasions the transport of insects to the island by storms "which, during the rainy season, blow occasionally from the northern quarter," but inclines to the supposition that the "rats, the fruit-bat, and possibly some of the land birds, very probably owe their introduction to the island" to the transport by rafts of trees brought by the equatorial drift from the Timor Sea. This island is at least of unusual interest as affording a case in which the native fauna has within a few years been altered as a result of settlement by man, and two of its few native mammals have become extirpated.

G. M. A.

Broad-toothed Rat

MASTACOMYS FUSCUS Thomas

Mastacomys fuscus Thomas, Ann. Mag. Nat. Hist., ser. 5, vol. 9, p. 413, 1882. ("Tasmania.")

This rare rat survives in the Otway Forest of Victoria and in Cradle Valley, Tasmania, but little or nothing is known of its present occurrence elsewhere.

Fur long and soft; general color dark grayish brown above and below, the dorsal hairs tipped with light brown and the ventral hairs with white; tail and feet dark brown. Head and body, 142 mm.; tail, 95 mm. (Thomas, 1882, pp. 413-415.) It is a large rat, with a stout build, strong limbs, and a short tail. Head and body (Tasmanian specimens), 170-182 mm.; tail, 110-113 mm. (Finlayson, 1933a, pp. 126, 128.) Victorian specimens have longer tails (119-124 mm.) (Brazenor, 1934, p. 161).

The type specimen, from an unspecified locality in Tasmania, was acquired by the British Museum in 1852, and for 80 years no further information seemed to be forthcoming as to its occurrence in that state. In 1931, however, five specimens were collected in Cradle Valley, northwestern Tasmania, at an altitude of about 3,000 feet. The Broad-toothed Rats were living in colonies in grassy areas on open heaths, in association with Eastern Swamp Rats (*Rattus lutreolus*). "Both rats are probably quite numerous, but the labyrinths are the chosen hunting grounds of *Dasyurus vivverinus* [sic], and it was not until several days trapping had got rid of the latter that rats began to be caught." (Finlayson, 1933a, pp. 125-126.) Doubtless this Native Cat acts as a check upon the increase of the rats.

Lydekker (1885, p. 227) records some bone fragments of *Mastacomys fuscus* from the caves of the Wellington Valley, New South Wales.

Brazenor (1934, pp. 159-160) records specimens from the following localities in Victoria: Swan Island; Gippsland; Laver's Hill in the Otway Forest; Olangolah, near Beech Forest, at the head of the Gellibrand River. He also mentions a specimen, apparently previously overlooked, from the "West Coast of Tasmania, 1872." He writes (*in litt.*, March 3, 1937) that the species "still survives in the Otway Forest but not in any numbers."

White-tailed Rat

ZYZOMYS ARGURUS ARGURUS (Thomas)

Mus argurus Thomas, Ann. Mag. Nat. Hist., ser. 6, vol. 3, p. 433, 1889.
("South Australia.")

This South Australian rat is apparently known only from the type specimen.

The fur is crisp; general color above pale sandy rufous; ears rounded, thinly covered with fine white hairs; muzzle and under parts white, the line of demarcation on the sides not sharply defined; hands and feet pure white; tail uniform white above and below, the tip slightly penciled. Head and body, 83 mm.; tail, 101. (Thomas, 1889, pp. 433-435.)

"Of this very distinct species there is no material available in South Australia, which was the home of the type specimen. . . .

"There seem to be no recent records of this remarkable little rat, and no observations on its habits. Probably it is one of the many lost species of which no specimens are preserved in our State collections." (Jones, 1925, pp. 336-337.)

A. S. Le Souef remarks (*in litt.*, February 15, 1937) that these native rats do not stand up to settlement or invasion of their habitat by *Rattus rattus*.

E. Le G. Troughton writes (*in litt.*, April 16, 1937) that the lack of records since the original description in 1889 supports Wood Jones's conclusion that the species may be lost from the state.

[According to L. Glauert (*in litt.*, March 17, 1937), the Western Australian subspecies, *Z. a. indutus* (Thomas), is "not reduced in numbers."]

Order CARNIVORA: Carnivores

Family CANIDAE: Wolves and Foxes

The Canidae are nearly cosmopolitan, indigenous species being found in all important land masses except Madagascar, the central and eastern parts of the Malay Archipelago, New Zealand, and

Tasmania. There are about 19 genera and more than 200 species and subspecies. The predatory habits of some of the larger species (especially the wolves) bring them into conflict with the economic interests of man, and the animals have suffered accordingly—particularly in North America. Accounts of no less than 24 New World forms appear in Dr. Allen's volume (1942), while only 4 Old World forms are treated herein. One of the these, the Japanese Wolf, is extinct.

Abyssinian Wolf; Abyssinian Red Wolf. Cuberow (Ethiopian)

SIMENIA SIMENSIS SIMENSIS (Rüppell)

Canis simensis Rüppell, Neue Wirbelthiere zu der Fauna von Abyssinien gehörig, Säugethiere, p. 39, 1835. (Mountains of Simien, Abyssinia.)

FIGS.: Rüppell, 1835, pl. 14; Mivart, 1890, pl. 6; Bryden, 1899, pl. 15, fig. 8; Lydekker, 1908, pl. 15, fig. 8; Fuertes, Abyssinian Birds and Mammals, pl. 29, 1930.

This interesting animal has a restricted range and occurs in limited numbers. The Committee of Experts of the Second International Conference, held at London in 1938, states (1938, p. 8) that this species is "almost completely confined to Abyssinia," and suggests its inclusion in Class A of the Annex at the next Conference for the Protection of African Fauna and Flora.

Snout long and slender; general color light yellowish reddish brown, mixed with black on the sides; white about the mouth, eyes, inner margins of ears, chest, belly, lower parts of limbs, and lower side of tail toward base; distal half of tail blackish, and upper side toward base mixed with black. Head and body, 99 cm.; tail, 25 cm. (Mivart, 1890, pp. 18-19.)

"We observed this wolflike dog in the mountains of Simien, where it lives in packs, and hunts tame sheep and small game, but never becomes dangerous to man. It occurs also in most of the other Abyssinian provinces. Its vernacular name in Simien was given to me as 'Kaberu.'" (Rüppell, 1835, p. 39, transl.)

"Since Rüppell's time little has been heard of this wolf and scarcely any fresh or recent information is to be obtained concerning it. From its predatory habits it is probable that the Abyssinians, so soon as they began to acquire fire-arms, turned their attention to its destruction, and that in consequence it has become much scarcer than it used to be. . . .

"It would be extremely interesting to know if this handsome wolf still survives in Abyssinia in any numbers. Modern travellers and sportsmen apparently make no mention of it." (Bryden, 1899, pp. 601-602.)

Lydekker (1908, p. 462) refers to "its rarity and zoological in-

terest." The Cuberow "was scarcely known in England, except by its skull, till a few years ago, when skins were brought home by Major Powell-Cotton." The latter saw several of the animals alive in the mountains of Simien.

Maydon (1932, pp. 220-221) writes that "the Red Wolf is common" at Simien, and refers to it as being seen occasionally on the Gojam plateau, between Lake Tsana and Addis Ababa.

W. H. Osgood (oral communication, 1936) speaks of this species as not uncommon locally. The Field Museum expedition of 1926-27 obtained about five specimens. Alfred M. Bailey (oral communication, 1937) does not consider that it is in any danger from the Ethiopians.

This animal appears to occupy a peculiar zoölogical position. Lydekker considers it neither a wolf nor a jackal, while Pocock denies to it affinity with the foxes.

[A subspecies from south-central Ethiopia has been proposed by De Beaux under the name of *Canis (Simenia) simensis citernii* (Atti Soc. Ital. Sci. Nat., vol. 61, p. 25, 1922; type locality, "Arussi: Barofa"). No information is at hand concerning its numerical status.]

Japanese Wolf

CANIS HODOPHILAX Temminck

Canis hodophilax Temminck, Tijdschr. Natuurl. Geschied. Physiol., pt. 5, p. 284, 1839. (Japan; *i. e.*, Hondo.) (Cf. Harper, 1940, p. 192.)

FIGS.: Temminck, 1842-45, pl. 9; Mivart, 1890, p. 14, fig. 17; Beddard, 1902, p. 418, fig. 209.

This wolf is now considered extinct.

It is distinguished from the European Wolf by its smaller size and shorter legs, though it differs but little in the nature and color of its pelage; fur short and smooth, but tail bushy; ground color gray or ashy; basal two-thirds of the hairs of back and rump thus colored, the tips black; sides, neck, belly, and tail gray, the extreme tips of the hairs blackish; head and muzzle dark gray; lips more or less whitish; outer surface of ears brownish rufous; four extremities gray, washed with rufous and brown; tail tip without colored tuft. Height at shoulder, 16 inches; total length, 3 feet 9 inches, of which the tail comprises about 1 foot; ears, 3 inches. (Temminck, 1844, pp. 38-39.) "Prof. Brauns . . . says that in the Museum at Tokio there are very differently coloured skins, namely 'yellowish,' 'brownish,' and 'whitish grey'" (Mivart, 1890, pp. 14-15).

The Japanese Wolf lives in wooded and mountainous regions, and hunts in small family parties. It is as much dreaded by the Japanese

as the European Wolf is in its range. It shows itself often in winter, notwithstanding the assiduous pursuit of which it is the object. The Japanese state that its flesh is unwholesome. (Temminck, 1844, p. 39.)

A female wolf from Japan was presented to the Zoological Society of London in 1878 (Flower, 1929, p. 114). Mivart (1890, p. 15) records a skull in the British Museum from the province of Kotsuke.

Thomas (1906, p. 342) records a specimen collected in 1904 or 1905 in the vicinity of Washikaguchi, Nara Ken, Hondo. The collector, M. P. Anderson, adds: "The Wolf was purchased in the flesh, and I can learn but little about it. It is rare, some say almost extinct."

Aoki (1913, p. 317) gives the range of this animal as "Hondo (Thomas), China." Hatta remarks (1928, p. 1033): "*Canis hodophilax* T. confined in Japan to the heart of Hondo, Yamato and Wakayama, occurs also in China." These reports from China are considered erroneous. Pocock (1935, p. 658) records a skull from Chichibu.

Nagamichi Kuroda writes (*in litt.*, July 5, 1938) that many of these wolves were formerly said to be seen in the mountainous districts of Hondo, but that the animal is now considered completely extinct. It was destroyed because of its injuriousness to men and cattle. It is said that the only specimens in Japan are a mounted male from Fukushima Prefecture, Hondo, which is now preserved in the Tokyo Science Museum, and one or two skulls.

Kuroda (1938, p. 36) records the animal from the following additional localities in Hondo: Rikuchu, Shimotsuke, and Aomori.

Yezo Wolf

CANIS LUPUS HATTAI Kishida

Canis lupus hattai Kishida, *Lansania*, vol. 3, no. 25, p. 73, 1931. (Sapporo, Hokkaido, Japan.)

SYNONYM: *Canis lupus rex* Pocock (1935).

Although extinct in Hokkaido (or Yezo), this wolf survives in Sakhalin and perhaps in the Kuriles.

It is much larger than *Canis hodophilax* of Japan and is distinguished from *C. l. lupus* of Europe by its larger premolar teeth and by its longer palate and mandible (Pocock, 1935b, p. 659).

In the Amur region, according to Schrenck (1859, pp. 45-48), the wolf is most numerous in northern Sakhalin. Its principal object of chase is the wild Reindeer. Occasionally packs approach the villages or solitary houses of the natives and destroy their dogs. The animal ranges to the south end of Sakhalin and occurs also on the Kuriles.

Pocock (1935*b*, pp. 659-660) refers to "the discovery of this big wolf in Yeso in the early 'eighties," and to the opinion of Brauns (1881) "that it possibly inhabited the Japanese islands . . . between Yeso and Kamschatka."

"*Canis lupus* L. is found . . . in Sakhalin; in Hokkaido it was abundant some thirty years ago, but it has decreased so that it seems to be totally exterminated at present" (Hatta, 1928, p. 1037).

"Aoki and Kishida both reported it from this island [Sakhalin] and Hokkaido (rare)" (Kuroda, 1928, p. 226).

"In authentic historic times the wolves occurred in the main island of Hokkaido, in Sakhalin, and in Kunashiri, Etoruf and Paramushir of the Kurile Islands. It seems true that the wolves were not so frequent in Hokkaido as compared with the other mammals. They were still fewer in Sakhalin and in the Kurile group. Though old records say that the wolves fed mostly upon the deer which abounded in Hokkaido, at the beginning of settlement they wrought serious havoc amongst herds. So the government at that time paid a high bounty for the slaughter of the animal. For instance, the local government in Sapporo paid 7 yen for one wolf from 1878 to 1882 and 10 yen for each from 1883 to 1885. More than 1500 wolves were brought in for the bounty during the 11 years from 1878 until 1888. Since then we have heard scarcely any account of the animal in Hokkaido." (Inukai, 1932*b*, p. 525.)

Kuroda (1938, p. 36) gives the range of this subspecies as Sakhalin, the Kuriles, and Hokkaido; on this last island it is extinct.

Japanese Raccoon-dog

NYCTEREUTES PROCYONOIDES VIVERRINUS (Temminck)

Canis viverrinus Temminck, Tijdschr. Natuurl. Geschied. Physiol., pt. 5, p. 285, 1839. (Japan.)

Figs.: Temminck, 1842-45, pl. 8; Martens, 1876, pl. 1.

Formerly abundant in Japan, this animal has become extremely scarce.

The form is small and foxlike; the tail is short and bushy. The general color is yellowish brown; hairs of the back, shoulder, and tail tipped with black; arms and legs blackish brown; a large dark brown spot on each side of the face, beneath and behind the eye (Martens, 1876, p. 78). The measurements of some representative of the species on the Asiatic mainland are given by Mivart (1890, p. 135) as follows: head and body, 530 mm.; tail, 140 mm.

A century ago the Raccoon-dog was considered very common in Japan (Temminck, 1844, p. 40). At this period "Siebold found it to be very common throughout the Japanese islands, where its flesh was considered as good food with an agreeable flavour, and its

powdered, calcined bones a valuable medicine. . . . It is not deemed destructive to poultry. The natives employ its skin to make bellows, and also to decorate their drums and for winter head-gear." (Mivart, 1890, p. 135.)

Possibly Ognev refers to its former rather than to its present status when he writes (1931, p. 369) that it is widely distributed in Japan and particularly common on Hondo (Honshiu) Island.

In the open season extending from October 15, 1929, to April 15, 1930, 15,218 of these animals were taken in Japan (Uchida, 1935, p. 8.)

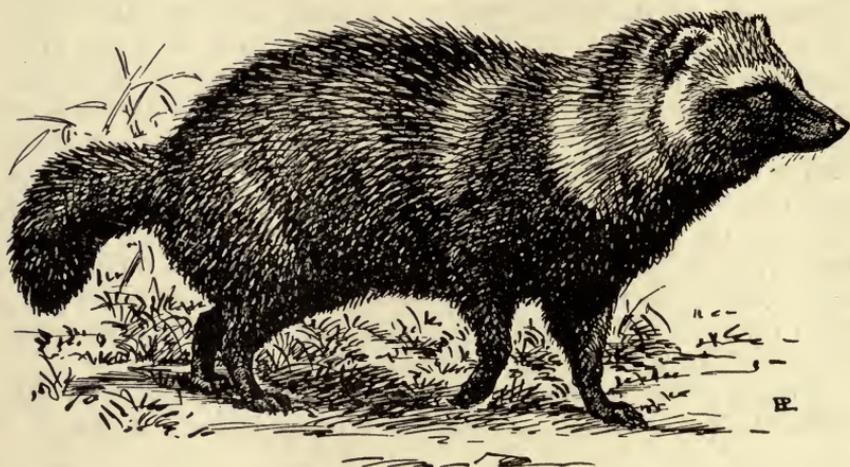


FIG. 22.—Japanese Raccoon-dog (*Nyctereutes procyonoides viverrinus*)

"Muko-jima, a small island in the Inland Sea on the coast of Yamaguchi Prefecture, is famous as a sanctuary for the raccoon dog In feudal times it was abundant throughout this country. Owing to indiscriminate hunting it became extremely scarce." (Kiburaki, 1934, pp. 4183-4184.)

Uchida writes (1935, p. 25) that the animal is gradually becoming scarce in Japan, since its fur is highly valued and a large number of skins are exported annually. Mukojima is inhabited by innumerable individuals. It is supposed that persecution on the Japanese mainland gradually forced them to migrate to the island, where they found a safe breeding place and an abundance of fish for food.

[Concerning the several mainland representatives of this species, Arthur de C. Sowerby writes (*in litt.*, April 24, 1937):

"There are now several subspecies of the raccoon-dog recognized in China and neighbouring regions, namely, *Nyctereutes procyonoides*

procyonoides (Gray) of Central and South China, *Nyctereutes procyonoides orestes* Thomas of South-west China, and *Nyctereutes procyonoides ussuriensis* Matschie of North-east China, Manchuria, and neighbouring eastern Siberia and Korea. Except in a few places these animals are probably as plentiful to-day as they ever were, except that they seem to have been badly decimated in the Amur region, where once they were particularly plentiful, for the sake of their pelts. In years past large quantities of the latter have been exported from China, but at present there is no demand on either the American or European markets for the 'raccoon' or 'raccoon-dog' skins, as they are known to the trade, and consequently none are coming from the interior to the ports, except such as are required for the home market, which is fairly considerable."

A few years ago approximately one-half million skins were exported annually from Shanghai (Sowerby, 1934*a*, p. 287).]

Family URSIDAE: Bears

The bears occur on all continents except Australia and perhaps Africa (where a single problematical, extinct species has been reported from Morocco and Algeria). The only South American species is restricted to the Andean region. Thus the distribution of the Ursidae is not quite so extensive as that of the Canidae. The bears have suffered perhaps even more than the wolves at the hands of man. Seven genera and about 135 forms are provisionally recognized. The majority of the latter, however, are North American Grizzly Bears, whose exact taxonomic status remains somewhat uncertain. Dr. Glover M. Allen, in his volume on New World mammals (1942), treats all the Grizzly Bears and some of the Black Bears, as well as the South American Spectacled Bear. The present volume deals with the various forms of the Brown Bear in Europe and Asia and with the Atlas Bear of North Africa.

Old World Brown Bear. Ours brun (Fr.). Brauner Bär (Ger.). Oso (Sp.). Orso bruno (It.)

URSUS ARCTOS Linnaeus

[*Ursus*] *arctos* Linnaeus, Syst. Nat., ed. 10^o, vol. 1, p. 47, 1758. (Sweden.)
FIGS.: Geoffroy and Cuvier, Hist. Nat. Mamm., vol. 5, pl. 211 (*U. a. pyrenaicus*), pl. 212 (*U. a. collaris*), 1824; Gervais, Hist. Nat. Mammif., pt. 2, pl. 13, 1855 (*U. a. pyrenaicus*); Fitzinger, Bild.-Atlas, Säugth., fig. 72, 1860; Millais, 1904, pl. facing p. 236; Martin, 1910, pl. 38; Cabrera, 1914, pl. 5 (*U. a. pyrenaicus*); Ognev, 1931, pl. 1 (*U. a. caucasicus*); Pocock, 1932, pl. 2, upper fig.; Castelli, 1935, pls. 1, 2.

Numerous forms of the Brown Bear have been described, but there is no general agreement on the validity of most of them, and

the systematics of the group remains in a state of very considerable confusion (*cf.* Miller, 1912, pp. 285, 296; Ognev, 1931, pp. 14-118; Pocock, 1932). In the account that follows, only two of the forms will call for separate treatment. Among those that have been described, the following may be mentioned as being better known or as having gained more or less recognition in the literature:

Ursus arctos arctos Linnaeus, of northern Europe.

U. a. pyrenaicus Fischer, of the Pyrenees and northern Spain.

U. a. meridionalis Middendorff, of the Caucasus.

U. a. syriacus Hemprich and Ehrenberg, of Asia Minor.

U. a. collaris Cuvier, of Siberia.

U. a. beringianus Middendorff, ranging from Manchuria to Kamchatka.

U. a. lasiotus Gray, of Mongolia, Manchuria, Hokkaido, and the Kuriles.

U. a. isabellinus Horsfield, of the western Himalayas and the Thian Shan.

U. a. pruinus Blyth, of Tibet (not generally regarded as conspecific with *U. arctos*, but so treated by Pocock, 1932).

The Brown Bear has become extinct over the greater part of its former range in western Europe but survives in small numbers in remote and chiefly mountainous areas in Norway, Sweden, Spain, France, Austria, Czechoslovakia, Italy, Yugoslavia, Greece, Bulgaria, Rumania, Poland, and Estonia. It has remained much commoner in parts of Russia and northern Asia.

The general form of the species is short and heavy; fur long and rather loose; head moderately pointed, broad posteriorly; ear short and rounded; front claws strongly curved, blunt, at least twice as long as hind claws; tail very short, concealed in the fur. The general color is usually a light brown or dull buff, the head not essentially different, but feet and outer surface of legs darker. There are many individual and racial variations in color. Measurements of an adult male from Sweden: head and body, 1,900 mm.; tail, 80 mm.; hind foot, 195 mm.; ear, 90 mm. (Miller, 1912, pp. 287-296.)

The range of the species is the "entire continent of Europe wherever sufficiently extensive forests remain; east into Asia" (Miller, 1912, p. 287).

Great Britain.—Numerous postglacial remains have been found in various parts of England. These include bones from refuse heaps that are probably of Roman origin. The remains found in Ireland appear to belong to an older species than *Ursus arctos*. In ancient times in Britain the animal was trailed with boar-hounds and attacked with arrows, pikes, clubs, javelins, and long knives. The great Caledonian forest in Scotland seems to have been the chief

stronghold of the British bears. Bears were transported from Britain to Rome, probably in the fourth century. After the extinction of the species in Britain, foreign animals were imported for the purpose of "bear-baiting." This was done in the reigns of Henry II, Henry VIII, Queen Elizabeth, and Queen Anne. Queen Elizabeth entertained the French Ambassador and the Danish Ambassador at different times with such a spectacle. (Harting, 1880, pp. 11-29.)

Many place names in Wales afford evidence of the former occurrence of bears. Boyd Dawkins thinks that they became extinct in Britain before the tenth century. Bell, in his *British Quadrupeds*, says that they may have existed in Scotland as late as 1073, but tradition gives the latest date as 1057. (Millais, 1904, pp. 236-237.)

Norway.—According to Collett, the bear was numerous about 1750 and did great damage to the cattle all over the country, but during the following 150 years the numbers were reduced owing to improved firearms and to high rewards paid for animals shot (Hj. Broch, *in litt.*, December, 1936).

Bowden states (1869, p. 4) that "the Brown Bear . . . is pretty common in all parts of this country, especially in Nordland and the central districts."

"The average number that is killed yearly amounts to . . . 250" (Barnard, 1871, p. 262).

"The number of bears in Norway is now beyond doubt very small. . . . A conservative estimate would be that there are not more than 20-25 bears in Norway south of the Trondhjem Fjord. In the northern parts the number is beyond doubt also very small, chiefly consisting of stray bears from Sweden and Finland. . . .

"We have done everything in our power to attempt a protection sufficient to stop the extinction which obviously threatens the species in this country. But all attempts have been without avail, as it cannot be denied that the bears occasionally do some damage to sheep

"We have attempted the establishment of a reservation in certain forest tracts owned partly by private owners and partly by the government. But the project has until now failed." (Harald Platou, *in litt.*, November 22, 1932.)

By a law of 1932 the bear may be killed only from May 15 to November 1. Previously "the bear, being considered a pest, received no protection at all. In fact there was a premium for killing him

"This recent protection . . . is due to the efforts of the Norwegian Association for Hunting and Fishing, which endeavored to induce the Storting to protect the bear all the year round. The Association had even collected money which it offered to place at the disposal of the Norwegian Department of Agriculture to compensate for

losses to farmers and goat and sheep owners for damage done by the bear. . . . This offer was not accepted. . . .

"It is not known exactly how many bears there are in Norway. . . . The greatest number are to be found in the tract Eastern Hallingdal—the Hemsedal mountains—to Laerdal, where it is estimated that there are from 15 to 25 bears. It is possible that there are a few bears between Valdres and Gudbrandsdal and in the central part of Telemarken, but their number is uncertain. There are also a few bears in the northern part of Norway which come from Sweden." (Julius Wadsworth, *in litt.*, July 28, 1932.)

"An area of about 125,000 acres north of the city of Lillehammer has been privately set aside for the protection of the bear." Mr. Platou "thinks the bears will now be preserved from extinction." (Julius Wadsworth, *in litt.*, May 9, 1933, and July 20, 1933).

Sweden.—The bear was formerly found in all parts of the country, but in most of the provinces constituting Götaland it had practically disappeared during the eighteenth century. It has been calculated that in the whole country 1,351 bears were killed during the period 1827-1836, and 1,055 during the period 1847-1856. In the 50-year period from 1856 to 1905, 2,762 bears were killed in Sweden, including 86 in Wermland, 499 in Dalecarlia, 171 in Gävleborg, 144 in Westernorrland, 796 in Jemtland, 292 in Westerbotten, and 770 in Norrbotten. The rapid decrease is illustrated by the following statistics on the numbers killed in six of the above-mentioned districts: 908 in 1856-1865; 434 in 1876-1885; 109 in 1896-1905. In olden times a small bounty was paid on each bear killed, and in 1864 the amount was raised to 50 riksd. Sportsmen and others objected to the bounty, and it was finally abolished in 1893. By that time the bears were greatly decimated and in most provinces entirely exterminated. The building of railroads had contributed decidedly to this decrease. After considerable agitation for protection of the species, a new law of 1912 declared that no bear could be shot on crown land without special permission from the King, unless it had attacked man or domestic animals, nor on private land without the permission of the owner. According to a law of 1927, a bear killed anywhere belongs to the Crown. Compensation for damage by bears is now provided by the state. The whole sum thus paid for domestic animals (sheep, goats, reindeer, and one horse), during 1933 and 1934 did not amount to more than 2,404 kr. in all. Since the bears have been protected their numbers have increased only a little.

In considering the bear's economic status, it may be noted that it never attacks man unless directly provoked or wounded. It preys on domestic animals only exceptionally, and not regularly. Many reindeer succumb to starvation and disease, and when the bear feeds

on their carcasses, it is often accused of having killed the animals. Its diet consists largely of insects and their larvae and various kinds of plant food, especially berries. It also catches voles and lemmings. (Einar Lönnberg, *in litt.*, October, 1936.)

Under present conditions the bears are not threatened with extinction (Einar Lönnberg, *in litt.*, November 15, 1932).

Spain (U. a. pyrenaicus).—Cabrera (1914, p. 153) gives the range of this race as the Pyrenean and Cantabrian districts: Pyrenees of Aragon and Catalonia; mountains of Santander and Asturias; extreme north of the Provinces of Palencia and León and the eastern part of Lugo. In historic and even comparatively recent times it ranged more to the south, reaching at least the center of the peninsula. In 1582 Argote de Molina reported it not far from Madrid.

“Bears still occur not unfrequently all along the Cantabrian range of mountains. On the central chain of Spanish mountains they seem to be rarer. There are none now in Portugal. Formerly, as lately as the sixteenth century, before the devastation of the forests, the bear seems to have had a much wider distribution in the Peninsula.” (Gadow, 1897, p. 362.)

In Asturias it nightly raids the maize-fields in the valleys in September. It is also in the habit of attacking and destroying many cattle. It is tracked to its covert, and a drive with beaters is organized. From 20 to 30 bears are killed in Asturias every year. (Marquis de Villaviciosa de Asturias, in Chapman and Buck, 1910, pp. 296-297.)

France (U. a. pyrenaicus in the Pyrenees; U. a. arctos in the Alps).—Trouessart states (1884, pp. 195-196) that the species is restricted to the forested and the wildest regions of the Alps and the Pyrenees. It occasionally ravages the wheatfields and the vineyards. It becomes more carnivorous with age and then forms the habit of making raids upon sheep and calves, and finally it even attacks grown cattle and horses.

E. Bourdelle (1937, pp. 178-181, and *in litt.*, March 6, 1937) gives the following account:

Formerly rather widely spread in the mountainous regions of France—Vosges, Jura, Cévennes, Alps, and Pyrenees—it disappeared from the first three areas during the past century, and it now exists only in the Alps and the Pyrenees. It is generally believed to have disappeared from the French Alps and that the last two animals were killed in 1898 in the Forest of Vercors in these mountains. However, fresh tracks were observed in the same region in 1913, in 1928, and again during the past few weeks. The extent and wildness of the Forest of Vercors militate in favor of the possibility of a few bears surviving there.

In the Pyrenees the Brown Bear, though much less abundant than formerly, is still met with in the wild areas of upper Ariège adjacent to Andorra, in the Hautes Pyrénées (massif of Maladetta and Cirque de Gavarnie), and as far as the neighboring parts of the Basses Pyrénées (Forest of Irruti, for example). It is even probable that there are some bears in other parts. While it was still rather common 20 or 30 years ago, it has been gradually pushed back into refuges more and more restricted, where it is easily hunted, so that it has become rarer and rarer during recent years.

Its only economic importance in the Pyrenees consists in its being a true game animal, its flesh being much prized in the whole region. Its hide provides a good fur, but not a very valuable one.

The bear of the Pyrenees, like that of the Alps, is the victim of man's increasing penetration into the mountains, of the extension of agriculture, forestry, and mining, of highways, railroads, tourist traffic, and especially the sport associated with the hunting of this animal.

Protection should be provided for the Pyrenean bears as well as for those of the Alps (if the latter still exist in the Forest of Vercors). Prohibition of hunting and of the sale of flesh and hides would suffice to halt the steady depletion and perhaps to assure the preservation of the species.

According to Didier and Rode (1935, p. 268), the last bears in the Hautes-Alpes were killed at the beginning of the nineteenth century. Two were killed in 1896 in the massif between La Chambre and Saint-Rémy (Savoie) and Allevard (Isère).

Belgium and The Netherlands.—The species no longer exists in these countries (Martin, 1910, p. 38a; Ognev, 1931, p. 40).

Germany.—Blasius (1857, p. 199) reports the bear as still occurring in the Bavarian highlands.

The last specimens were killed in 1759 in Thuringia, in 1770 in Upper Silesia, in 1810 in the Bavarian-Bohemian forests, and in 1835 in Frauenstein, Bavaria. In the sixteenth century the species was still of frequent occurrence in Germany. When improved fire-arms were introduced, the population started a real war against the animal. The hide was readily sold, and bear-hunting, which involved some danger, was considered by the upper classes as entertainment and sport. Bounties were often paid, as the animals were looked upon in many places as seriously injurious to cattle. (Internationale Gesellschaft zur Erhaltung des Wisents, *in litt.*, October, 1936.)

The last bear in Pomerania was killed in 1750; in the Riesengebirge about 1800. The species was still being taken in East Prussia up to 1806. (Krumbiegel, 1930, p. 6.)

Castelli (1935, p. 33) quotes the *Alpines Handbuch* (1931) to the effect that the last one was killed in Wetterstein, Bavaria, in 1864.

Denmark.—The bear was once generally distributed over Denmark. Remains have been found in the ancient kitchen middens, but there is no information on the occurrence of the species within historic times. (Winge, 1908, p. 127.)

Switzerland.—In 1869 Fatio (pp. 301-302) gave the following account of the bear's status: It was formerly abundant in the north and center of Switzerland but has gradually retired to the high Alps. It is now scarcely found except in Grisons, in Tessin (where 9 specimens were killed from 1852 to 1862), and here and there in the Jura. It has almost entirely disappeared in Valais and Uri. Basle, Lucerne, Schwyz, and Berne have no more bears.

Castelli (1935, pp. 25-27) supplies the following records: The last bears near Zürich were killed or recorded in 1565, in Unterwald in 1664, in Fribourg in 1698, while in Solothurn 38 were killed from 1507 to 1737. Other last records are: Berne, 1815; Glarus, 1816; Vaud, 1843; Valais, 1860; Uri, 1898. In the Engadine 5 were killed in 1852, 8 in 1861, 6 in 1872, and 4 in 1873. In Grisons 25 were killed from 1878 to 1887, 9 from 1888 to 1897, and 3 within the following decade; the last one was killed in 1904 in Val Minger, but a female with two cubs was reported seen as late as 1919 in Val Lavirum.

The species is now of exceptional occurrence in Switzerland, being represented only by an occasional straggler across the border from western Trentino, Italy (Tratz, in Castelli, 1935, p. 9).

Italy.—The bear is now restricted to two general areas in Italy—the extreme north and the mountains of Abruzzi.

From 1837 to 1852 146 specimens were killed in Trentino. The species is now protected there by the Italian Government. (G. Schlesinger, *in litt.*, March, 1937.)

According to Castelli (1935, pp. 50-135), 77 bears were killed in Trentino from 1886 to 1912. In the district of Cles, at the north end of the Group of Brenta, the following numbers were killed: 26 from 1886 to 1891; 5 in 1895; 2 in 1900; 1 in 1901; 2 in 1902; 4 in 1903; 1 in 1906; 2 in 1908; 2 in 1909; 3 in 1910; 8 in 1911; 2 in 1912; 3 in 1913. In Trentino 15 bears have been killed from 1922 to 1933, and a small number have been seen yearly up to 1935. The Brenta Group and vicinity form the last refuge of the species in Trentino. It is sedentary there, and is in urgent need of protection, such as would be afforded by the establishment of a National Park.

Castelli (1935, p. 28) quotes Cermenati to the effect that 40 bears were killed between 1876 and 1886 in Valtellina, Lombardy, Italy. He adds (p. 31) that the last individuals were killed in Valtellina in 1896 and 1902. He also mentions (p. 32) a report of Depoli in 1928

that there were about 10 bears, protected by law, in the Province of Carnaro, northeastern Italy.

In the National Park of the Abruzzi about 200 Brown Bears are well protected (Tratz, in Castelli, 1935, p. 9). They are found in the mountains about the valley of the Sangro, and must be regarded as indigenous, notwithstanding the local tradition that the Czar of Russia had sent King Ferdinand of Naples a couple of such animals, which he set free in the mountains of the Abruzzi (Colosi, 1933, pp. 48-49). The park administration estimates the present number at about 100 (Laboratorio di Zoologia Applicata a Caccia, *in litt.*, September, 1936).

The bear is completely gone from the Sila Montains, Calabria, though present there in the middle of the last century (Hecht, 1932, p. 23).

Austria.—This was probably an indigenous species all over Austria in former days. In Carinthia it was generally distributed up to 1850; one bear was killed during each of the years 1895, 1920, 1927, and 1936. They are supposed to have come from the reserves in Gottschee, Carniola, and on Schneeberg (Monte Nevoso), north of Fiume, Italy; perhaps also from Croatia. In Lower Austria the bear was observed rather frequently up to the last half of the nineteenth century; here, in Semmering, Schneeberg, Rax, and the mountainous areas to the westward, fine stocks of bears were to be found. The last one was observed in 1919 near Rohr in the mountains of Lillienfeld. In Upper Austria and Salzburg the species was probably quite common up to the middle of the nineteenth century. In Tyrol the decrease started in 1570. At that time Duke Albrecht prohibited the capture and killing of bears. During the Thirty Years' War the numbers increased again. Up to about 1840 the annual kill was from 20 to 30 specimens. The last one was shot in Stellantal, Tyrol, in 1898; in Vorarlberg, in 1870. The bear is not compatible with cattle-raising or with the increase in human population. (G. Schlesinger, *in litt.*, March, 1937.)

According to the Alpines Handbuch (1931), 34 bears were killed in Tyrol in 1835, and in the same year the last one was killed in the Schneeberg district near Vienna. The last one was seen at Karwendel, on the Tyrolean-Bavarian border north of Innsbruck, in 1896. (Castelli, 1935, p. 33.)

Czechoslovakia.—The species is still comparatively common in two well-defined districts. One embraces the mountainous territory of the Low and the High Tatra, bordered on the west by the Arva and the Waag Rivers, on the east by the Dunajec and Poprad Rivers. The other comprises the wooded Carpathians west of the railway from Munkacs to Volovec. According to Dr. Komàrec of

Prague, 210 Brown Bears live in this territory, under government protection. (Tratz, in Castelli, 1935, pp. 8-9.)

Hungary.—Blasius (1857, p. 199) reports the bear as still occurring in the Hungary of his time, especially in the Carpathians and in the Hungarian Erzgebirge. The species is not found in the reduced Hungary (since World War I) (J. Schenk, *in litt.*, November, 1936).

Yugoslavia.—In this country the bear lives especially in the Gottschee district, Carniola, where it is carefully protected, and in the immense woods of the Auersperg district, Carniola (Tratz, in Castelli, 1935, p. 9).

In Croatia about 20 bears are estimated to inhabit the forested area about Jasenak in the Grosse Kapela. They are also reported as not rare near Otočac and in the northern Velebit Mountains. The bears do far less damage than the wolves to livestock, and are reported as harmless to man. (Wettstein, 1928, p. 33.)

The species occurs in considerable numbers only in Bosnia. It is found also in Slovenia (forests of Kočevje), in Croatia (forests of Velebit and Vemika Kapela mountains), and in some parts of Serbia. In these regions a total of 272 specimens were killed from 1891 to 1921, including 21 in 1892, 22 in 1893, and 26 in 1910. From 1921 to 1931, 51 specimens were killed. (M. Hirtz, *in litt.*, December, 1936.)

Albania.—According to Baldacci (1932-33), the Bear still occurs commonly in the mountains in the center and north of Albania (Castelli, 1935, p. 37).

Greece.—The bear occurs in Macedonia and Epirus and does not show a decrease (Game Department, Ministry of Agriculture, Greece, *in litt.*, October, 1936). It is not a rarity in the extensive forests of the Greek and Turkish Balkans (Tratz, in Castelli, 1935, p. 9).

Bulgaria.—"The bears are being killed at all seasons of the year, in every manner." A 220-kilo specimen was recently killed in a predatory animal "drive" in the Rhodope Mountains. Reserves for the preservation of the bear are advocated in the Eastern Balkans (Stara Planina) and in the Rhodope and the Pirene Mountains. (H. W. Shoemaker, *in litt.*, June 30, 1932, and December 27, 1932.)

The species is found in all the mountains of Bulgaria. The present number is estimated at about 500. Since 1935 the bear may be hunted only on a special license, which is issued only for individuals that have become harmful to cattle pasturing in summer on the mountains. Protection is assured, and there are some reserves where hunting is entirely forbidden. (Bulgarian Game Association "Sokol," *in litt.*, February, 1937.)

Rumania.—The bear occurs in the coniferous forest zone of the Banat and the southern Carpathians and in a limited area of the eastern Carpathians. Toward autumn it comes in search of food to lower heights, as far as the lower border of the coniferous forests (Tismana, in the Horjin District, and Brasov). (Calinescu, 1930, p. 365.)

In the Transylvanian Alps it is still common in some districts (Tratz, in Castelli, 1935, p. 9).

Poland.—The species was not rare in the eighteenth century, when it was still found all over Poland. The number is now reduced to about 250-270 individuals, found chiefly in the eastern Carpathians; there are still about 20 in eastern Poland. There are also some in the Tatra Mountains. The number has perhaps increased of late. Females and young are absolutely protected, and the hunting of males is forbidden from January 15 to December 15. (M. Siedlecki, *in litt.*, October, 1936.)

About 256 are left in the Carpathians, and 15 in eastern Poland in the swampy forest of Agarkow (National Council for Nature Protection, *in litt.*, October, 1936).

In the future special permits for the shooting of bears will be granted by the Ministry of Agriculture (Quarterly Information Bulletin concerning the Protection of Nature in Poland, Kwartal 3, 1935).

The proposed National Parks of the Tatra and of Czarnohora will be of importance in the protection of bears. The chief aim of the proposed International Park of Poland, Czechoslovakia, and Rumania is the creation of a breeding ground for the Bear, Lynx, Wildeat, Wolf, Stag, etc. (Benedyct Fuliński, MS, 1933.)

Lithuania.—The species has been exterminated in this country since about 1877 (T. Ivanauskas, *in litt.*, November, 1936).

Latvia.—The species is now extinct in Latvia, the last specimens having been killed in 1880-90 (N. von Transehe, *in litt.*, February, 1937). An occasional straggler comes from Russia or Estonia to our northeastern forests (Forest Department, Latvia, *in litt.*, March, 1937).

Estonia.—About 20 individuals are found in the northeastern part, in the district of Wirumaa (Wiesland). Hunting is allowed only on a special permit from the State Forest Department. In recent years permits have been given for only one specimen each year. (Zoölogical Institute, University of Tartu, *in litt.*, October, 1936.)

Russia.—In Russia and Siberia the Brown Bear is more or less generally distributed, and in many areas it has maintained itself in fairly satisfactory numbers. Under these circumstances it seems unnecessary here to devote a great deal of space to the local dis-

tribution. Very detailed information on this point is supplied by Ognev (1931, pp. 34-108). Various forms have been described from this vast region; all that are considered valid at all are rated as subspecies of *Ursus arctos* by Pocock (1932).

W. G. Heptner writes (*in litt.*, December, 1936) that the species is found in all forested regions of the U. S. S. R., including Caucasia and the mountains of Turkestan. In certain regions there are great numbers. Hunting is allowed in most regions during the whole year, but in White Russia only on special permit. In one part of Caucasia and in the mountains of Turkestan hunting is limited to certain open seasons.

In European Russia, at the present time, the species seems to be found chiefly in the northern parts, in the Ural region, and in Caucasia. Many of the records from central Russia seem to date from the last century, and yet the species still survives near Leningrad and Moscow. In the Caucasus region generally it is quite common, though rare in Daghestan. (Ognev, 1931, pp. 34-38.) As many as half a dozen different races have been recognized in Caucasia by various authors (Satunin, Smirnov, Lönnberg, Ognev).

"In the Caucasus, according to Prince Demidoff, it is so common that the keepers of the Grand Ducal territories have instructions to treat these animals as vermin, and to kill them whenever occasion occurs" (Lydekker, 1901, pp. 92-93).

Asia.—The Brown Bear is still numerous in many of the thickly forested areas of Siberia, where the people do not hunt so much now as formerly. It is distributed from the Urals east through the basins of the Ob, Yenisei, Lena, and Kolyma to the Anadyr region and Kamchatka (where it is very common). It ascends to 11,400 feet in the Sayan Mountains, and to 8,259 feet in the Yablonoi Mountains. (Ognev, 1931, pp. 38-40.) Southward its range extends to Turkey, Syria, Persia, Afghanistan, the Pamirs, Tian Shan, Himalayas, western China, Manchuria, Hokkaido, and the Kuriles. There is almost a plague of bears in Hokkaido (Inukai, 1932*b*, p. 526). Many different names (generic, specific, and subspecific) have been applied to the Brown Bears of various parts of Asia, but Pocock (1932) regards them as nothing more than races of *Ursus arctos*. Separate accounts of two of these forms follow.

The Old World Brown Bear is closely related to the Grizzly Bears of North America and shows a decided resemblance to them in food habits and economic status. The considerable human tolerance exhibited toward it, together with its survival to the present day in most of the thickly populated countries of Europe, leads one to question the actual necessity for the ruthless war of extermination that has been waged upon the Grizzlies in the relatively sparsely settled areas of the Western United States.

Manchurian Black Bear; Manchurian Grizzly

URSUS ARCTOS LASIOTUS J. E. Gray

Ursus lasiotus J. E. Gray, Ann. Mag. Nat. Hist., ser. 3, vol. 20, p. 301, 1867.
("North China.")

SYNONYM: *Melanarctos cavifrons* Heude.

FIG.: Sowerby, 1923, pl. 3.

For the purposes of the present report, this subspecies is restricted to Manchuria and adjacent regions of the Asiatic mainland, although Pocock (1932, p. 799) provisionally includes with it the bear of Yeso (Hokkaido) and the Kuriles (*U. a. yesoensis* Lydekker).

Only five museum skins of this little-known bear seem to be on record from Manchuria and Mongolia (Pocock, 1932, p. 799). It is becoming increasingly rare, and calls for government protection in some way or other if it is to be saved from ultimate extinction (Arthur de C. Sowerby, *in litt.*, April 24, 1937).

It is as large as the Kamchatkan Brown Bear (*U. a. beringianus* Middendorff) but differs from it on the average, at least, in the prevalent blackness of its hue. The general color is glossy black; muzzle brown; underwool brown. Adult male from Manchuria: head and body, 6 feet 7 inches; tail, 5.5 inches (Pocock, 1932, pp. 799-800.)

The range seems to include the forested regions of northern Manchuria, northern Mongolia, southeastern Siberia, and perhaps northern Korea.

Sowerby (1920, pp. 230-231) shot a specimen in North Kirin, Manchuria, and heard reports of a similar animal in South Kirin, on the lower Sungari River, and in northern Korea. "The specimen I shot was very savage The native Russians and Chinese greatly fear this animal, as it has been known to kill and devour hunters."

Sowerby also writes (1923, p. 58): "The distribution of this species is doubtful, or, perhaps it would be more correct to say, is not known. So far it has been recorded only from the forest near Tsi-tsi-har in South-western Heilung-kiang, and from the forest in the I-mien-p'o district of North Kirin. From all accounts, however, it occurs throughout the Manchurian forest, and on into Primorsk [Siberia]." He adds that a hunter reports this form as "much rarer than the black bear [*Selenarctos*], occurring in the proportion of one in twenty of the bears shot in the district."

Syrian Bear

URSUS ARCTOS SYRIACUS Hemprich and Ehrenberg

Ursus syriacus Hemprich and Ehrenberg, Symbolae Physicae Mammalium, decas prima, text to pl. 1, 1828. (Near the village of Bischerre, Mount Makmel, Lebanon.)

SYNONYM: *Ursus schmitzi* Matschie (1917).

FIGS.: Hemprich and Ehrenberg, 1828, pl. 1; Wolf, 1861, pl. 17 (specimen from the Persian Gulf); Pocock, 1937, p. 807, fig.

The Syrian Bear is now extinct, or nearly so, in Palestine and Lebanon but survives in rather indefinite numbers to the northward and eastward, where the exact limits of its range have not been determined.

The type specimen (which was not full-grown) was described as uniform fulvous-white; it was smaller than *Ursus arctos* and had long ears. Its head and body measured 3 feet 8 inches; tail, 6 inches; height at shoulder, 2 feet 4 inches. Other skins were said to be fulvous or sometimes almost wholly brown. (Hemprich and Ehrenberg, 1828.)

The range, according to Flower (1929, p. 149), is "western Asia: in certain mountainous localities from Asia Minor and Syria to Persia."

Bodenheimer (1935, p. 114) writes:

The Syrian Bear . . . was not uncommon in N. Palestine in Biblical times. David boasts of having strangled a bear, which had attacked his herd (I Regum 17, 34) and two bears killed the 42 boys who had scoffed at the prophet Elisha (II Regum 2, 24). Tristram encountered one in a ravine near Tiberias, near Beisan and in the Jolan. Schmitz seems to have seen the last specimens on the southern Hermon (1911, 1913). . . . It has not been a menace to flocks of sheep and goats for a long time, but occasional visits to vine-yards and fruit-groves are still reported from Syria. The Bear is extinct on the Hermon and Anti-lebanon, mainly because it was so drastically hunted by German officers during the war. It is reported to have survived on the Lebanon.

J. C. Phillips writes (*in litt.*, July 20, 1936) that there were supposed to be a few bears left on Mount Hermon when he was there in 1912.

The following information, supplied by Dr. William Van Dyck and Professor West, both of the American University in Beirut, is transmitted by Theodore Marriner (*in litt.*, 1936):

"Shortly after the World War, when there were a large number of army rifles in mountain villages, the number of Syrian bears . . . was greatly reduced. They were, in fact, exterminated in some parts of the Anti-Lebanon range, but a few are still reported in the less accessible parts of both the Anti-Lebanon and Lebanon ranges. Farther north, in the Gebel Ansariyah and in the Amanus range of northern Syria and southern Turkey, they are still quite common in the more wooded sections. At the present time no definite attempt is being made to preserve the Syrian Bear, although the government policy of forbidding civilians to carry rifles indirectly helps towards this end."

Aharoni (1930, pp. 336-337) gives the following account (somewhat freely translated): "During the war, while stationed in Leba-

non, I found that the light isabella-colored bear [*Ursus syriacus* H. and E.], with the dimensions of the original description, inhabited only the green shrubbery of the Anti-Lebanon, while the smaller brown bear [*U. syriacus schmitzi* Matschie] inhabited only the bare snow-fields of the Lebanon. I saw examples of both subspecies in nature and still have specimens from Lebanon. To-day the bear has disappeared not only from Palestine, but perhaps also from Syria.

"Last year I became convinced that the Mesopotamian bear inhabiting the Jebel Abdul-Aziz [in the present Syria; lat. 36° 30' N., long. 40° 30' E.] represents a distinct subspecies."

F. S. Bodenheimer writes (*in litt.*, March, 1937) that the animal is now extinct in Palestine and Lebanon but probably still survives in Anti-Lebanon in small numbers. He adds that protection is most highly desirable.

Pocock states (1932, p. 793) that "the bears of Asia Minor and Syria merely differ from the typical Brown Bear of Europe in being on the average paler in colour, intermediate specimens occurring in the Caucasus and perhaps in northern Persia." He records specimens from Smyrna and from Sumela, 30 miles south of Trebizond, Turkey.

Blanford (1876, pp. 46-47) gives the following account of bears in Persia:

"Major St. John, . . . who has seen several Elburz bears, assures me that, although they are darker than the true *Ursus Syriacus* which is found in Southern Persia, they are much paler in colour than the common bear of Europe. . . ."

Ursus syriacus "is, as Major St. John assures me, the bear of South-western Persia. It is not the bear of Balúchistán, but is said to be found between Bampúr and Bam. It is found pretty commonly in the neighbourhood of Shiráz and in the hills bordering on Mesopotamia."

To this St. John adds (in Blanford, 1876, p. 47): "This bear is found throughout the mountains of Western and Northern Persia, possibly extending to Khorassán. In many places watchers are set at night to keep the bears from the ripening grapes."

Atlas Bear; Crowther's Bear

URSUS CROWTHERI Schinz

Urs[us] Crowtheri Schinz, Synopsis Mammalium, vol. 1, p. 302, 1844. (Based upon "the Bear of Mount Atlas," Blyth, Proc. Zool. Soc. London 1841, p. 65; type locality, "the foot of the Tetuan mountains, about twenty-five miles from that of the Atlas.")

The bear of North Africa is almost a mythical species, for no specimen has ever reached a museum. No very definite news of the

species has been obtained for nearly a century, and it is very probably extinct.

An adult female was smaller than the American Black Bear but more robustly formed and with a shorter and broader face, though the muzzle was pointed; toes and claws remarkably short; hair black or brownish black, shaggy, 4 or 5 inches long; muzzle black; under parts orange-rufous (Blyth, 1841, p. 65).

Pliny, though skeptical himself, quoted Roman annals to the effect that Domitius Ahenobarbus, an aedile of 61 B. C., had shown in the Roman arena a hundred Numidian bears, conducted by as many Ethiopian hunters. The bear of Libya was mentioned by Pliny's contemporaries, Juvenal and Martial, and a long time previously by Virgil. (G. Cuvier, 1825, vol. 4, pp. 325-326.)

Strabo says expressly that the Moors dressed themselves in bear and lion skins (Wagner, 1841, p. 70).

Blyth (1841, p. 65) gives a brief description of the animal, based upon information supplied by Mr. Crowther, who had spent some time in Morocco. "Upon questioning Mr. Crowther respecting the Bear of Mount Atlas, which has been suspected to be the *Syriacus*, he knew it well, and it proves to be a very different animal. . . . This individual was killed at the foot of the Tetuan mountains, about twenty-five miles from that of the Atlas. It is considered a rare species in that part, and feeds on roots, acorns, and fruits. Does not climb with facility; and is stated to be very different-looking from any other Bear." An unsuccessful effort was made to preserve the skin of the specimen mentioned.

According to Loche (1867, p. 52), Shaw (1743) mentions a bear in the Atlas Mountains. Loche also states that the Emperor of Morocco had recently sent to the zoölogical garden of Marseilles a live bear coming from his territory.

Bourguignat (1867, pp. 41-46) contributes the following information. Herodotus records a bear from western Libya. Poiret, a French botanist and zoölogist, reports (1789) bears from the Atlas Mountains, and mentions a fresh skin brought by an Arab into Mazoule. A friend of Bourguignat's, M. Letourneux, had reports of many bears in the region of Édough, and learned of others occurring not long previously on Djebel-Bou-Abed, Djebel Gherar, Djebel Debhar, and Djebel Thaya, Algeria. The animal was said to be small, thick-set, and brown, with a white spot on the throat, and to be very fond of honey and fruits. Bourguignat himself records skeletal remains of a bear from a cavern on Djebel Thaya in the Province of Constantine, to which he gives the name of *Ursus faidherbianus*. Human artifacts associated with these remains were believed to date from the early Christian Era.

Lataste (1885, pp. 235-237), in reviewing the evidence for the presence of bears in Barbary, considers that the case has by no means been proved.

"Since Mr. Crowther's time no more definite news has been received of this bear, though other travellers have reported statements of Arabs and Moors that such a creature exists in the mountains of Eastern Morocco and Western Algeria" (Johnston, in Bryden, 1899, p. 608).

"In view of the apparent rarity of the animal, it is important to mention that fossilised remains of bears have been discovered in caverns in north-western Africa, as well as in the rock-fissures of Gibraltar" (Lydekker, 1908, p. 463).

During the years 1892-96, "there were still rumours of Bears (*Ursus crowtheri*) in the Western Atlas, but although they certainly existed there in the first half of the last century I have never heard of one being killed or seen since this region became better known with the penetration of the French into Morocco, though there may be a possibility that a few exist" (Pease, 1937, p. 81).

The foregoing accounts seem to constitute fairly strong evidence of the former existence of a bear in North Africa. It must be acknowledged, however, that no less an authority than Cabrera (1932, pp. 10, 102-103) throws the whole case for the Atlas Bear out of court. But he is hardly correct in maintaining that its sole basis is the "fantastic" account of Blyth.

On first thought, the Atlas Bear might appear to be a noteworthy exception to the general rule that recently extinct mammals have succumbed to the advance of the European type of civilization. Yet one of the tools of that civilization, the rifle, in the hands of the Moors, must have at least contributed to the animal's downfall. Nevertheless, the disappearance of the Barbary Lion from Morocco in the early part of the present century is singular enough (Cabrera, 1932, p. 186), and the still earlier disappearance of the Atlas Bear is even more puzzling.

Family MUSTELIDAE: Weasels, etc.

This family is distinguished by the large number of valuable fur-bearers represented in it; and many of the species have been seriously reduced by the demands of the fur trade. Its distribution is practically as cosmopolitan as that of the Canidae; it extends to Borneo and the Philippines, but not to Australia. There are about 35 genera and 400 species and subspecies. Nineteen forms (including one extinct species) are discussed in Dr. Allen's volume on the New World (1942), and nine forms of the Old World in this volume.

European Mink. Vison (Fr.). Nörz; Sumpfotter (Ger.)

MUSTELA LUTREOLA Linnaeus

[*Mustela*] *Lutreola* Linnaeus, Syst. Nat., ed. 12, vol. 1, p. 66, 1766. (Finland.)
Figs.: Royal Nat. Hist., vol. 2, p. 68, 1894; Martin, 1910, pl. 33; Didier and Rode, 1935, p. 303, fig. 176.

The European Mink is a rare and vanishing species in central Europe and France but is more generally and more commonly distributed in Russia.

The general color is a rich dark brown; region about the mouth whitish; tip of the tail blackish. Head and body, 350 (female) to 400 mm. (male); tail, 130 (female) to 140 mm. (male). (Miller, 1912, pp. 415, 418.)

The range extends from western France eastward to the Tobol and Irtysh Rivers in western Siberia; south to Austria, Hungary, Rumania, and Transcaucasia; north to Finland and northern Russia.

France.—Though recorded by Lesson in 1840 in Poitou and Saintonge, the Mink was long overlooked in France. It seems to have been formerly rather common in the center, the west, the southwest, Normandy, and the Vosges. The present range consists of a narrow zone extending from the Jura to the vicinity of Nantes and in a general way following the valley of the Loire. Here the species seems to become rarer and rarer. The decrease is due to the active hunting of the animal, for its fur is very valuable and it is also considered a harmful species. Prohibition of hunting and surveillance of the fur trade would be the only means of conservation; but these measures would be very difficult to apply. (E. Bourdelle, *in litt.*, March 6, 1937.)

Martin (1910, p. 35a) extended the range to the Gironde and to Brittany.

The Mink's food includes fish, frogs, crawfish, ducks, and small mammals (Didier and Rode, 1935, p. 304).

Germany.—The species has been exterminated in western Germany and is very rare in northern and eastern Germany. Latest dates of capture are: Mecklenburg, 1894-96; Hannover, 1902; East Prussia, 1909; Lüneburger Heide, 1910. At present there is no open season. (Internationale Gesellschaft zur Erhaltung des Wisents, *in litt.*, October, 1936.)

It had disappeared from Schleswig-Holstein by about 1890 (Mohr, 1931, p. 32).

During recent years solitary individuals are still regularly shot or seen in the east (Krumbiegel, 1930, p. 6).

Switzerland.—Fatio (1869, p. 336) has only a few doubtful records from this country.

Austria.—The Mink was formerly found in Burgenland and prob-

ably also in Lower Austria. It is now absolutely protected in Burgenland, where it is said to still exist, though reliable reports are not obtainable. (G. Schlesinger, *in litt.*, March, 1937.)

Czechoslovakia.—The known specimens are mostly from the Carpathians, in the former Hungary (J. Schenk, *in litt.*, November, 1936).

Hungary.—From the present limits of Hungary (since the World War) only one specimen is known. The animal has no legal protection. (J. Schenk, *in litt.*, November, 1936.)



FIG. 23.—European Mink (*Mustela lutreola*). After Lydekker.

Rumania.—The Mink is common, like the Otter, but has a greater distributional area, since it is more adaptable to civilization (Calinescu, 1930, p. 366).

Poland.—It was formerly quite common all over Poland but is now very rare, being found especially in the southeast, in Polish Podolia and in the Eastern Carpathians. Hunting is forbidden from February 1 to December 31. Lately there has been a demand for complete protection. (M. Siedlecki, *in litt.*, October, 1936.)

Kuntze (1935, p. 63) records it from northeastern and southeastern Poland.

Lithuania.—The species is exterminated except in the eastern part of the country, where it is still found in the districts of Zarasai and Utona. The annual production amounts to as many as 150 skins. The value of one is about 40 Litas (£5-6/). So far no protective measures have been adopted. (T. Ivanauskas, *in litt.*, November, 1936.)

Latvia.—In 1908-09 it was reported as numerous in Courland and widely distributed in Livonia (Ognev, 1931, p. 759).

The present stock is about 2,000 individuals. The increase through natural propagation is not important, and the annual kill is about 300-400 specimens. The species is protected from March 1 to November 14. Forest guards are not allowed to kill it. (Forest Department, Latvia, *in litt.*, March, 1937.)

Estonia.—The species is found throughout the country in suitable areas. There is a steady decrease, owing to the drying up of the country. The animal is not threatened by man, but it is without any legal protection. (Zoological Institute, University of Tartu, *in litt.*, October, 1936.)

Finland.—The species is apparently distributed in the southern part of the country (Ognev, 1931, p. 758).

Russia.—From Ognev's data (1931, pp. 758-761), the Mink appears to be widely and more or less commonly distributed over most of Russia, from Kandalaksha Bay, the lower Dvina, and the Petchora and Usa Rivers in the north to the Ukraine, the Caucasus, and Astrakhan in the south. Westward it is found about Lake Onega, in Volhynia and Podolia, and on the lower Dniester. At the bazaar of White Russia 473 Mink skins were sold in 1926-27, and 649 in 1927-28. Eastward the species is found in the Ural region, from the tributaries of the Petchora in the north to Orenburg and the Ilek River in the south. Beyond the Urals it extends only to the Tobol and Irtish Rivers. In Transcaucasia it occurs on the Bzyb River.

The animal is strongly persecuted as a fur animal and is rare in certain regions. Hunting is not allowed in the Volga region and in the eastern part of European Russia. There is no danger of extinction, except in certain industrial regions. (W. G. Heptner, *in litt.*, December, 1936.)

Russian Sable. *Martes zibellina* (Fr.). Zobel (Ger.)

MARTES ZIBELLINA (Linnaeus)

Mustela zibellina Linnaeus, Syst. Nat., ed. 10, vol. 1, p. 46, 1758. (Northern Asia; type locality restricted by Ognev (1925, p. 276) to "the northern part of the government of Tobolsk.")

FIGS.: Royal Nat. Hist., vol. 2, p. 55, 1894; Ognev, 1931, pl. 5 (*M. z. sahalinensis*); Zeitschr. f. Säugetierk., vol. 9, pl. 18, fig. 7, 1934 (Amur form).

This is one of the animals that has suffered particularly from the "curse of beauty." It has been decimated by the demands of the fur trade and has disappeared from considerable areas within its former range. Its principal home is in Siberia.

The Sable bears considerable resemblance to the Pine Marten (*Martes martes*). It has a cone-shaped head, large ears, a bushy

tail, and comparatively stout limbs. The fur is thick and soft; the color varies from blackish, mixed with gray and brown, to yellowish brown; throat sometimes orange. Head and body, about 20 inches; tail, about 7 inches.

The former range of the species included the forested regions from northern Russia east to the Anadyr district, Siberia; it extended south to the southern Urals, the Altai and Sayan Mountains, Manchuria, the Ussuri district, Hokkaido, Sakhalin, and Kamchatka.

The following subspecies have been recognized (*cf.* Ognev, 1925, and 1931, pp. 560-598), but the ranges so far assigned to them do not cover the entire range of the species:

Martes zibellina zibellina (Linnaeus). (Original reference and type locality given above.) Tobolsk Sable.

Color dull and pale, varying from cinnamon-drab to pale brownish yellow and even to dark brown; underfur light and dull.

Range: the Ob Basin and the Ural region.

M. z. yeniseensis Ognev, Jour. Mammalogy, vol. 6, p. 277, pl. 26, fig. 3, 1925. ("Krasnojarsk district, the forest on the plain along the Yenisei River," Siberia.) Yenisei Sable.

Color more dusky warm brown in comparison with the Tobolsk Sable.

Range: the great forests of the districts of Krasnojarsk, Ashinsk, and Kansk, in the Yenisei Basin.

M. z. sajanensis Ognev, Jour. Mammalogy, vol. 6, p. 278, 1925. ("Orsyba River, northern part of the Sajansky Mountains," Siberia.) Sayan Sable.

General color dark brown; underfur pale yellowish.

Range: "the mountain country of the rivers Uda, Kasyr and especially of the Kasyr-Suk and partly of the Usa."

M. z. princeps (Birula). (*Mustela zibellina princeps* Birula, Ann. Mus. Zool. Acad. Impér. Sci. Petrograd, vol. 22, p. 08, 1922; the mountain country of Bargusin, Transbaikalia, Siberia.) Bargusin Sable.

Fur soft and silky; color a brilliant blackish brown; underfur bluish gray, brownish at bases and tips; throat patch much reduced, commonly not visible.

Range: mountain forests, Bargusin Hills and spurs of the Stanovoi Mountains, Transbaikalia.

M. z. kamtschadalica (Birula). (*Mustela zibellina* subsp. *kamtschadalica* Birula, C. R. Mus. Zool. Acad. Sci. Petrograd 1918, p. 82 (*vide* Ognev); Kamchatka.) Kamchatka Sable.

General color between warm sepia and mars brown; underfur pale yellowish gray; skull large.

Range: Kamchatka.

M. z. sahalinensis Ognev, Jour. Mammalogy, vol. 6, p. 279, pl. 26, fig. 4, 1925. ("Saghalien, Wedernikovo.") Sakhalin Sable.

Winter pelage like that of the Kamchatka Sable but of a more decided cinnamon tint and lighter; throat patch of the same cinnamon color; head avellaneous, back darker; flanks sayal brown or tawny-olive; underfur pale yellowish, more cinnamon at the tips; summer pelage duller and darker, more brownish.

Range: the whole of Sakhalin Island.

M. z. brachyura (Temminck). (*Mustela brachyura* Temminck, in Siebold, Fauna Japonica, Mammifères, p. 33, 1844; Matimaja, Hokkaido, Japan.) Japanese Sable.

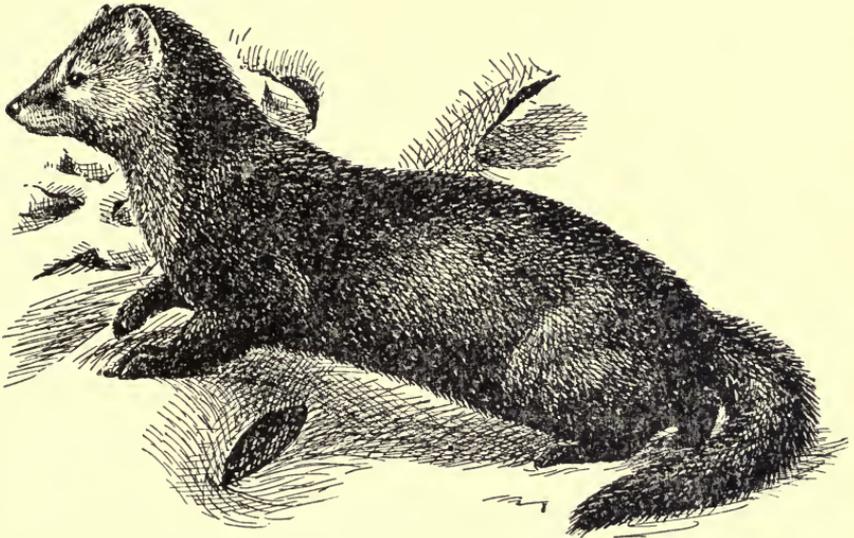


FIG. 24.—Russian Sable (*Martes zibellina* subsp.)

Inferior to the Siberian Sable in fineness and length of fur; back and tail dark brown; sides and limbs lighter; long hair of feet concealing the claws. Tail, 3.5 inches. (Temminck, 1844, pp. 33-34.)

Range: Hokkaido and the Kuriles.

Russia.—In past centuries the Sable's range extended westward perhaps as far as the Kola Peninsula or even Lapland. In the sixteenth and seventeenth centuries it was found on the Petchora River and probably at the same time in the Dvina region. In Pallas's time it occurred in the vicinity of Ufa, west of the southern Urals; the last one in this general region was killed in 1850 near Ufimsk. Its southern limit on both slopes of the Urals was about latitude 52° N., or possibly 51° N. About 1700 it inhabited the entire Government of Perm and the eastern half of the Governments of Volgda, Archangel, and possibly Viatka. By 1875 about 300 Sables were trapped annually in the northeastern part of Perm. More

recently the Russian population of the species seems to have become largely restricted to the Urals, where it is less numerous on the western slopes than on the eastern. However, in 1925 it was still common on the Ilych River, a tributary of the Petchora. (Ognev, 1931, pp. 569-570.)

The Ural form is considered distinct from *M. z. zibellina* but is not named. It occurs sporadically and rarely along the western foothills (headwaters of the Shugora, Laga, Ilych, and Petchora); it is also rare on the eastern slopes, at the sources of the Losva, Aspia, Purma, Ushma, Toshemok, and Wishaj Rivers. The fur is considered the finest in western Siberia. (Ognev, 1925, p. 277.)

Siberia, Ob Basin (M. z. zibellina).—In the Government of Tobolsk the Sable is not rare in the taiga forests of the Pelym River; it is rare along the Tavda River and in the Tarsk and Surgut districts. At the end of the last century more than 300 Sables were obtained annually along the Jugan River. The species is absent between Beresof and Obdorsk. Along the Rivers Omi, Tara, and Irtish, and in the southern part of the Government of Tobolsk it was very scarce in 1886. In the Narym district it was numerous on the upper Wasugan River in 1875. It occurs on the Ket and Chulym Rivers, and was particularly numerous on the Tchirk-Ul River about 1923. It avoids the steppes in the central part of the Government of Tomsk. (Ognev, 1925, p. 277, and 1931, pp. 571-572.)

Prejevalsky (1879, p. 233) reported the Upper Katuna, the Bukh-tarma, and their tributaries, in the Russian Altai, as particularly good districts for Sables. The hunters used specially trained dogs, and endeavored to surround the animals with nets, which were as much as 1,000 feet long and 4 feet high. The average price of a sable skin was then 15 rubles.

Siberia, Yenisei Basin (M. z. yeniseensis, M. z. sajanensis, M. z. princeps).—The Sable is found in suitable areas from the Mongolian boundary northward to latitude 69° N. The form living along the Tunguska River and near Turukhansk probably represents an undescribed subspecies; the same form is found in small numbers in the adjacent Khatanga Basin. The species is less common in the Government of Irkutsk than in the Government of Yenisei. It is absent from the steppes in the vicinity of Minusinsk, Achinsk, and Krasnoyarsk. It is common in the Sayan region on the Kasyr-Suk and Uda Rivers, and occurs on practically all sides of Lake Baikal. According to Turov (1923), 700 skins were exported annually across Bargusin from the Verkhne Angarsk and Podlemorsk districts near Lake Baikal. (Ognev, 1931, pp. 572-573.)

Siberia, Lena Basin.—In the Olekma-Vitim mountainous country the Sable is very rare. Far to the north, in the enormous region between the Anabar, the Olenek, the Lower Tunguska, and the Vilui,

it disappeared about the middle of the last century. About 1873 it was found occasionally on the Patom River. Its disappearance from the entire southern Muisk district was unusually rapid. It has been recorded from the Aldan and Mae Rivers. (Ognev, 1931, p. 573.)

The dark animals furnish the most valuable skins; in peace times they fetched as much as 2000 marks. They come mostly from the Vitim Plateau and from the Bargusin district, where the Sable is now almost exterminated. (Klemm, 1930, p. 367.)

Eastern Siberia.—At present the Sable is not found in the Verkhoyansk and Kolyma districts. In former times it was widely distributed along the Kolyma and Omolon Rivers, but it finally disappeared from the Kolyma district in 1852. The species has long since vanished from the Anadyr River region; the last one was found near the village of Eropol about 1847.

By 1900 the species was rare in the Gizhiginsk district, though in former years from 30 to 50 Sables were collected annually, particularly from the Penzhina Valley and from northern Kamchatka. Possibly this form belongs to *M. z. kamtschadalica*, which is widely distributed in Kamchatka, especially in the Petropavlovsk district. (Ognev, 1931, pp. 574-575, 595.)

In Kamchatka the Sable was decimated in Dybowski's time (1879-85). At the beginning of the nineteenth century a hunter could get 40 animals a day, and the annual production of Kamchatka amounted to 10,000 skins. The natives did not endanger the stand of Sables, but by 1881 Cossack and Tungus immigrants reduced the yield to 2,883. The abundance of the animals in some years was dependent on the wholesale occurrence of a vole, *Microtus oeconomicus*. (Kuntze, 1932, p. 47.)

In the western Amur region the species occurs on the Argun and Shilka Rivers. In the middle and lower Amur Basin, the Sables from the Albazin area, the Zeya River, and the Bureya Mountains, which are very dark in color, and costly, may belong to the subspecies *M. z. princeps*. In 1861 the species was reported as particularly numerous on the Amgun River. In the Ussuri district it varies from common to rare, and has even disappeared entirely in some parts. The Ussuri Sable is probably very near to *M. z. sahalinensis*. (Ognev, 1925, pp. 279-280, and 1931, pp. 573-574.)

Sowerby (1923, pp. 63-65) says that among the Tartars of the Primorsk coast in southeastern Siberia, "sable hunting is their chief end and aim in existence." He continues:

It is certain that it was largely the presence of the sable throughout Siberia and in the Amur and Primorsk that led the Russian pioneers and conquerors across that wide stretch of country. . . . Thus we must look upon this little animal as having a very important bearing upon the history of these regions.

... The only trouble is that with the unrestricted hunting that takes place, and the steady increase in the settlement of the country, this valuable supply of fur-bearing animals is rapidly diminishing. . . .

It is evident that one of the chief objects of the conquest of Siberia was to secure a supply of sable skins for the Imperial Government, and it is significant that the conquering Cossacks . . . always imposed a heavy tribute of sable skins upon the Tartar tribes they defeated, and brought under subjection

In Siberia this animal is protected by the Government, and comparatively recently it was given a five years closed season.

The Cedar Valley Reservation (Kedrovaya Pad) on Amur Bay, comprising 7,500 hectares, and the Kronotsk Bay Reservation in Kamchatka, comprising 15,000 hectares, provide for the protection of the Sable (Makaroff, in Skottsberg, 1934, pp. 433-434).

In Sakhalin the Sable is distributed over the entire island, and in 1889 it was considered more numerous there than in any other part of Siberia (Ognev, 1931, p. 574).

Mongolia.—P. P. Sushkin reported in 1925 that the Sable was a regular inhabitant of the southern slopes of the Altai Mountains, about the headwaters of the Black Irtish and the Urungu. It is also abundant in the vicinity of Kossogol, at the southern base of the Sayan Mountains. (Ognev, 1931, p. 572.)

Manchuria.—The most valuable fur-bearing animal of Manchuria is the Sable (Sowerby, 1934, p. 286).

"The Manchurian sable does not come up to those from the Amur, Primorskaya and Siberia in the value of its pelt. . . . It is said that the Chinese nearly always hunt the sable by running it down with dogs. . . .

"Unfortunately the Chinese Government is not alive to the value of its game and fur-bearing animals and birds, and so affords no manner of protection. There can be only one result of this; complete extinction of the sable in the provinces of Heilungkiang and Kirin." (Sowerby, 1923, pp. 64-65.)

Japan.—Temminck (1844, pp. 33-34) described the Japanese Sable from Yezo (Hokkaido) and added that it was common in all the Kuriles. It was being utilized in the fur trade in his day.

In Hokkaido "the sables . . . have . . . met a sad fate and in spite of particular protection, their coming back to their existence as before is anything but promising. . . .

"It is interesting to note that the increase of the Japanese minks [*Mustela itatsi*] in Hokkaido associates closely with the decrease of the sables which occupied the land before the minks and decreased inland gradually from the southern part. The number of sables caught in Hokkaido was 2,395 in 1906, 765 in 1910, 1,706 in 1915 and 214 in 1919 respectively." (Inukai, 1932*b*, pp. 524, 527.)

Uchida reports (1935, p. 8) a total of 5,948 Japanese Sables taken during the six-months open season of 1929-30.

In the Kuriles the Sable is threatened with destruction (Miyoshi, in Skottsberg, 1934, p. 412).

Economics and conservation.—The Sable has been very actively hunted for several centuries. Its numbers are now much reduced, and in only a few regions can it be said to be "not rare." Its range also has been considerably reduced and has become discontinuous. There has been shrinkage of the range at its western limits in Russia and at its southern limits in western and southern Siberia. From time to time hunting has been forbidden in the whole or in certain parts of its range. These measures have given good results, and the decrease in numbers has been halted for several years. In order to obtain an increase, a closed season has been maintained on the whole territory of the U. S. S. R. Several great reserves have been created to afford protection to the Sable (Barguzinsk, Kronotski, Sikhote-Alin, Kondo-Sosva). Successful propagation has been carried out, and several "sovkhoz" have been specially created for sable-farming. (W. G. Heptner, *in litt.*, 1937.)

In 1928 the entire Sable production of Asia was 15,000. In 1929-30 the yield in that part of eastern Siberia bordering Manchuria was 1,925 skins (Kuntze, 1932, p. 47).

Wolverine; Glutton. *Glouton arctique* (Fr.). *Vielfrass* (Ger.)

GULO GULO (Linnaeus)

[*Mustela*] *gulo* Linnaeus, Syst. Nat., ed. 10, vol. 1, p. 45, 1758. (Lapland.)
Figs.: Fitzinger, Bild.-Atlas, Säugth., fig. 70, 1860; Royal Nat. Hist., vol. 2, p. 71, fig., 1894; Zeitschr. für Säugetierk., vol. 8, pl. 31, 1933; Ognev, 1935, pl. 2.

The range as well as the numbers of the Wolverine have become reduced in northern Europe, but its status in northern Asia has remained more satisfactory.

The general form is heavy and badgerlike; fur long and dense; tail bushy; general color a rich dark brown, becoming blackish on legs, feet, and tail; a broad light brownish or yellowish band across rump and upper side of basal part of tail, extending forward to shoulders, where it gradually disappears; a cream-buff area across the head between ears and eyes. Head and body, 825 mm.; tail, 125 mm. (pencil, 75). (Chiefly from Miller, 1912, pp. 434-440.)

"In prehistoric times, the wolverine was found in England, and indeed ranged as far south as the Pyrenees" (Lydekker, 1901, p. 112).

Its recent range is given by Miller (1912, p. 434) as the "northern forests of the Old World; in Europe, confined to Scandinavia and northern Russia." It is stated by Trouessart (1910, p. 71) a little more fully: "Circumpolar Europe (but not the islands north of the

continent), south to lat. 55° N. (Lithuania, Volhynia, and northern Germany where it is now exterminated); in Asia south to the Altai. Still lives in northern Norway, Sweden, and Lapland."

Norway.—In former times it was common throughout the country, but only in the mountains in the southern part. At present it is rare in the high mountains and probably will soon become completely extinct. Large bounties are paid for every specimen because of the damage the Wolverine does to cattle and reindeer. (Hj. Broch, *in litt.*, December, 1936.)

It is supposed that a small stock is left in the south of Norway on Hardangervidda and in Jotunheimen. While still found in the northern parts, it shows a considerable decrease there. It is questionable whether it is possible to preserve the Wolverine in Norway. (Director of Forestry, Ministry of Agriculture, Norway, *in litt.*, January, 1937.)

Sweden.—The Wolverine inhabits chiefly the mountain forests and the areas above the tree limit. It has therefore been mostly restricted to the country northward from northern Dalecarlia (lat. 61° 30' N.). In Wermland it was formerly found in small numbers, but disappeared before the middle of the last century. Single specimens have even been found as far south as Scania. At present it occurs only from Jemtland northward.

The skin of the Wolverine has been valued for centuries, and the animal has also been pursued because of its damage to livestock, mostly reindeer but also sheep to some extent. Consequently bounties are paid, and have recently been increased; the State pays 10 Cr., while the Lappfund pays 100 Cr. for old animals and 50 Cr. for cubs. The total number of Wolverines killed in the whole country is, by decades, as follows:

1856-1865	1,159	1896-1905	1,084
1866-1875	1,201	1906-1915	717
1876-1885	1,240	1916-1925	639
1886-1895	992	1926-1934	517

There is a pretty steady decrease in numbers from the beginning of the present century, indicating that there is danger of extermination. (Einar Lönnberg, *in litt.*, October, 1936.)

Finland.—Ognev (1935, p. 95) mentions the occurrence of the Wolverine about Lake Enara.

Latvia.—In the Baltic states the species was once found in large numbers, but now seems to have disappeared. In 1875 a specimen was killed near Gerki in Courland, and in 1876 another near Jacobstadt. (Ognev, 1935, p. 94.)

Lithuania.—Its former existence is uncertain (T. Ivanauskas, *in litt.*, November, 1936).

Poland.—It was quite frequent in the eighteenth century and even in the nineteenth century, but is now most probably exterminated (M. Siedlecki, *in litt.*, October, 1936). It lived till the end of the last century in Volhynia, Podolia, and Polesia (Lubicz v. Niezabitowski, 1934, p. 190).

Germany.—Two reports of Wolverines in central or northern Germany in the eighteenth century are evidently based upon escaped captives (Blasius, 1857, p. 211; Hilzheimer, 1933, pp. 219-221).

Russia.—The species formerly ranged southward to the northern Ukraine. At present it is found rarely in the Western Area, and pos-



FIG. 25.—Wolverine (*Gulo gulo*)

sibly in Volhynia. Once thought to have been exterminated in White Russia at the end of the nineteenth century, it may have survived till later. It formerly occurred in the Governments of Novgorod and Olonets. It ranges northward to the Kola Peninsula. Prior to 1901, 200-300 Wolverines were collected annually in the Government of Archangel, but at present there is a decrease. Prior to 1925, 75 animals were captured annually in the Petchora district. The species now seems to be very rare in central Russia (Ivanovo Industrial Area and adjacent areas). It is widely distributed in the Urals, south to about lat. 53° N. (Ognev, 1935, pp. 94-96.)

Siberia.—The range of the Wolverine extends from the Urals east to the Anadyr district and Kamchatka; on the north it reaches the Arctic coast in places; on the south it extends to the Altai Mountains, the Tannu-Ola Mountains (Mongolia), the Bargusin district, the Amur region, the Ussuri district (lat. 44° N.), and Sakhalin. Over this vast area its status varies considerably; it is reported as numerous in some places and as rare or absent in others: (Ognev, 1935, pp. 97-100; map, p. 101.)

The Wolverine is widely distributed in the forested regions of the U. S. S. R. as a whole (Russia and Siberia). It is less common in northern Russia than in Siberia. Its decrease in central Russia results from the decrease of the forest cover. It is very common in parts of Siberia. It causes great damage to hunting interests, taking animals caught in traps, destroying hunters' provisions, attacking young ungulates and even adults in deep snow. It is not legally protected and may be killed at any time. (W. G. Heptner, *in litt.*, December, 1936.)

Sakhalin.—"Schrenck and Kishida reported it from the island. It is . . . a rare animal on Sakhalin." (Kuroda, 1928, p. 227.) A specimen was taken in 1934 (Kuroda, 1938, p. 26).

Manchuria.—"I heard sufficient from authentic sources to convince me that the animal is fairly common, at least in the northern forested area" (Sowerby, 1923, p. 71).

Mongolia.—The species is reported in the Tannu-Ola Mountains (Ognev, 1935, pp. 98, 100). "I once saw a skin from the Urga district in Northern Mongolia" (Sowerby, 1923, p. 71).

Economics.—"Wolverine fur has been much in vogue of late years; and has consequently appreciated in value. For a good skin, thirty shillings is often asked." (Lydekker, 1901, p. 112.)

The world's fur production for 1928 included 6,000 Wolverine skins [some probably from North America] (*Jour. Soc. Preservation Fauna Empire*, pt. 12, p. 64, 1930).

Folklore.—Many curious bits of folklore concerning the Wolverine have been handed down. Some of them are quoted by Lloyd (1854, pp. 16-18) from Pontoppidan and Olaus Magnus.

Family VIVERRIDAE: Civets, Mongooses, etc.

This Old World family ranges over southern Europe, Africa, Madagascar, southern Asia, and the Malay Archipelago as far as Timor, Ceram, and the Philippines. There are about 40 genera and 350-400 forms. Accounts of six forms are given here.

Malay Binturong; Bear-cat; Black Marten. Bintoroeng (Dutch)

ARCTICTIS BINTURONG BINTURONG (Raffles)

Viverra? Binturong Raffles, Trans. Linnean Soc. London, vol. 13, pt. 1, p. 253, 1821. ("Malacca.")

FIGS.: Geoffroy and Cuvier, Hist. Nat. Mammifères, vol. 5, pls. 201, 202 (subsp.?), 1824; Selater and Selater, 1899, p. 128, fig. 26; Lydekker, 1900, pl. 9, fig. 1 (subsp.?).

Opinions differ as to the rarity of the Binturong, the six subspecies of which range from northeastern India and Tonkin through the

Malay Peninsula to Sumatra, Java, Borneo, and Palawan. Nevertheless, it is evidently in need of total protection, more especially because of the demands upon it by the Chinese for medicinal purposes.

There has long been uncertainty as to the exact taxonomic status of the various described forms, owing chiefly to the inadequacy of the series of museum specimens. The species as a whole is distinguished from all other Viverridae by its long ear tufts and by the prehensile nature of its long, bushy tail. The fur is long, coarse, and black, more or less washed with gray, fulvous, or buff. (Lydekker, 1893-1894, p. 463.) The present subspecies is larger and darker than *A. b. penicillatus*; its winter coat is much shorter and less luxuriant with underwool than that of *albifrons*, and the long hairs are less extensively annulated with lighter color (Pocock, 1933, p. 1030). Body, 30 inches; tail, nearly the same (Raffles, 1821, p. 253).

The Malay Binturong inhabits the Malay Peninsula north to Tenasserim and Siam, and also Sumatra.

Siam.—In this country the Binturong seems to be rare (Gyldenstolpe, 1919, p. 148). Specimens have been recorded from Sikawtur, northwest of Raheng, western Siam; from Prachin, central Siam; from Sai Yoke, southwestern Siam; and from Bang Nara, Patani, Peninsular Siam (Kloss, 1917, p. 293, and 1919, p. 53; Gyldenstolpe, 1919, p. 148). In Ratburi Province, southwestern Siam, "the Karangs are well acquainted with the animal and state it is generally distributed in evergreen forest" (Gairdner, 1915, p. 252). Since its habits are "largely nocturnal and arboreal, the Bear-cat is not easily obtained" (Kloss, 1917, p. 294).

Malay Peninsula.—"The Bear-cat . . . is generally obtained in Malacca, and is sometimes kept as a pet. It is easily domesticated, and becomes very affectionate, and will follow its master like a dog. It feeds on fruit, also taking small birds." (Ridley, 1895, p. 93.)

"This delightful animal is apparently not uncommon on the mainland, but I have not heard of it occurring wild in Penang or Singapore. In the Museum at Taiping are specimens from Larut and Kuala Kangsar, Perak. It is represented in the Museum at Kuala Lumpur, and is said to be common in Selangor." (Flower, 1900, pp. 330-331.)

In the Malay Peninsula "*Arctictis*, *Hemigalus*, *Neofelis*, . . . are not in my opinion vanishing forms. . . . The three carnivores are all rare but it is extremely difficult to estimate their status in a country covered with jungle. I see no reason why they should be classed under 'vanishing forms' as there is plenty of country suited to their requirements and they are not systematically hunted. I prefer to regard them as uncommon animals, rarely collected. Never-

theless, they are rare enough to be given total protection." (F. N. Chasen, *in litt.*, March 31, 1937.)

In Malaya "many with whom I talked . . . were insistent that such animals as the . . . binturong . . . are to-day practically non-existent. . . .

"It is true that the loris and binturong fetch a high price in the Chinese market, but they are numerous." (Comyn-Platt, 1937*b*, p. 48.)

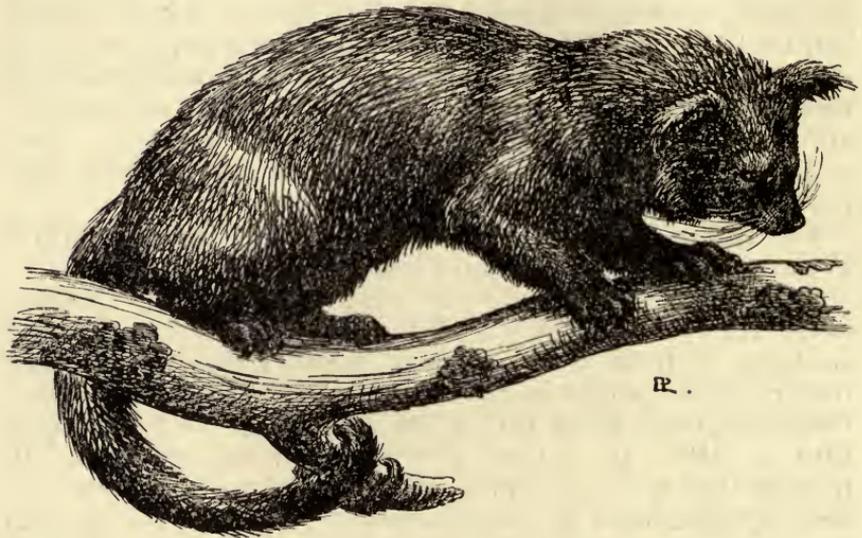


FIG. 26.—Binturong (*Arctictis binturong* subsp.)

Sumatra.—In the Korinchi region two specimens are recorded from Sandaran Agong, 2,450 feet (Robinson and Kloss, 1918, p. 11).

F. N. Chasen (*in litt.*, May 5, 1937) considers the Binturong much more numerous in Sumatra than in the Malay Peninsula. "Most specimens seen in captivity originate on the east coast of Sumatra." It "needs protection as the Chinese use it for medicine."

"In Sumatra, the binturong is found occasionally near Selat Pandjang. It is not often seen in Rokan and Bengkalis." (Heynsius-Viruly and Van Heurn, 1936, p. 63.)

According to Dr. Hagen, the species is rare in Sumatra. This agrees with information obtained from natives inland from Palembang. During two years' residence in the Ogan Oeloe Subdivision only one animal was seen in captivity. (Coomans de Ruiter, 1932, p. 53.)

Lyon (1908, p. 652) records specimens from Aru Bay, Sungei Mundau, Siak River, Pulo Payong, and Pulo Tebing Tinggi, eastern

Sumatra. Pocock (1933, pp. 1018-1019) records additional specimens from Ulu Ifok, Perak; Wellesley Province, Straits Settlements; Tenasserim Village; and Sandaran Agong, Sumatra.

Nias Binturong

ARCTICTIS BINTURONG NIASENSIS Lyon

Arctictis niasensis Lyon, Proc. U. S. Nat. Mus., vol. 52, p. 443, 1916. (Near Fadoro, Nias Island, off west coast of Sumatra.)

Forty years ago this Binturong was "said not to be common" (W. L. Abbott, in Lyon, 1916, p. 443).

"Upper parts of back of head, neck, body, and all of tail, brownish black, coarsely and rather sparsely grizzled with ochraceous tawny on the lower back, sides, outside of legs, and proximal two-thirds of tail; under parts tawny ochraceous." Tail, 540 mm. The ochraceous-tawny in the present form is replaced by buff or ochraceous-buff in *A. b. binturong*. (Lyon, 1916, p. 443.) Cranial and dental differences are discussed by Miller (1942, pp. 123-124).

This Binturong is apparently restricted to Nias Island. Since the type specimen was described, a second individual has been recorded by Miller (1942, pp. 123-124), who quotes the collector, Frederick A. Ulmer, Jr., as follows: "The young binturong was purchased alive from the natives of Soliga in Central Nias and was the only one I saw, although I heard of one other specimen in captivity near Gunong Sitoli." Ulmer also refers to it as a "rare animal."

Banka Binturong

ARCTICTIS BINTURONG KERKHOVENI Sody

Arctictis binturong kerkhoveni Sody, Natuurk. Tijdschr. Nederl. Indië, vol. 96, no. 1, p. 43, 1936. ("Banka Island," Malay Archipelago.)

This form is based upon a single specimen from Banka Island.

It is the smallest subspecies. The fur is black, with short buffy tips to the hairs in some places, especially the head and forelegs; tail plain black, with light buffy bases to hairs on basal two-thirds of the ventral surface. Head and body, 600 mm.; tail, 520 mm. (Sody, 1936, p. 43.)

No information is at hand concerning the frequency of the Binturong on Banka.

Himalayan Binturong

ARCTICTIS BINTURONG ALBIFRONS (F. Cuvier)

Paradoxurus albifrons F. Cuvier, Mém. Mus. Hist. Nat. [Paris], vol. 9, p. 48, pl. 4, upper fig., 1822. (Based upon a menagerie specimen in Bengal, said to have come from Bhutan.)

Figs.: Wolf, 1867, pl. 10; Royal Nat. Hist., vol. 1, p. 463, 1893-94; Jour. Bombay Soc. Nat. Hist., vol. 38, no. 2, suppl., pl. 60, 1935.

This form ranges through Nepal, Sikkim, Bhutan, Assam, Upper Burma, and Tonkin.

It is distinguished from other forms by the length of its winter coat and the abundance of long underwool; the color of the body varies from jet black to tawny or gray (Pocock, 1933, p. 1030).

"The Binturong appears to be rare in Northern India." Specimens are recorded from Assam; from Endwagyi Lake, in Myitkyina, Upper Burma; from Fouine, Tonkin; and from Lower Laos. Only one skull appears to be known. (Pocock, 1933, pp. 1016-1017, 1030.)

"Mr. W. L. Selater says that it is found even as far west as Simla" (Lydekker, 1900, p. 334).

Javanese Binturong

ARCTICTIS BINTURONG PENICILLATUS Temminck

(Original reference not found; not in Sherborn; cf. Temminck, Monographies Mammalogie, vol. 2, p. 310, 1841. Possibly the name was first published by Temminck sometime prior to 1825 in the prospectus of his "Monographies" (cf. Valenciennes, 1825, p. 57, footnote). Pocock's citation (1933, p. 1031), "Temminck, Mon. Mamm. ii. p. 18, 1835," is evidently erroneous; he gives "Java" as the type locality.)

Figs.: Ann. Sci. Nat., vol. 4, pl. 1, 1825; Coomans de Ruiter, 1932, p. 54, fig. 12.

The range of this form is Java and Borneo.

It is distinguished from *A. b. binturong* by its smaller skull and generally lighter color; pale annulation of the hairs extensive and profuse (Pocock, 1933, p. 1031). Head and body, 960 mm.; tail, 890 mm. (Schwarz, 1911, p. 636).

Java.—Temminck (1841, vol. 2, p. 311) was inclined to consider the Binturong the rarest of the mammals of Java and Sumatra. The species is "apparently rare in Java" (Shortridge, in Thomas and Wroughton, 1909, p. 386).

Heynsius-Viruly and Van Heurn write (1936, p. 63):

Few data were received concerning this animal. It was observed in Java in the vicinity of Madjalengka and near the border of Tomo

The binturong is often seen in the Midangan mountains, but it is much scarcer on the Andjasmoro. None were seen there for the past two years. . . .

Owing to his size, his striking color, his pretty fur and his rather sluggish motions, the binturong is doomed to be soon exterminated, unless very stern measures are taken. It occurs on all the Greater Sunda Islands, but is nowhere common. . . . Young animals become very tame and affectionate in captivity.

This pretty animal . . . should be intensively protected.

Borneo.—"These animals are common in parts of Borneo, usually living in the dense forest, but when in search of fruit they will often visit gardens" (Hose, 1893, p. 24).

Schwarz (1911, p. 636) mentions specimens from Sandakan and La Datu, North Borneo, and from Sarawak. Pocock (1933, p. 1031) records others from Mount Mulu, Mount Dulit, and Saribas in northern Borneo. In the Western Division of Borneo the Binturong is not rare, and specimens are frequently kept in captivity (Coomans de Ruiter, 1932, p. 54).

Palawan Binturong

ARCTICTIS BINTURONG WHITEI J. A. Allen

Arctictis [sic] *whitei* J. A. Allen, Bull. Am. Mus. Nat. Hist., vol. 28, p. 15, 1910. ("Iwahig, Palawan, Philippine Islands.")

This form is apparently restricted to Palawan.

It is closely related to *A. b. penicillatus*, but has a smaller skull; general color black, strongly washed with fulvous; hairs of nose and facial region tipped with whitish; neck all round and terminal fifth of tail black; ears narrowly bordered with white or yellowish. Head and body, 700 mm.; tail, 610 mm. (J. A. Allen, 1910, p. 15.)

Only about four specimens of this form seem to be on record (Taylor, 1934, p. 357).

Fossane; Lesser Fossa

FOSSA FOSSA (Schreber)

Viverra Fossa Schreber, Säugthiere, vol. 3, pl. 114, 1776, and p. 424, 1777.

(Based upon "la Fossane" of Buffon (Hist. Nat., vol. 13, p. 163, pl. 20, 1765); type locality, "Madagascar.")

SYNONYM: *Fossa daubentonii* Gray (1865).

FIGS.: Buffon, *op. cit.*, pl. 20; Schreber, *op. cit.*, pl. 114; J. E. Gray, 1873, pl. 74.

This endemic viverrid of Madagascar is accorded special protection as a Class A species under the London Convention of 1933.

The ground color is light ashy gray, slightly washed with reddish; stripes and spots blackish brown; breast, belly, and legs gray; tail gray, incompletely ringed with brown (Schreber, 1777, p. 424). Gray (1873, p. 872) gives the following description: "Brown or reddish, closely grizzled with an abundance of white hairs, with four rows of more or less confluent black spots on each side of the back, a few black spots on the hinder thighs. The chin, neck, and belly whitish, more or less obscurely spotted." Daubenton (in Buffon, 1765, p. 166) gives the following measurements: head and body, 17 inches; tail, 8½ inches.

Our information concerning this animal is very meager. According to Buffon (1765, p. 164), in captivity it eats flesh and fruit and is especially fond of bananas.

The Mission Zoologique Franco-Anglo-Américaine of 1929-1931 obtained 13 specimens (Delacour, 1932, p. 220).

"The striped civet of the humid forest is apparently entirely nocturnal Though fairly common" 20 kilometers west of Vondrozo, "as we found by trapping, none was seen in the daytime.

"Three stomachs from near Vondrozo and one from near Maroantsetra all contained insect matter and one contained also a lizard The striped civet was known as 'fanaloka' amongst the Atamoor in the southeast." (Rand, 1935, p. 93.)

Family PROTELIDAE: Aard-wolves

The single genus of this family contains one species, which has been divided into half a dozen subspecies. They range over southern and eastern Africa. All come within the scope of this work.

Aard-wolf. Maanhaar Jackal (Boer). Faux-loup; Loup de terre (Fr.). Zibethyäne (Ger.)

PROTELES CRISTATUS (Sparrman)

Viverra cristata Sparrman, Resa till Goda Hopps-Udden, vol. 1, p. 581, 1783. (Near Little Fish River, Somerset East, Cape Province.)

FIGS.: Cuvier, Règne animal, disciples' ed., Mamm., atlas, pl. 40, fig. 3, 1836-1849; Proc. Zool. Soc. London 1869, pl. 36; W. L. Sclater, 1900, vol. 1, p. 81, fig. 21; Anderson and de Winton, 1902, pl. 28; Derscheid, 1925, pl. A; Pocock, 1937, p. 758, fig.

The Aard-wolf is of particular scientific interest as the sole representative of the family Protelidae; and it has been accorded rigid protection as a Class A mammal under the London Convention of 1933.

Six subspecies have been proposed, as listed below, but since their distributional limits have not been worked out, all will be included in this account of the species as a whole.

Proteles cristatus cristatus (Sparrman). Cape Aard-wolf. (Type locality as given above.)

Form hyenalike; general color dirty yellowish gray, with projecting coarse hairs, black and white; an erectile black mane from nape to tail; seven to nine transverse black stripes on sides; upper parts of limbs with indistinct black bands; feet black; face, lower jaws, and chin brown; tail yellowish at base, rest black. Head and body, 32 inches; tail without hairs, 6 inches. (W. L. Sclater, 1900, vol. 1, pp. 80-81.)

Proteles cristatus pallidior Cabrera, Ann. Mag. Nat. Hist., ser. 8, vol. 6, p. 464, 1910. Nubian Aard-wolf. ("Suakim," Anglo-Egyptian Sudan.)

General color pale yellowish cream; body hairs unicolored; cheeks and sides of neck not rufous as in true *cristatus*; mane with very little black; feet brownish, not black; tail black only at tip (Cabrera, 1910, p. 464).

Proteles cristatus septentrionalis Rothschild, Novit. Zool., vol. 9, p. 443, 1902. Somali Aard-wolf. ("Somaliland.")

Creamy white, washed with buff on neck and sides of rump; stripes less defined than in *cristatus*; mane black, variegated with creamy white (W. Rothschild, 1902, p. 443).

Proteles cristatus termes Heller, Smithsonian Misc. Coll., vol. 61, no. 13, p. 9, 1913. Masailand Aard-wolf. ("Headwaters of the Amala River west of the Loita Plains, British East Africa.")

Interorbital region black, crown grizzled, feet black, and ears blackish as in *cristatus*; body stripes narrow; ground color grayish fulvous; tail black on terminal third; muzzle and chin black; throat grayish buffy. Head and body, 680 mm.; tail, 310 mm. (E. Heller, 1913b, p. 9).

Proteles cristatus transvaalensis Roberts, Ann. Transvaal Mus., vol. 15, pt. 1, p. 6, 1932. Transvaal Aard-wolf. ("Roodekuil, Pretoria," Transvaal.)

Pale buffy; face, bands on limbs and body, and distal third of tail dark brown; mane rufous-white, the hairs with three brown bands and blackish tips. Head and body, 650 mm.; tail, 270 mm. (Roberts, 1932, p. 6.)

Proteles cristatus harrisoni Rothschild, Novit. Zool., vol. 9, p. 443, 1902. Angola Aard-wolf. ("Umpata, Mossamedes district, S. Angola.")

Head white, grizzled with black; body pale orange rufous; stripes less developed than in other races; mane and tail black, variegated with rufous (Rothschild, 1902, p. 443).

The species as a whole has a wide range over southern and eastern Africa, from Cape Province and Natal north to Angola, Northern Rhodesia, and Anglo-Egyptian Sudan. It is apparently absent along the low-lying east coast from the Transkei district of Cape Province to Portuguese East Africa. (Shortridge, 1934, vol. 1, p. 150.)

Anglo-Egyptian Sudan.—Specimens have been recorded from the vicinity of Suakin (Anderson and de Winton, 1902, p. 198; Cabrera, 1910, p. 465) and from the Blue Nile (Butler, in Maydon, 1932, p. 151).

Eritrea.—This animal is rather widespread, if not common, in the greater part of the country, especially in the southwest (Zammarano, 1930, p. 77).

Ethiopia.—It is "common on the lowlands and foot hills wherever white ants abound" (Wylde, 1901, p. 485).

British Somaliland.—"The aardwolf is found sparsely scattered throughout Somaliland. They are almost invariably seen alone." (Drake-Brockman, 1910, p. 38.)

Italian Somaliland.—Recorded by De Beaux (1935, p. 12).

Kenya.—Hollister (1918, pt. 1, p. 138) lists specimens from the following localities: Kabalolot Hill, Sotik; Northern Guaso Nyiro River; Telek River, Sotik; and Ulukenia Hills.

Tanganyika Territory.—Recorded from Tabora (Matschie, 1895, p. 62).

Northern Rhodesia.—"I am reliably informed that specimens have been obtained at Tara and Kalomo in the Batoka Province. Elsewhere the natives do not seem to have heard of it." (Pitman, 1934, p. 162.)

Southern Rhodesia.—It ranges rather sparsely over this country (western Matabeleland, etc.) (Shortridge, 1934, vol. 1, p. 150).

Transvaal.—"In the Eastern Transvaal the Aard Wolf is not found in the low-veld proper; it occurs in the more open country among the foothills of the Drakensberg at a height of over 1,500 feet" (Hamilton, in Shortridge, 1934, vol. 1, p. 150). A specimen is recorded from Potchefstrom (W. L. Sclater, 1900, vol. 1, p. 82).

Natal.—"It is fairly common in Natal" (Warren, in Shortridge, 1934, vol. 1, p. 150).

Cape Province.—The Aard-wolf is reported as not uncommon throughout the colony (W. L. Sclater, 1900, vol. 1, p. 81).

Bechuanaland.—"The Kalahari Sand-Plains" are "perhaps the regions in which it is most plentiful. . . . The karross-making tribes in Bechuanaland . . . are said to procure most of their aard wolf skins with the aid of dogs." (Shortridge, 1934, vol. 1, p. 150.)

As many as 14 have been seen together in the Kalahari (Langdon, in Shortridge, 1934, vol. 1, p. 151).

South-West Africa.—"Proteles is widely distributed throughout South-West Africa; nowhere very abundantly. It is apparently rather scarce along the valley of the Orange River, and northwards in the neighbourhood of the Okavango and in the Caprivi. . . .

"The Aard Wolf is fairly plentiful around Gobabis and in the sand-plains generally; and is also familiar in Namaqualand, Damaraland, the Kaokoveld, Ovamboland, and the Namutoni Game Reserve." (Shortridge, 1934, vol. 1, pp. 149-150.)

Angola.—It is rather common in the south of Angola but much rarer in the north. A skin was brought in to Vila da Ponte, where the animal was unknown to the natives. (Monard, 1931, p. 66, and 1935, p. 228.) The type locality of the subspecies *harrisoni* is Um-pata in the Mossamedes district.

Economic status.—"The coat is very handsome, and . . . its skin is more sought after [than that of the hyenas] by some of the native tribes—notably the Bechuanas, who hunt and trap it systematically" (Bryden, 1899, p. 599).

"Sparrman and other authors who have examined the stomachs

of these animals, found that they contain nothing but termites or white ants; this is further confirmed by Mr. Cloete, who writes that he has examined the stomachs of more than fifty, and never found any trace of anything else than a purely insectivorous diet, ants being the chief constituent." However, farmers report that this species kills kids and lambs merely for the sake of the milk contained in their stomachs. (W. L. Sclater, 1900, vol. 1, p. 82.)

The food consists of insects—particularly termites, locusts, beetles, and grubs. The animal has been accused of killing lambs and kids,



FIG. 27.—Aard-wolf (*Proteles cristatus* subsp.)

but evidently without justification and through confusion with the Jackal. Its weak dentition is sufficient evidence of its harmlessness in respect to livestock. Yet, despite its inoffensive nature and the distinct service it performs in destroying such agricultural pests as termites, it was, in former years, officially listed by several governments as "harmful," and a bounty of half a pound sterling was paid in the Cape Province for each Aard-wolf killed. (Derscheid, 1925, p. [78].)

It feeds to some extent on "small rodents, reptiles, and the nestlings and eggs of ground-nesting birds" (Shortridge, 1934, vol. 1, p. 151).

In South Africa generally it is subjected to a great deal of irresponsible persecution, and is becoming scarce in farming and other settled districts. However, it is in no immediate danger of actual extermination. (G. C. Shortridge, *in litt.*, October 14, 1937.)

Although normally the animal has no unpleasant odor, it is able to eject an evil-smelling fluid from its anal glands as a defense against such enemies as dogs.

Family FELIDAE: Cats

This family is nearly cosmopolitan, but it does not occur naturally in Greenland, the eastern Malay Archipelago, or Australasia. Twenty or more genera are recognized by some authorities, and there are probably more than 250 forms. Dr. Allen discusses 12 North American forms in the preceding volume (1942), while 27 Old World forms are dealt with in the following pages. Man's prejudice against some of the larger members of the cat family (such as Lions, Tigers, Leopards, and Cougars) is linked with his necessary efforts to defend himself or his livestock from their attacks.

Fossa

CRYPTOPROCTA FEROX Bennett

Cryptoprocta ferox Bennett, Proc. Zool. Soc. London 1833, p. 46, 1833. ("Madagascar.")

FIGS.: Bennett, 1834, pl. 21; Schreber, Säugthiere, suppl. vol. 2, pl. 125CC, 1841; Schlegel and Pollen, 1868, pl. 8; Proc. Zool. Soc. London 1895, pl. 26; Beddard, 1902, p. 405, fig. 199; Elliot, 1907, p. 397, fig. 43; Kaudern, 1915, pl. 3, fig. 2; Sibree, 1915, pl. facing p. 302; Pocock, 1937, p. 760, fig.

This largest carnivore of Madagascar occurs in limited numbers and will probably require protection if it is to survive in the dwindling forests of that great island. It is an endemic species.

Since Bennett's type specimen was distinctly immature, the following description of an adult male is derived from Schlegel and Pollen (1868, pp. 13-14). Hairs of upper parts ringed with brown and pale reddish yellow; lower parts of head and body uniform reddish yellow, taking on a strong rusty tint toward the middle of the venter. Total length, 56 inches; tail, 26 inches.

Bennett (1834, p. 140) quotes Charles Telfair as follows: "It is the most savage creature of its size I ever met with: its motions and power and activity were those of a tiger: and it had the same appetites for blood and destruction of animal life."

Milne Edwards and Grandidier write (1867, p. 317) that it occurs rather commonly on the west coast, from the River Mangouke [Mangoky] northward. Three specimens were secured between Morondava and Manharrive [Maharivo?]. The animal often carries off goats and especially kids.

This animal is very carnivorous and is endowed with great strength. It is dangerous to man only when wounded or in rut. At other times it steadily flees from man. At the mating season

it is often seen in bands of four to eight individuals. It is said to be fond of lemurs and to pursue them in trees. It is also destructive to poultry, young pigs, and other domestic animals. The natives really fear this species, but they enjoy its flesh. (Schlegel and Pollen, 1868, pp. 15-16.)

According to Milne Edwards and Grandidier (1875a, p. 341, footnote), this is the only native animal of Madagascar that the Sakalava (a western tribe) have been able sometimes, but very rarely, to train for hunting the Wild Hog (*Potamochoerus larvatus*).

Kaudern states (1915, pp. 79-80) that *Cryptoprocta* appears to be distributed over the entire island and that it is probably nowhere

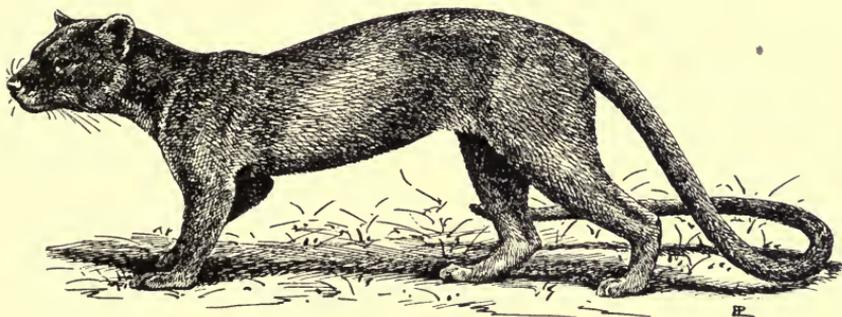


FIG. 28.—Fossa (*Cryptoprocta ferox*). After photo in Brehm.

rare. In northwestern Madagascar it was very common. He saw the animal three times in the wild at Ste. Marie de Marovoay on the Betsiboka River, and its tracks were observed everywhere in the sand. One was killed there in a poultry yard. Another was secured at Katsepe on the Bay of Bombetoke, and two live young ones were brought in by natives at Andranolava, in north central Madagascar. Black individuals are reported from the interior and from the great rain forests on the east coast.

According to Sibree (1915, pp. 302-303), the northwest coast is the animal's "special habitat. This creature is called by the people, Fòsa . . . , and although small is very ferocious Examples of the fòsa have been seen in the outskirts of the upper belt of forest on the east side of the island A specimen I once saw was of a beautiful black colour, but I believe this was only a variety, and not a distinct species from the brown animal. The fòsa is much dreaded by the Malagasy, and, from its mode of attack, appears to be like an immense weasel, attacking large animals, such as the wild boar and even oxen."

G. M. Allen (1918, p. 514) records a specimen from the vicinity of Tuléar.

Petit (1931, p. 588) records a female and its three young ones captured in 1922 in the region of Tamatave, and two young ones taken in the region of Fénériver on the east coast.

The Mission Zoologique Franco-Anglo-Américaine of 1929-1931 secured 6 specimens of this species, as compared with 13 specimens of *Fossa fossa* (Delacour, 1932, p. 220).

Rand (1935, pp. 93-94) says:

The fossa inhabits the rain forest of the east and the dryer forest of the west at least as far south as Tabiky [inland from Cape St. Vincent], and was well known to the natives. [Two were seen near Tsarakibany and Maromandia during the daytime, though the natives said it was nocturnal.] This viverrid was much disliked by the natives because of its raids on their fowls. Twice I saw fossa skins in the possession of natives, but this was probably due to European influence as the natives rarely use mammal skins for any purpose. One large fossa was brought to me that had been run down with dogs and speared. From the natives we heard no accounts of its attacking sheep or young cattle and its reputation in literature for ferocity and the fear with which it is regarded by the natives is exaggeration. My gun boy had a particular antipathy for it because, he said, in his country near Vondrozo, where the dead are walled up in caves, the fossa sometimes dug out the corpses and fed on them. The natives universally called it "fossa."

**European Wildcat. Chat sauvage (Fr.). Wildkatze (Ger.).
Gato montés; Gato salvaje (Sp.). Gatto selvatico (It.)**

FELIS SILVESTRIS SILVESTRIS Schreber

Felis (Catus) silvestris Schreber, Säugthiere, vol. 3, p. 397, pls. 107A, 107 Aa, 1777. (Germany.)

Figs.: Gervais, Hist. Nat. Mammif., pt. 2, pl. 17, 1855; Blasius, 1857, p. 162, fig. 101; Elliot, 1883, pl. 30; Royal Nat. Hist., vol. 1, pl. facing p. 422, 1893-94; Hamilton, 1896, frontisp.; Martin, 1910, pl. 27; Cabrera, 1914, pl. 9, fig. 1; Zeitschr. f. Säugetierk., vol. 7, pl. 7, fig. 7, 1932; Colosi, 1933, p. 55, fig.; Didier and Rode, 1935, p. 283, fig. 163; Schmidt, 1938, pl. 5.

The typical European Wildcat shows a very general and marked recession in France and central Europe, amounting to extirpation in many parts of its former range. Apparently its chief remaining stronghold is in the Balkan countries.

More definite light is needed on the question as to whether interbreeding with feral Domestic Cats takes place at all or on a sufficient scale to menace the Wildcat's survival as a pure-bred species. Fatio states (1869, p. 276) that hybrids are sometimes met with in Switzerland, and that he has examined a number of specimens; the pelage, he adds, is often spotted with white. Ferrant (1931, p. 62), in discussing the Wildcat in Luxembourg, says that it mates frequently with feral Domestic Cats. Prof. M. Hirtz refers (*in litt.*, December, 1936) to hybrids in Yugoslavia, and the National Council for Nature Protection does likewise (*in litt.*, October, 1936) in Poland. On the other hand, Pocock (1907, pp. 165-166) is rather skeptical in regard to the alleged interbreeding.

Hamilton speaks rather emphatically in his monograph (1896, p. iv): "On a careful examination of a number of examples of the Wild Cat of the present time I found many indications of a mixture of the two races.

"It would seem as if the original Wild Cat, as it existed in the olden days, has been almost exterminated throughout Europe, and that its place has been taken by a mongrel race, the result of continual interbreeding during many centuries (2000 years) of the Wild and the imported Domestic Cat."

The Wildcat is slightly larger than the Domestic Cat; fur longer, this being especially noticeable in the tail; general color approaching the smoke gray of Ridgway; dark markings on sides and legs tending to be faint, brownish, and ill-defined; tail, abruptly rounded at the black tip, with two to four more or less complete black rings; tip of ear slightly blackish. Head and body, 481-545 mm.; tail, 309-310 mm. (Miller, 1912, pp. 457-463.) Head and body, 450-700 mm.; tail, 200-300 mm. (Didier and Rode, 1935, p. 284).

The typical subspecies ranges from northern Spain, France, and northern Germany eastward to Poland and Russia, and southward to Italy and the Balkan Peninsula.

In Spain it inhabits the Pyrenean, Cantabrian, and north central districts, and it may extend to northern Portugal. Probably the Douro and the Ebro constitute its southern limits. (Cabrera, 1914, p. 204.) "Curiously enough there is no specimen in the Museums of Ponferrada, Lugo, and Santiago. I was left in doubt as to whether the wild cat occurs in the Sierra de Picos, in Galicia, or in the Picos de Europa." (Gadow, 1897, p. 367.)

In France, where it was formerly very common, the Wildcat is at present in the process of disappearing, but may still be met with in certain regions, such as the Ardennes, the Forest of Orleans, the Pyrénées-Orientales, and the Forest of Carnelle. It preys upon rabbits, hares, squirrels, rats, young Roebucks and Wild Boars, grouse, partridges, and pheasants, and even eats fishes. It is a very injurious animal, which one need not hesitate to destroy. (Didier and Rode, 1935, p. 287.)

Hunting has contributed in part to its depletion in France, but does not explain this altogether. The species is very much in danger, and we do not think that protective measures can be effective. (E. Bourdelle, *in litt.*, March 6, 1937.)

In Belgium the species has become very rare, but still exists in some forests in the Province of Luxembourg. It is systematically destroyed as an injurious animal, while another cause of depletion is deforestation. Total protection ought to be adopted. (Musée Royale d'Histoire Naturelle de Belgique, *in litt.*, September, 1936.)

In the Grand Duchy of Luxembourg the Wildcat is rather common in the extensive forests of the Ardennes, in the environs of Echternach, Grevenmacher, Manternach, and Fischbach, in the Grünewald, etc. (Ferrant, 1931, p. 61).

In The Netherlands the species was long since exterminated (Van den Brink, 1931, p. 174).

In Germany the Wildcat has survived better than the larger carnivores; it occurs in very small numbers in the Bavarian mountains, the Black Forest, the Odenwald, and the Riesengebirge. From 1850 to 1860 ten animals were killed in Gotha; in 1885-86, two in Silesia; in 1928 an unquestionably pure-blooded male was taken in the Harz Mountains, and in the same year a male in the Kurische Nehrung. (Krumbiegel, 1930, pp. 5-6.) The Wildcat is still regularly observed in the Eifel, in the Moselle Mountains, and in the Hunsrück, and there is one from the Pfalz in the Köln Zoological Garden (Hauchecorne, *Zeitschr. f. Säugetierk.*, vol. 9, p. 4, 1934). The animal is almost exterminated in Germany, and is protected as a natural monument (Internationale Gesellschaft zur Erhaltung des Wisents, *in litt.*, October, 1936).

In Denmark bones of the Wildcat have been found in kitchen middens, but there is no record within historical times (Winge, 1908, p. 116).

In Switzerland it appears to have been abundant in the sixteenth century and was then the object of much hunting; but it had become rare by the beginning of the nineteenth century. In the 1860's some were killed each year in the Alps and the Jura, and a few were still found in the cantons of Bern, Lucerne, Unterwalden, Uri, Schwyz, Glarus, Thürgau, and Valais. The most were found in the Jura region, from Geneva to Basle. The species seemed to have disappeared from Ticino. (Fatio, 1869, p. 275.) During the last decades it has become very rare and is probably extinct, although it is possible that a few survive in the forests of the Alps and the western Jura (Federal Forest, Game, and Fish Inspection, Bern, *in litt.*, March, 1937).

Wildcats have almost disappeared from northern Italy, and are rare everywhere except in the Maremma, in the southern provinces of Gargano, and in Calabria (Colosi, 1933, p. 56). [The animal of the Tuscan Maremma is regarded by Martorelli (1896, p. 266) as identical with the Sardinian Wildcat (*Felis sarda*).] The Wildcat still occurs in the Sila Mountains of Calabria (Hecht, 1932, p. 23). According to the Laboratorio di Zoologia Applicata a Caccia (*in litt.*, September, 1936), the animal is scattered through Sicily as well as the Italian Peninsula; in legislation it is rated as a harmful species.

In former times it was probably found everywhere in Austria. It is now exterminated in Burgenland but is said to survive in

Rosenbachthal in Carinthia. In 1926 two specimens were killed in the district of Völkermarkt, Carinthia. In Lower Austria the last one was killed in 1912. The species is no longer found in Salzburg. In the Tyrol 26 specimens are said to have been shot in 1876. By 1888 it was almost exterminated in northern Tyrol, but was considered more frequent in southern Tyrol. In Vorarlberg it was reported as late as 1918, but has now disappeared. (G. Schlesinger, *in litt.*, March, 1937.)

Within the boundaries of the present Hungary it was common before World War I, but is now decreasing. It has no legal protection. It is also found in the northern part of the former Hungary (now Czechoslovakia), but not together with the Lynx. (J. Schenk, *in litt.*, November, 1936.)

In comparison with its status in most other parts of Europe, the Wildcat is comparatively common in Yugoslavia. Considerable numbers are found only in certain regions, and especially in the enormous oak forests of Slavonia. The statistics are uncertain, since they probably include hybrids and feral Domestic Cats. The reported annual kill from 1891 to 1921 was about 500 to 1,000 specimens, reaching a maximum of 1,207 in 1904. The minimum kills were 420 in 1918 and 331 in 1931. These figures pertain chiefly to Croatia and Slavonia. (M. Hirtz, *in litt.*, December, 1936.) In northwestern Croatia the animal is rare near Jasenak and near Otočac (Wettstein, 1928, p. 35).

Lord Lilford wrote of frequently meeting with Wildcats in the Province of Epirus, near the boundary between Albania and Greece (Hamilton, 1896, p. 35).

The Wildcat is found throughout Greece except on the islands. A decrease has been observed, but there is no danger of extermination. (Game Department, Ministry of Agriculture, Greece, *in litt.*, October, 1936.) (The Wildcat of the Peloponnesus is discussed on a subsequent page, under the name of *Felis silvestris morea*.)

Turkey is included in the range by Blasius (1857, p. 166).

In Bulgaria the Wildcat occurs in considerable numbers and is in no danger of extermination. The skins are marketed locally. (Bulgarian Game Association "Sokol," *in litt.*, February, 1937.) H. W. Shoemaker (*in litt.*, June 30, 1932) is of the opinion that the Wildcats in this country are being rapidly destroyed.

The species is common in Rumania, occurring in nearly all forests of greater or lesser altitude; it is also frequently found in the lowland forests (District of Ilfo) and in the flood lands of the Danube (Calinescu, 1930, p. 366).

In Poland it occurred formerly from the Carpathians to the Baltic but is now met with chiefly in the eastern Carpathians; it is also found in the forests along the Dniester (Zurawno, Stanis-

lawow) and in Podolia. It is nowhere common (Niezabitowski, 1934, pp. 190-191). By 1936 the species was considered restricted to the Carpathians, where its numbers are roughly estimated at 300. It is protected from February 1 to September 30. (M. Siedlecki and National Council for Nature Protection, Poland, *in litt.*, October, 1936.) The proposed International Tatra Park and the proposed International Park of Poland, Czechoslovakia, and Rumania will, it is hoped, provide absolute protection for the Wildcat and other species (Benedyct Fuliński, MS., 1933).

The following summary of the Wildcat's status in Russia is derived from Ognev (Ogneff, 1930, pp. 55-58). The information is fragmentary and suffers from lack of material. Pallas (1811-1831) denied the animal's existence throughout Russia except in the Caucasus. Georgi (1800) reported it in the southwestern governments, on the Dniester, and in the central Urals (Bashkiri). Brandt (1853) believed in an early, much wider distribution, as far as the central governments and perhaps to the Urals. Kessler (1856, 1858) records the Wildcat in Volhynia and Podolia. In 1854 it was reported in the Governments of Grodno, Vitebsk, and Kovno. Sabaneeff (1878) considered the Government of Minsk the center of its distribution in western Russia. According to Charlemagne (1920), it is now very rare in Volhynia and in the vicinity of Odessa and Tiraspol (Government of Kherson). Old reports from central and northern Russia in the latter part of the past century may have been based upon feral Domestic Cats. The question as to whether the Wildcat ever occurred in the Urals is unsolved.

On the subject of general depletion Elliot comments (1883, text to pl. 30): "Various are the causes that have effected this; probably the chief one is the constant persecution to which the animal has been subjected, as this species has but few friends, and no quarter is shown when it is met with in the forest."

Hamilton (1896, pp. 31, 95) remarks on the spread of the Domestic Cat with the increase of the human population, and the resulting interbreeding with the Wildcat, as possibly a chief factor in the disappearance of the pure-bred wild animal in Europe generally.

British Wildcat

FELIS SILVESTRIS GRAMPPIA Miller

Felis grampia Miller, Ann. Mag. Nat. Hist., ser. 7, vol. 20, p. 396, 1907. ("Invermoriston District, Inverness, Scotland.")

FIGS.: Millais, 1904, pls. facing pp. 166, 170, 172, 174, 178; Pocock, 1937, p. 777, fig.

The British Wildcat formerly occurred throughout Great Britain but is now restricted to the wilder portions of Scotland (Miller, 1912, p. 464).

It is like *Felis silvestris silvestris* of continental Europe, but the general color is darker, approaching broccoli-brown; dark markings on sides and legs tending to be extensive, blackish, and well defined; upper side of feet and inner surface of hind legs ochraceous-buff, under side of body duller; intercrural and pectoral white areas well defined; middle of chest mottled with black; dark markings on tail, legs, and upper parts similar to, but more definite than, those of *F. s. silvestris* (Miller, 1912, p. 464). Males: head and body, 558-660 mm.; tail, 280-355 mm. Females slightly smaller. (Millais, 1904, p. 170.)

The following account is condensed from Millais (1904, pp. 170-180). It is not known when the Wildcat became extinct in southern and central England, but it probably lingered until the forests were cleared. In Wales it may have survived till about the end of the nineteenth century. Approximate dates of last records in England are: Yorkshire, 1840; Lake District, 1843. In churchwardens' accounts and other records there is mention of bounties paid for Wildcats in the sixteenth, seventeenth, eighteenth, and even nineteenth centuries.

Last dates in certain counties of Scotland are: Berwickshire, 1849; Dumfriesshire, Wigtown, and Kirkcudbright, about 1832; Dumbarton, 1857; Perthshire, 1870-71; Aberdeenshire, 1891; Forfar, Kincardine, Banff, Elgin, and Nairn, practically extinct since 1850. "Northern and western Inverness is, with western Ross-shire, the main stronghold of the Wild Cat to-day." Up to 1904 William Macleay, of Inverness, annually received eight or ten specimens, chiefly from Glenmoriston and Balmacaan, west of Loch Ness. "In Sutherland the Duke of Sutherland does not allow the slaughter of Wild Cats to take place," and the animals are on the increase in certain parts. In Caithness the species was never common but was reported as occasional until 1845, and it evidently survived to a somewhat later date.

The Wildcat's prey includes poultry, lambs, and roe fawns. But since it keeps down certain animals—such as grouse, hares, and rabbits—that are considered undesirable in deer forests, it receives protection from the sportsmen who control these forests.

According to the minutes of a meeting of the Society for the Preservation of the Fauna of the Empire in October, 1922, "a circular to owners and tenants of deer forests in Scotland, asking them to protect wild cats and martens, had been well received." Several years later it is reported that "we get very gratifying reports in regard to the preservation by land owners of wild cats and pole cats" (Onslow, 1929, p. 7).

"Mr. N. B. Kinnear remarked that the wild cat was now not rare in the north of Scotland, and a good account of its increase and

spread was given by the late Mr. J. G. Millais in 'The Times' of 26 October 1926. According to that article the wild cat reappeared in Inverness-shire, from north of the Caledonian Canal, about 1912 and, after becoming established round Lochs Ericht and Laggan, spread farther south into Perthshire, where one was killed at Murthly, twelve miles from Perth, in 1925.

"Mr. Kinnear further stated that owing to the increase of tree planting the safety of the wild cat appeared to be assured, as it had taken to the young plantations on account of the rabbits and, where the plantations were under the charge of the Forestry Commission, the cats were encouraged, as they helped to keep down the rabbits." (Kinnear, 1934, p. 68.)

"The War granted a respite to the Carnivora, and the Wild Cat, which but for that event would probably have been exterminated by now, increased in numbers. But now the persecution of this animal and other carnivores is in full swing again; and apart from a slight possibility of help coming from the third cause of change, dealt with below [planting of thousands of acres in the Highlands with conifers], it is probable that the Wild Cat will be brought to the verge of extinction again before long." (Hinton, 1935, pp. 33-34.)

Peloponnesian Wildcat

FELIS SILVESTRIS MOREA Trouessart

[*Felis catus*] *morea* Trouessart, Cat. Mamm., quinq. suppl., fasc. 1, p. 273, 1904. (Based upon the "*Felis catus ferus* L. var. *e* Morea" of Reichenbach, Vollständigste Naturgeschichte, Raubsäugethiere, p. 362, 1852, *ex* Bory de Saint-Vincent, Expéd. Sci. Morée, atlas, ser. 3, zool., pl. 1, A, 1833; type locality, as restricted by Harper (1940, p. 194), "above Dragomanou, near Mt. Diaphorti, west central Morea (Peloponnesus), Greece.")

FIGS.: Bory de Saint-Vincent, Expéd. Sci. Morée, atlas, ser. 3, zool., pl. 1, A, 1833; Reichenbach, Praktisch-gemeinnützige Naturgeschichte, Kupfer-sammlung, pt. 1, Raubsäugethiere, pl. 80, fig. 639, 1837(?).

This form of southern Greece, while evidently less common than formerly, does not seem to be threatened with extinction and is included here chiefly for the purpose of rounding out the picture of the European Wildcats.

It differs from *F. s. silvestris* in its generally isabelline coloration, in the absence of distinct stripes on the sides, and in having the black rings on the tail straight and clearly defined; lateral stripes replaced by irregular brownish-rufous marblings; feet unspotted (Trouessart, 1910, p. 100).

Bory de Saint-Vincent states (1836, vol. 1, p. 396) that among the oak-dotted pastures of the type locality near Mount Diaphorti the Wildcats occur in larger numbers than elsewhere. Here he collected the type specimen from the high branches of an oak.

According to Geoffroy (in Bory de Saint-Vincent, 1833, vol. 3, pt. 1, zool., p. 13), the animal is very common in certain mountainous parts of Arcadia, especially in the Canton of Karytaena and on the slopes of Mount Diaphorti. It is destructive to poultry, small birds and mammals, and partridges.

The Game Department, Greek Ministry of Agriculture, reports (*in litt.*, October, 1936) a general decrease in the numbers of Wildcats in Greece.

[The Spanish Wildcat (*Felis silvestris tartessia*¹) inhabits the Iberian Peninsula south of the Douro and the Ebro, and still abounds in the wilder parts. While interbreeding with feral Domestic Cats probably takes place, no evidence of it has been found. (Cabrera, 1914, pp. 205-206.)

The Caucasian Wildcat (*Felis silvestris caucasicus*²) occurs in all the mountain forests and in the greater part of the forested lowlands of the Caucasus region. It is generally reported as very common. (Ognev, 1930, p. 58.)]

Cretan Wildcat. Chat sauvage de Crète (Fr.)

FELIS AGRIVUS Bate

Felis ocreata agrivus Bate, Proc. Zool. Soc. London 1905, pt. 2, p. 317, 1906. (Type skin bought in the bazaar at Khania, Crete.)

This species, which is confined to the island of Crete, may be in danger of extinction by "dilution," consisting in this case of interbreeding with feral Domestic Cats.

The general color is yellowish gray; no black markings on body or legs, but indications of brownish shoulder stripes and dorsal stripe; tail with black tip and two or three black subterminal rings; ear blackish at tip (Miller, 1912, p. 470).

Raulin (1869, p. 1033) records the species from the woods of the lower zones.

"Hybrids between *F. o. agrivus* and the domestic cat of the island appear to be not uncommon, and this can easily be accounted for by the fact that formerly small villages were often totally deserted for a considerable time, or possibly entirely, during the insurrections which occur so frequently in Crete, when the cats, as well as the villagers, are forced to take to a life in the hills. Skins of these hybrids, which are generally of large size like the true wild race, may often be seen hanging up in the bazaars at Khania and Candia." (Bate, 1906, p. 318.)

¹ *Felis tartessia* Miller, Ann. Mag. Nat. Hist., ser. 7, vol. 20, p. 397, 1907. ("Coto Doñana, near Jerez de la Frontera, [Huelva,] Spain.")

² *Felis catus caucasicus* Satunin, Mitteil. Kaukas. Mus., vol. 2, pts. 2-4, pp. 154 (Russian) and 316 (German), 1906. (Caucasus region.)

The same author (in Trevor-Battye, 1913, p. 255) refers to the Cretan Wildcat as "not uncommon in the island."

The Game Division, Forestry Department, Greek Ministry of Agriculture, seems to consider (*in litt.*, March, 1937) that this animal is derived from Domestic Cats which the inhabitants left when they had to flee during the war of independence, and also from those left by the departing Turks when the exchange of populations took place after 1922.

It may be added that Pocock (1907, pp. 151, 160) evidently believes that the type specimen was a Domestic Cat or a feral representative of one.

Corsican Wildcat. Chat sauvage de Corse (Fr.)

FELIS REYI Lavauden

Felis reyi Lavauden, C. R. Acad. Sci. [Paris], vol. 189, p. 1023, 1929. ("Forêt d'Aunes des bords de la lagune de Biguglia (Sud de Bastia)," Corsica.)

This Wildcat is included because of its interest as an insular form and because of the generally uncertain future of the Wildcats of Europe, rather than on account of any definitely recorded decrease.

It is smaller than *Felis silvestris silvestris*; pelage very dark, with a darker, rather indistinct dorsal stripe; hind feet with black marks like those of African Wildcats; back of the ear dark brown. Head and body, 580 mm.; tail, 270 mm. Weight, 2 kg. (small females) to 5 kg. (large males). (Lavauden, 1929, pp. 1023-1024.)

No Wildcat had been recorded from Corsica before 1929, and only three specimens have been studied so far, but the species is not extremely rare. It is found throughout Corsica—in the high mountains, the forests, the thickets of the hills, and the shrubbery of the plains. The Corsican hunters do not bother to seek the animal because of the low value of its fur. (Lavauden, 1929, p. 1024.)

Sardinian Wildcat. Chat sauvage de Sardaigne (Fr.). Gatto selvatico di Sardegna (It.)

FELIS SARDA Lataste

[*Felis libyca*] var. *sarda* Lataste, Act. Soc. Linn. Bordeaux, vol. 39, p. 231, 1885. ("Sarrabus (Sardaigne).")

FIGS.: Martorelli, 1896, pls. 1, 2.

While little information is at hand concerning the numerical status of this species, it is possibly being subjected, like other Wildcats of Europe, to the process of extinction by "dilution" in addition to direct persecution.

It differs from *Felis silvestris* in its shorter fur and more slender tail (hairs at middle averaging about 30 mm. instead of 40 mm.);

hairs of median dorsal line slightly elongated and stiffened; dark markings obsolete, the back and sides grayish or brownish, without definite stripes; back of ear yellowish clay-color, the tip black; tail with well-defined black tip. Head and body, 600 mm.; tail, 300 mm. (Miller, 1912, pp. 468, 470.)

While this species was originally described from Sardinia, the same animal is recorded by Martorelli (1896, p. 266) from the Maremma of Tuscany in western Italy.

It is found throughout Sardinia but is not numerous there, and in legislation is rated as harmful (Laboratorio di Zoologia Applicata a Caccia, *in litt.*, September, 1936).

The animal of Tuscany is said to be not rare (Colosi, 1933, p. 56). It is considered a fierce destroyer of hares, pheasants, and other game and consequently is much persecuted (Martorelli, 1896, p. 279).

European Lynx. *Lynx* (Fr.). *Luchs* (Ger.). *Lince* (Sp., It.)

LYNX LYNX LYNX (Linnaeus)

[*Felis*] *Lynx* Linnaeus, Syst. Nat., ed. 10, vol. 1, p. 43, 1758. (Near Upsala, Sweden.)

SYNONYM: *Felis borealis* Thunberg (1798).

FIGS.: Wolf, 1867, ser. 2, pl. 6; Elliot, 1883, pl. 39; Martin, 1910, p. 117, fig. 34; Colosi, 1933, p. 41.

The Lynx has suffered rather serious depletion of numbers in its European range, and even total extermination in some of the countries (Britain, France, Denmark, Switzerland, Italy, Austria, Hungary). In northern Asia, however, its status remains much more satisfactory, especially in those areas where the human population is still sparse.

The form is heavier than in *Felis silvestris*; the legs are relatively longer, the feet more robust, and the tail shorter; upper parts and sides varying from yellowish brown to brownish gray; back and sides never thickly spotted; cheeks not conspicuously whiskered; ears conspicuously tufted at tip (Miller, 1912, p. 472). Head and body, 800-1,200 mm.; tail, 190-220 mm. (Didier and Rode, 1935, p. 289).

The range of this Lynx includes the forested portions of Europe and Asia: north to the tree limit; south to France, northern Italy, Yugoslavia, Greece, Bulgaria, the Ukraine, central Russia, the Altai Mountains, northern Mongolia, northern Manchuria, and northern Korea; east to Sakhalin and eastern Siberia.

"The European Lynx, *Felis lynx*, was . . . an inhabitant of Britain in the Pleistocene age, and survived until *recent* times, and may even have lingered into the historic period" (Millais, 1904, p. 168).

Although the French authors record the Lynx from the Pyrenees (where it is now probably exterminated), Cabrera suggests (1914, p. 210) that the animal formerly occurring there was the Spanish Lynx (*Lynx pardellus*). Trouessart in 1884 (p. 229) considered the European Lynx still present in the Alps, the Jura, and the Pyrenees. There is a record (the last?) for the Jura in 1834 (Martin, 1910,



FIG. 29.—European Lynx (*Lynx lynx lynx*)

p. 118). Didier and Rode (1935, pp. 290-291) cite records from the French Alps as late as 1907, 1913, and 1922, but conclude that the species has probably disappeared from the entire country.

In Germany, for several centuries past, the Lynx has occurred only as an occasional straggler. From 1773 to 1796 five were shot in the Thuringian Forest. A few were taken in Upper Silesia at the beginning of the nineteenth century. Two were shot in the Harz Mountains in 1817 and 1818. (Blasius, 1857, p. 176.) The species was exterminated in Pomerania in 1738; in Westphalia in 1745; in Gotha in 1819; in Bavaria in 1850. In East Prussia several were taken about 1870, and the animal still occurs frequently on the eastern boundary. (Krumbiegel, 1930, p. 6.) One was taken in Thuringia in 1843, and one in Württemberg in 1846 (Internationale Gesellschaft zur Erhaltung des Wisents, *in litt.*, October, 1936). At

present the law gives it absolute protection (Reichsstelle für Naturschutz, *in litt.*, October, 1936).

In Denmark the species is known only from Stone Age and Bronze Age remains (Winge, 1908, p. 117).

In Switzerland it abounded during the seventeenth century, and numerous captures were made up to the early part of the nineteenth century. Thereafter it suffered a pronounced decrease. In the 1860's it was still found, but only occasionally, in Grisons, Ticino, and Valais (one record in 1867). (Fatio, 1869, p. 280.) One was killed in the Engadine in 1872. The species is now extinct in Switzerland. (Federal Forest, Game, and Fish Inspection, Berne, *in litt.*, March, 1937.)

The species may be considered extinct in Italy, the last specimens having been killed in Piedmont in the second half of the last century (Laboratorio di Zoologia Applicata a Caccia, *in litt.*, September, 1936). De Beaux (1932, p. 9) speaks of the forest of Langhe in the Maritime Alps, in the province of Cuneo, as its last refuge.

In Austria the Lynx is entirely exterminated. In Carinthia one was killed in 1848, and another was seen in 1878. In Lower Austria it was fairly distributed up to the middle of the last century. In the Tyrol it was very common in the sixteenth century, but during the next century it decreased decidedly, and at the beginning of the nineteenth century it was said to be not very rare; the last one was killed at Graun in 1873. In Vorarlberg the last one was killed in 1918. (G. Schlesinger, *in litt.*, March, 1937.)

Before World War I the Lynx was found everywhere in the Carpathian forests of Hungary (now Czechoslovakia) (J. Schenk, *in litt.*, November, 1936). In the higher elevations of the Tatra Range (Czechoslovakia and Poland) there are a few Lynxes (Maurice, 1927, p. 21). (See also under Poland.)

In the present Hungary the species is not found (J. Schenk, *in litt.*, November, 1936).

During the past century the Lynx was exterminated throughout Yugoslavia except in the high mountain region of Shar Planina, in southern Serbia, where four or five specimens are killed every year (M. Hirtz, *in litt.*, December, 1936).

In Greece it occurs in Epirus, Thessaly, Macedonia, and Thrace. No decrease has been observed. (Game Department, Greek Ministry of Agriculture, *in litt.*, October, 1936.)

In Bulgaria "the lynx is about gone, though I saw two fine skins last week at a fur shop in Varna, on the Black Sea, and one in the peasant market in Sofia last year." A reserve for the Lynx in the Pirene Mountains is advocated. (H. W. Shoemaker, *in litt.*, June 30, 1932.) According to the Bulgarian Game Association "Sokol" (*in litt.*, February, 1937), the last specimen was killed in 1907. The

cause of its disappearance was the diminution of the forests (especially the virgin forests).

In Rumania the Lynx is an increasingly rarer species. Its distributional area is the coniferous-forest zone—narrower on the western slope of the eastern Carpathians (Nasaud district), and broader on the eastern slope (Bukowina). It is more common in the southern Carpathians (Bunzenländer Mountains, Fagaras Mountains, etc.). (Calinescu, 1930, p. 366.)

In ancient times, when Poland was covered with large forests, the Lynx was found everywhere. It still exists in the Carpathians, especially in the eastern Polish part, and also in the great forests of northeastern and eastern Poland. The estimated number is about 400. During the hunting season about 25 specimens are killed annually. Hunting is forbidden from March 1 to December 31. (M. Siedlecki,¹ *in litt.*, October, 1936.) In the proposed International Tatra Park (Poland and Czechoslovakia) the Lynx will be kept under absolute protection. The chief aim of another proposed International Park (Poland, Czechoslovakia, and Rumania) is the creation of a breeding ground for the Bear, Lynx, Wildcat, Wolf, Stag, etc. (Benedyct Fuliński, MS., 1933.)

In Lithuania the Lynx is almost exterminated. Since the Great War about ten specimens have been killed. Hunting is forbidden. (T. Ivanauskas, *in litt.*, November, 1936.)

In Latvia the species has decreased considerably but is still found in the large forests. The following numbers have been reported by the Forest Department: 74 in 1925; 49 in 1932; 59 in 1935; 78 in 1936. (N. von Transehe, *in litt.*, February, 1937.) The animals are found especially in the northeastern part of the country, where hunting is restricted; in other parts no protective measures have been adopted. Twenty to thirty years ago the stock was about 300-400, but for economic reasons, and in order to protect useful game, the numbers have been reduced intentionally, and they are now confined to a certain part of the forests, where they are protected. (Forest Department, Latvia, *in litt.*, March, 1937.)

In Estonia the Lynx is only a visitor, coming in from Russia, and is given no protection (Zoological Institute, University of Tartu, *in litt.*, October, 1936).

¹“Michel Siedlecki, Professor of Zoology in the University of Cracow, was . . . an enlightened apostle of Fauna Preservation. . . .

“Michel Siedlecki was done to death in one of Germany's most notorious concentration camps. . . .

“In . . . international relations Siedlecki inspired among his colleagues both respect and affection. One wonders with what feelings the German colleagues with whom he collaborated in the International Council for the Exploration of the Sea, as well as in the International Committee for Bird Preservation, reflect upon the death, brought about through the calculated brutality of their Government, of a loyal colleague who was so recently their guest.” (Jour. Soc. Preservation Fauna Empire, n. s., pt. 39, pp. 15-16, 1940.)

The species was formerly common in the Norwegian forests north to about latitude $65^{\circ} 30'$. A quarter of a century ago Collett remarked on a great decrease. Since it preys upon the more important smaller game and on small cattle, it is hunted throughout the country and is not protected by law. (Hj. Broch, *in litt.*, December, 1936.) Up to about 1875 it was generally distributed in the woodlands of Norway. A small stock remains in some places in Fosen, Namdalen, and South Helgeland. In southern Norway it is doubtful if there is any resident stock, but now and then some stragglers may appear. Up to the present, bounties have been paid on the Lynx, and it is doubtful if its total extermination in Norway can be prevented. (Director of Forestry, Norwegian Ministry of Agriculture, *in litt.*, January, 1937.)

About a century ago the Lynx was rather common throughout Sweden except in the northernmost provinces and in some of the southernmost. From 1827 to 1839, 3,224 Lynxes were killed—an annual average of 248; in 1844, 250; and in 1845, 273. The annual average was about 175 in 1856-60; 121 in 1865-69; 105 in 1871-75; 67 in 1876-80; 24 in 1881-85; 35 in 1891-1900; 10 in 1901-05; 17 (all in the four northernmost provinces) in 1906-10; 11 in 1921-25. In the southern provinces the species was practically exterminated before 1870; in the middle provinces it was found in diminished numbers in the 1890's. The increase in numbers killed in the 1890's and in 1906-10 was due to livelier persecution in the more northern provinces.¹ In 1926 and 1927, 7 Lynxes were killed. Since then the species has been protected by law to the extent that it may not be killed on public domains, and, if killed on private lands, it is nevertheless crown property, so that the profit motive is eliminated. The crown domains are very extensive, especially in the northern provinces, and there are some state forests, especially in Westerbotten, where the animals seem to thrive and to increase somewhat. There are a few in Ångermanland and perhaps also in Jemtland, while stragglers have been traced in some other provinces. (Einar Lönnberg, *in litt.*, October, 1936.)

The following information on the Lynx's range and status in Russia and Siberia is derived from Ognev (1935, pp. 206-214): The range extends entirely across Russia from east to west; in the north it reaches the tree limit on the Kola Peninsula and at other points near the Arctic coast; in the south it reaches Podolia, the southern part of the Western and the Moscow Areas, the district of Penza, and the former Governments of Kazan and Orenburg. Within this range its numbers vary considerably but are evidently

¹ Possibly these increases represented peaks in a periodic fluctuation, such as is evident in the case of the Canada Lynx; 1895-97 and 1905-06 were peak periods for the latter species (*cf.* Seton, 1929, vol. 4, p. 711).—Ed.

much less than formerly. In White Russia 76 animals were taken in 1924-25, but only 16 in 1925-26. In the Western Area 156 were killed in 1928-29, 43 in 1929-30, and 47 in 1930-31. According to Milovanowicz (1925), 50 are taken annually in the Petchora region. In the Vichegda Basin 3 were taken in 1929, 2 in 1930, and 27 in 1931.

In Siberia the Lynx ranges north approximately to the tree limit and south to northern Russian Turkestan (Irtish River and Zaisan Nor) and to the Mongolian and Manchurian boundaries, apparently avoiding the Arctic tundra on the one hand and the steppes of Russian Turkestan on the other. (In far eastern Siberia, beyond the Verkhoyansk Mountains, the typical subspecies seems to be replaced by *Lynx lynx wrangeli* Ognev.)

According to W. G. Heptner (*in litt.*, December, 1936), the Lynx is quite common in Siberia but rarer in Russia. Hunting is allowed the whole year, but in certain parts of Russia and in western Siberia, where the numbers of the animal are small, hunting is limited to certain open seasons.

The species occurs in the mountains of northern Mongolia, from the Altai Range eastward (Ognev, 1935, p. 214). A specimen from 15 miles northeast of Urga, Mongolia, is recorded by G. M. Allen (1929, p. 14) under the name of *L. l. isabellina*. The species also occurs in the forests of Manchuria; it is rare in northern Kirin (Sowerby, 1923, p. 37) and in the southern part of the Little Khingan Mountains (Ognev, 1935, p. 213). It is generally considered rare in Sakhalin (Kuroda, 1928, p. 226; Miyoshi, in Skottsberg, 1934, p. 411).

Economics.—The Lynx attacks game as large as the Red Deer and the Roe Deer, and it has been known to slaughter 30 sheep in a single night. Generally it feeds on the smaller game—hares, marmots, small rodents, and birds of all kinds. On occasion it does not fear to attack man himself. (Trouessart, 1884, p. 230.)

In Sweden, "when the lynxes were numerous, they sometimes killed sheep and perhaps also reindeer. They are therefore like all other carnivorous animals especially hated by the Lapps. The lynxes were also destructive to the hares, when they were common. The reason why they were so much hunted was, however, chiefly because it was regarded as a good sport, and the value of the skin was also attractive." The species is now protected in Sweden, and the government pays for the damages committed, "if they are not due to carelessness of the owners of the domestic animals killed." (Einar Lönnberg, *in litt.*, October, 1936, and January 18, 1933.)

"The Norwegian peasants believe that if a person wears a neck-lace made of the fore-claws of a lynx it will preserve him from spasms and the cramp. It would appear that the Russians entertain

a somewhat similar superstition, for when they sell lynx skins to the Chinese, they charge a much higher price for them if the fore-claws are included." (Bowden, 1869, p. 14.)

In the Polish forests "the lynx and the wolf alone are capable of killing the elk" (Korsak, 1934, pp. 78-79).

"The Russian naturalists Von Schrenk and Radde inform us that the natives of Amoorland esteem the flesh of this animal as a great delicacy, and that the furs which are obtained by the hunters in this part of Asia mostly pass into Chinese hands, being much treasured by the high officials of the Celestial Empire" (Sclater, in Wolf, 1867, text to pl. 6).

Tibetan Lynx

LYNX LYNX ISABELLINUS (Blyth)

Felis isabellina Blyth, Jour. Asiatic Soc. Bengal, vol. 16, p. 1178, 1847. ("Tibet.")
 Figs.: China Jour., vol. 23, no. 3, pl. facing p. 172, 1935, and vol. 25, no. 5, pl. facing p. 288, 1936; Schäfer, 1937, pl. facing p. 177.

The Tibetan Lynx seems to be a moderately rare animal, and while it is protected to some extent by the remoteness of its haunts, its fur is in considerable demand.

It differs from the European Lynx in its pale sandy gray or isabelline coloring, and in the relative shortness of the hair on the toes. Head and body, 837 mm.; tail, 196 mm.; weight, about 60 lb. (Blanford, 1888-91, p. 90.)

"This race inhabits the plateau of Eastern and Western Tibet, and certainly extends into Baltistan; but its exact geographical limits are impossible to define

"Throughout its habitat, so far as accounts go, the Tibetan lynx is a rare animal, seldom seen, and still more rarely shot. . . . The Tibetan hares and blue pigeons form the chief prey of the lynx in Ladak, although it also levies toll on the smaller domesticated animals of the Tatars." (Lydekker, 1900, pp. 326-327.)

"This animal is rarely encountered and consequently the exact limits of its habitat are somewhat conjectural, but I fancy that it is almost identical with that of *Ammon*. . . . They are savage animals and do not hesitate to attack sheep and goats, sometimes working considerable havoc." (Burrard, 1925?, p. 241.)

"Lynx skins . . . are brought in from the Thibetan regions to the north and west, to Sungpan [Szechwan], where they find a ready market among the wealthy Chinese. . . . They sell in Sungpan for 5 to 7 taels each." (Wilson, 1913, vol. 2, p. 181.)

"The Isabelline Lynx . . . is fairly common in the mountainous regions along the Chinese-Tibetan border. . . . The lynx supplies the fur market of this country [China] with one of its best furs, the

coat of this animal being long, thick and soft." (Sowerby, 1936, pl. facing p. 288.)

Ognev (1935, pp. 215, 231-232) reports it from Kansu, Koko Nor, the Zaidam region, the Nan-Shan, Altyn-Tagh, Kwen-Lun, Tian-Shan, Borokhoro, and Bogdo-Ola ranges, Kashgar, the Tarim Basin, and Lob Nor.

The systematic status of the Lynxes inhabiting various mountainous areas from northwestern India and southern Russian Turkestan to northern Persia seems to be in doubt; I am unable to determine what subspecific name or names should be applied to them. This vast region lies directly between the ranges of the Tibetan Lynx and the Caucasian Lynx.

The animal of Gilgit, in the valley of the Indus, has a more rufous coloring than that of Tibet (Lydekker, 1900, p. 326).

According to Ognev (1935, pp. 214-215), the Lynx is found in various localities of Russian Turkestan, including the Pamirs, the western Tian-Shan, Semiretchie, the Chu River, the Kara Tau, the Talassk Alatau, the Samarkand region, and the Kopet-Dagh (where it is rare). It occurs in northern Afghanistan and doubtless in the Persian provinces of Gilian, Mazanderan, and Astrabad; possibly also in the mountains of Khorassan (lat. 37° N.).

W. G. Heptner states (*in litt.*, December, 1936) that the Lynx occurs in small numbers in the mountains of Turkestan. Hunting is limited to certain seasons in the mountains of Uzbekistan, and is forbidden on the Kopet-Dagh.

Barbary Lynx. *Lynx caracal* (Fr.)

CARACAL CARACAL ALGIRUS (Wagner)

Felis Caracal . . . Var. *algira* Wagner, Reisen Regentschaft Algier, vol. 3, p. 76, atlas, pl. 4, 1841. (Vicinity of Algiers (*op. cit.*, p. 62).)

FIGS.: Buffon, Hist. Nat., vol. 9, pl. 24, 1761; M. Wagner, 1841, atlas, pl. 4; Loche, 1867, pl. 2.

This Caracal is evidently becoming increasingly scarce as the years roll by.

General color nearly uniform, between cinnamon-orange and reddish cinnamon; paler about the eyes, on the lips, and on the lower parts; a blackish spot on each side of the mouth; ears externally black, sometimes mixed with white hairs, terminal tuft black. Head and body, 717 mm.; tail, 284 mm. (Cabrera, 1932, pp. 171-172.)

The species as a whole is "widely distributed in suitable localities from South Africa to Egypt and Morocco, and from Palestine to India" (Flower, 1929, p. 83). Only the North African subspecies

(*algirus*) calls for attention here. It ranges from the Gulf of Gabes to the Atlantic coast, and south to Senegal. In Algeria and Tunisia it reaches the Mediterranean coast. Apparently it is not represented in Tripolitania. (Cabrera, 1932, pp. 172-173.)

Tunisia.—It is rare in the north but a little more common in the center and south (region of Feriana, Djebel-Selloum, Djebel-Bou-Hedma). It can be shot rather easily in its usual habitat among alfa grass, and it could be successfully chased with hounds, for its gait is not very rapid. (Lavauden, 1932, p. 7.)

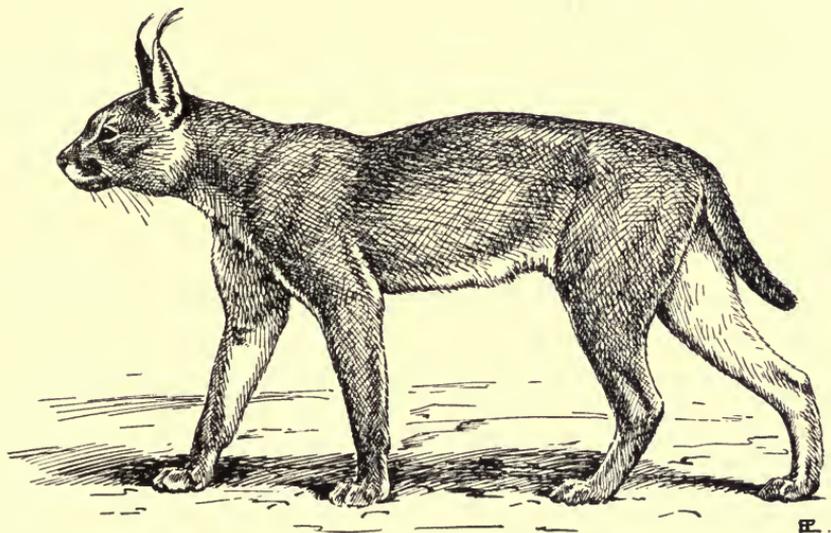


FIG. 30.—Barbary Lynx (*Caracal caracal algirus*). From specimen in Philadelphia Zoo.

Algeria.—The Barbary Lynx does not occur commonly in the vicinity of Algiers, whence occasionally specimens are brought to market (M. Wagner, 1841, vol. 3, p. 62).

Loche (1867, p. 41) reports for the period 1840-42 that it ranges throughout Algeria, where it is rather numerous. Specimens are recorded from Birkadem, Arba, and Djelfa. It is also met with near Coléah, Lac Halloula, and elsewhere.

Known in Barbary from the first explorations, it has been recorded by Shaw, Poiret, and others. Two specimens were taken in the vicinity of Laghouat, and one of the animals was seen between Haïdra and Tébessa, Algeria. Without being very abundant, the species seems rather widespread, and skins are frequently seen in the saddlers' shops of Algiers and Constantine. (Lataste, 1885, p. 225.)

Heim de Balsac (1936, p. 179) records it from the valley of the Saura, near Beni-Abbès.

Morocco.—"The Lynx . . . is found in wooded districts, and is sometimes brought alive to Mogador" (Leared, 1876, p. 304). It seems to be lacking in Yebala, but it undoubtedly exists more to the south, and it is reported as still living in the interior of the Rif (Cabrera, 1932, pp. 172-173). In the Zaïan district it is found from time to time, and its skin is frequently seen in the market. One was living in captivity as late as 1931. (Carpentier, 1932, p. 17.) Specimens are recorded from Gara de Debdou, Matarka, Oued Charef, region of Berguent (Laurent, 1935, p. 349).

Gambia.—"This splendid animal is to be seen some 150 miles up the [Gambia] river; being swift and cunning, very few are trapped or shot" (E. Johnson, 1937, p. 63). The local form does not seem to have been subspecifically determined.

The Cheetahs (genus *Acinonyx*)

These animals are also known as Hunting Leopards. Additional names in various Continental languages are: Guépard (Fr.), Gepard (Ger.), Ghepardo (It.), and Onza (Span.).

The common species of Cheetah (*Acinonyx jubatus*), which has been divided by various authors into approximately a dozen different forms, has become rather rare over a large part of its enormous range in Africa and Asia, while remaining moderately common in some areas. Another species, the King Cheetah (*A. rex*), has been described from a restricted area in Southern Rhodesia. For the sake of completeness, all forms that are more or less recognizable will be treated in the following accounts. In scarcely any case can the distributional limits of the subspecies be stated precisely, owing to the incompleteness of our present knowledge.

The Cheetahs are distinguished from all other members of the cat family (Felidae) by the absence of claw-sheaths (Pocock, 1916, p. 426). In size and form they suggest a long-legged and slender-bodied Leopard; but their markings are solid spots instead of rosettes, as in the Leopard. The hair of the neck is elongated to form a slight mane. (Lydekker, 1900, p. 328.)

The geographical distribution of the Cheetahs as a genus is very similar to that of the Lion. In Africa it includes chiefly the arid or semiarid areas of the South, East, and North—in fact, most of the continent outside of the rain forests of the West African sub-region and the humid, forested areas of southeastern Africa. In Asia, likewise, it includes more or less arid areas from India and Russian Turkestan to Syria, Palestine, and Arabia.

Economics and conservation.—"The Cheetah has been for centuries the playing thing of princes, Asiatic, African and European. When taken young it is easily tamed and trained to show its wonderful speed. A couple of cheetahs were sent as a present to Anastasius, Emperor of the East, at Constantinople in A. D. 439 from whence the sport reached Italy and obtained an enormous vogue among the wealthy, extravagant grandees of the great City States. The Turks, Moors and Persians alike used cheetahs in hunting. In India the Cheetah is usually taken blind-folded in a cart to the scene of the hunt. In the proximity of a herd of antelope it is unhooded and slipped from its leash: a short crouching stalk and a few bounds of great length and rapidity and the hunt is over—the quarry has escaped or the Cheetah holds it in a strangle-hold by the throat, till the keeper comes up and having cut the captive's throat rewards the captor with a drink of warm blood collected in its accustomed feeding bowl." (Anonymous, 1935, pp. 148-149.)

(For an interesting account of hunting with Cheetahs in the Middle Ages, see Yule's *Marco Polo*, ed. 3, vol. 1, pp. 397-398, 1903.)

"So far as I have heard, . . . this animal has not been known to breed in captivity" (Blanford, 1888, p. 93).

Probably the disappearance of the Cheetah in the Cape Province and its decrease in North Africa and in Asia are closely linked with the general decline in those regions of the various antelopes which constitute its principal prey. It also attacks calves, sheep, and goats to some extent, and thereby comes into conflict with man. However, "there are very few recorded cases of cheetah attacking human beings or taking the offensive, even when wounded or in defence of their cubs" (Shortridge, 1934, p. 107). Like all of the larger carnivores, it is evidently shot "on general principles." According to Shortridge (1934, p. 107), it retreats more rapidly than the Leopard before European settlement.

In Northern Rhodesia "Cheetah and other animals take their toll of the vast numbers of Black Lechwe, but these natural enemies do more good than harm" (David Ross, *in litt.*, May 3, 1933).

Fortunately the Cheetah is reported present in a considerable number of the African game reserves: White Nile Reserve and one near the Ethiopian border in the Sudan; reserve between the Gash and Setit Rivers in Eritrea; Northern and Southern Reserves in Kenya; Katavi, Mtandu, Lake Natron, Ngorongoro, Northern Railway, Saba, Selous, and Serengeti Reserves in Tanganyika; Matupo Reserve in Mozambique; Kruger National Park in Transvaal; Bechuanaland Reserve in Bechuanaland Protectorate; and Namutoni Reserve in South-West Africa. Such reserves doubtless afford

the species its best chance of survival in countries that continue to be opened up to settlement and cultivation.

Cheetahs make charming pets, and may be led about on a leash.

South African Cheetah

ACINONYX JUBATUS JUBATUS (Schreber)

Felis jubata Schreber, Säugethiere, vol. 3, pl. 105, 1776; p. 392, 1777. (Cape of Good Hope, South Africa.)

SYNONYMS: *Felis lanea* P. L. Sclater (1877); ?*Acinonyx guttatus obergi* Hilzheimer (1913).

FIGS.: Proc. Zool. Soc. London 1877, pl. 35 (incipient albinism); Hilzheimer, 1913, p. 289, fig. 2 (*A. j. obergi*).¹

The South African Cheetah has virtually disappeared from the Cape Province. Elsewhere in its huge range it has managed to survive in varying numbers, but in general it is obliged to retreat before settlement.

The general color is ochraceous-yellow, covered with round black spots; below almost white, with longer hair and indistinct spots; a black line from the anterior angle of the eye to the edge of the lip; ear with a black patch posteriorly and a tawny tip; chin white, unspotted; chest whitish, spotted; spots on the tail tending to form 6-8 imperfect rings toward the tip. (W. L. Sclater, 1900, p. 47.) Total length, about 6 feet 8 inches; tail, about 2 feet 6 inches; shoulder height, about 2 feet 8 inches.

All Cheetahs (except *A. rex* Pocock) occurring from the Cape Province north to Angola, Belgian Congo, Northern Rhodesia, and Nyasaland will be included provisionally under the present subspecies. This range corresponds roughly to the Southwest Arid District, the Southeast Veld District, and the Rhodesian Highland District of Chapin (1932, p. 90), or to the Southeast Veldt District, the Kalahari and the Damara Arid Districts, and the Rhodesian Savanna District of Bowen (1933, pp. 256, 259-260).

"In the [Cape] Colony it is found sparingly in the western and midland districts: north of the Orange River it is common in German territory [South-West Africa], the Kalahari and Bechuanaland, and exists in Rhodesia, the Transvaal, Zululand and Natal, though now very rare in the latter Colony, and found only in the Drakensberg range" (W. L. Sclater, 1900, p. 48).

In South-West Africa the Cheetah is widely distributed. It is considered quite plentiful in the eastern sand-veld region, scarce in the Kaokoveld, sparsely distributed in the Caprivi, and not uncommon in the Namutoni Game Reserve. It is recorded from various

¹ The following additional figures of Cheetahs are of undetermined subspecific identity: Wolf, 1861, pl. 13; Lavauden, 1924, p. 10, fig.; Leplae, 1925, p. 46, fig.; Malbrant, 1936, pl. 1, upper fig.

parts of Omaheke. It is apparently scarce in the vicinity of the Orange River, the western and southwestern parts of Great Namaqualand, and the highlands of western Damaraland. Its numbers increase in the sand-plain country adjoining Bechuanaland. Considerable numbers of skins are brought into Windhoek and Keetmanshoep annually by natives from this region and from Bechuanaland. The species also occurs in small numbers in southern and southeastern Angola. (Shortridge, 1934, p. 105.) This author adds (pp. 105-107):

The Cheetah has almost if not completely disappeared from the Cape Province, the Orange Free State, Natal, and the Southern Transvaal, but may still be met with in some of the more sparsely populated districts of the Northern Transvaal, Zululand, Swaziland, and probably the inland portions of Portuguese East Africa. It is widely distributed in Bechuanaland and still comparatively plentiful in the central and northern portions of that territory. . . .

The Cheetah is retreating rapidly before settlement in Southern Africa, and it is doubtful if there are any to be found to-day south of the Vaal River. . . .

Cheetah prey mostly upon medium-sized antelope, from steinbok and duiker up to the size of impala, springbok, reedbuck, and even cow kudu. . . .

When opportunity offers they kill sheep, goats, and ostriches, which last are driven into wire fences and cornered.

In the Transvaal the species is considered inimical to man, and not a game animal. Thus it is not given any protection. (Austin Roberts, *in litt.*, November, 1936.)

In the Kruger National Park, Transvaal, "the status of the species remains fairly constant; they were never very numerous, and no noticeable increase or decrease is reported" (Game Warden's Annual Report, 1925?).

In Southern Rhodesia Cheetahs are sparingly distributed over the greater part of the country, but soon retire from inhabited areas. They seldom raid domestic stock and consequently do not often fall a victim to traps and poison. There is no legal protection, but in the recognized game reserves and also in the forest reserves all animals are rigidly protected. (Game Warden, Wankie Game Reserve, *in litt.*, March, 1937.)

In Northern Rhodesia this "widely distributed species . . . is absent from the regions of interminable woodland. Usually occurs sparingly, though inclined to be locally plentiful." It "is most numerous in the neighbourhood of open expanses such as the Kafue flats, the Batonga and Batoka plateaux, the neighbourhood of Bangweulu, the Chambeshi flats and other similar localities. It appears to be absent from a great part of the Luangwa Valley. Family parties up to five are frequently reported, and as many as seven have been seen together. The cheetah is a very disturbing factor in localities where it occurs side-by-side with domestic stock, and is apt to be

particularly destructive where sheep and calves are concerned." (Pitman, 1934, p. 12.) Skins have been obtained in the Mumbwa, Namwala, Broken Hill, Mpika, Chinsali, and Petauke Districts (*op. cit.*, p. 159).

In Nyasaland "the Cheetah has so far only been found in the Central Province of Angoniland. Even there it is seldom seen, but may be more numerous than is believed at present, as it is nearly always confused with the Leopard by the natives." (Wood, in Maydon, 1932, p. 316.)

In Portuguese East Africa "Cheetahs . . . are not very numerous in the Zambezi valley, occurring perhaps most plentifully between Muterara and the Lupata Gorge, where reed buck and other small antelopes are common. I have also seen them in the Mlanje district . . . , in the Barue to the south of Tete, and in the open country south of the Shupanga Forest." (Maugham, 1914, p. 195.)

In the Belgian Congo, 20 years ago, the species was comparatively abundant over the southern part of the colony, from Kwango to Tanganyika. It probably ranged to the northern extremity of Lake Tanganyika, wherever grassy stretches, inhabited by small ruminants, assured it of favorable conditions for existence. The range seems to have remained practically the same, except in southern Katanga and Lomami, where stock-raising has led to the extermination of Cheetahs. It is well to note that these stock farms have been established where Cheetahs were particularly numerous. Furthermore, these animals suffer greatly from hunting with encircling fires, and the natives persecute them everywhere to satisfy the demand for skins on the part of the European population. The Cheetah should be put on the protected list. That would suffice, if the customary destructive hunting by the natives could be effectively stopped, to assure the recuperation of the species outside the zones of stock-raising. (A. J. Jobaert, *in litt.*, November 10, 1936.)

East African Cheetah

ACINONYX JUBATUS NGORONGORENSIS Hilzheimer

A[cinonyx] g[uttatus] ngorongorensis Hilzheimer, Sitz-ber. Ges. naturf. Freunde Berlin 1913, no. 5, p. 290, figs. 3-4, 1913. (Based upon a living specimen in the Leipzig Zoological Garden, said to have come from "Ngorongoro," south of Lake Natron, Tanganyika Territory.)

FIGS.: Hilzheimer, 1913, pp. 290-291, figs. 3-4; Roosevelt and Heller, 1914, pl. facing p. 244 (*raineyi*); Hollister, 1918, pl. 5, lower fig. (*raineyi*); Zammarrano, 1930, p. 152, fig. (*ngorongorensis?*).

Two other forms were subsequently described from East Africa: *A. j. velox* Heller, Smithsonian Misc. Coll., vol. 61, no. 19, p. 7, 1913 ("Loita Plains, British East Africa"), and *A. j. raineyi* Heller, Smithsonian Misc. Coll., vol. 61, no. 19, p. 9, 1913 ("Ulu, Kapiti

Plains, British East Africa"). Hollister (1918, p. 151) seems to be somewhat doubtful as to the distinctness of these three East African forms from each other, and De Beaux (1927, pp. 3-4) does not recognize *velox* or *raineyi*. The Cheetahs of East Africa, from Tanganyika north to Ethiopia and Eritrea, will be treated here as a unit. This range corresponds roughly to the Somali Arid District and the East African Highland District of Chapin (1932, p. 90), or to the Somali Arid District, the North Kenya Savanna District, and the East African Highland District of Bowen (1933, pp. 256, 258, 260).

The ground color of the living type specimen of *ngorongorensis* was isabella yellow-brown; under parts very light isabella, entirely without white; spotting of the lower neck very pronounced; cheeks grayish, heavily spotted; back of the ear yellow, with a slender black basal stripe; chin and lips white; chest and belly unspotted; outer side of the limbs heavily spotted as far as the toes; tail with three complete rings, tip yellowish white (Hilzheimer, 1913, p. 289). The coloration of this captive specimen may not have been typical.

The following might serve as a composite characterization of *velox* and *raineyi*: ground color ochraceous to light pinkish buff; spots large, blackish; snout ochraceous to ochraceous-buff; a black tear stripe from eye to mouth; back of ears black basally, tip and inner surface buff or pinkish buff; chin and upper throat white to cream-buff; belly cream to cream-buff, with elongate spots; hind feet more or less distinctly spotted; terminal part of tail ringed with black, tip whitish (Heller, 1913, pp. 8-10). Head and body, 1,120-1,300 mm.; tail, 720-800 mm. (Hollister, 1918, p. 154).

In East Africa and in South-West Africa the Cheetah seems to have survived in more satisfactory numbers than elsewhere in its wide range.

It occurs throughout Tanganyika Territory in varying numbers. There is no danger of extinction at present. In five provinces out of eight, only two Cheetahs may be killed on a Full Licence, and only one on a Minor Licence. (Game Preservation Department, Tanganyika Territory, *in litt.*, December, 1936.) It is "quite numerous in Masailand" (Browne, in Maydon, 1932, p. 312).

In Kenya the Cheetah is fairly common and generally distributed, specimens being recorded from the Loita, Kapiti, and Athi Plains, Laikipia and Uasin Gishu Plateaus, the flanks of Kilimanjaro, and Upper Tana River (Roosevelt and Heller, 1914, pp. 244-249). There are fair numbers in the Southern and Northern Game Reserves (Percival, 1923, pp. 69-71). There is a decrease in the Native Reserves and in the European settled areas; otherwise it is fairly common, and it is protected (Game Warden, Kenya, *in litt.*, November, 1936).

The Cheetah is sparingly distributed throughout northern and eastern Uganda. Not long ago it had a much more extensive distribution, occurring throughout the savanna regions. Its disappearance from many localities is due to the extension of settlement and cultivation. The Cheetah is of sentimental importance and also of considerable economic value, being sought after for hunting antelopes in India. Specimens trained by their parents in the field have a local value of £20 to £30. Only one specimen is allowed on a Full Game Licence. (Game Warden, Uganda, *in litt.*, December, 1936.)

De Beaux (1927, p. 4) records the species from Italian Somaliland, Ethiopia, and Eritrea. In the southern plain of Eritrea, especially between Barca and Gash, the animal is rather frequent (Zammarano, 1930, p. 61).

In British Somaliland "the cheetah is commonest in the thick bush country on the edge of the Haud, although it is to be found both on Guban and Ogo-Guban" (Drake-Brockman, 1910, p. 22).

Sudan Cheetah

ACINONYX JUBATUS SOEMMERINGII (Fitzinger)

Cynailurus Soemmeringii "Rüppell" Fitzinger, Sitz-ber. math.-nat. Cl. Akad. Wiss. [Wien], vol. 17, Heft 2, p. 245, 1855. (Based upon a living specimen from the Kababish Steppes in the south of the Bayuda Desert, Kordofan.)

Roosevelt and Heller (1914, p. 249) give the range as "lowlands of the Nile Valley, from the Albert Nyanza northward to Kordofan and westward to Lake Chad and northern Nigeria." No information is at hand as to the exact northern or western limits of this subspecies, where it should presumably intergrade with *A. j. hecki*. Its range lies in the eastern portions of the Sudanese Arid District and the Sudanese Savanna District of Chapin (1932, p. 90) and of Bowen (1933, pp. 256, 258).

The ground color above is ochraceous or pinkish buff; spots not exceeding half an inch in diameter and widely separated; hind feet unspotted. However, according to Malbrant (1936, p. 137 and pl. 1, upper fig.), the hind legs are nearly always spotted in Cheetahs of the Chad region.

Roosevelt and Heller (1914, p. 250) record specimens from El Dueim on the White Nile and from Lake Chad. "It is a rare animal in the Nile district and is seldom secured by sportsmen. . . . Heller saw a pair near Gondokoro."

"Cheetah, although by no means common in the Sudan, are widely distributed throughout the country. They are even reported to exist as far north as Jebel Tegarü in the north-west corner of the Province of Kordofan." (Brocklehurst, 1931, p. 32.)

Butler (in Maydon, 1932, p. 139) refers to this Cheetah in the Blue Nile district as "everywhere a much scarcer beast than the Leopard, and rarer in the Eastern Sudan than it is in Kordofan. Indeed, on this side of the country I only met it twice, both times on the Setit."

"Heuglin gives the following locality for the Chitah: Southern Takah and Eastern Sudan not north of 19° N. . . . Rüppell . . . mentions *Felis guttata* as one of the animals hunted . . . in the western deserts of the Dongola district." (Anderson and de Winton, 1902, p. 185.)

In the Ubangi-Shari district of French Equatorial Africa a few Cheetahs *may* occur in the extreme north (Birao), but it is not certain. They are not threatened for the moment." (L. Blancou, *in litt.*, December, 1936.)

In the French Cameroons the species is found in the thorn-bush country, but is very rare. It does not have any special legal protection. (Ministry of Colonies, Paris, *in litt.*, November 7, 1936.)

In writing of the Chad region, Malbrant says (1936, pp. 137-138) that the Cheetah is found in the whole of the Sahelian region of central Africa and in the somewhat forested steppes, its southern limit being at about lat. 10° N. It lives sometimes solitarily, but more often in bands of two to four individuals. The natives of Chad do not utilize it for the chase.

It is found in French Sudan, the Niger Territory, Borku and Ennedi, and the desert part of the Chad Territory (General Government of French West Africa, *in litt.*, November, 1936).

In Nigeria "it is pleasant to be able to report that cheetah are not nearly as rare as was thought. There are fair numbers in several Provinces and they extend nearly as far south as the Benue River." ("Observer," 1934, p. 54.)

Senegal Cheetah; North African Cheetah

ACINONYX JUBATUS HECKI Hilzheimer

Acinonyx hecki Hilzheimer, Sitz.-ber. Ges. naturf. Freunde Berlin 1913, p. 288, fig. 1, 1913. (Based upon a living specimen in the Berlin Zoölogical Garden, said to have come from Senegal.)

FIGS.: Geoffroy and Cuvier, Hist. Nat. Mamm., vol. 3, pl. 145, 1824; Hilzheimer, 1913, p. 287, fig. 1.

The name *A. j. hecki*, although based upon a Senegal specimen, may be provisionally applied to the Cheetah occurring over the greater part of Palaeartic Africa (Mauretania, Morocco, Algeria, Tunisia, Cirenaica, and northwestern Egypt). It is a rare form.

It is described as a small, dainty animal, with a ground color of pale reddish ochraceous on the back and sides; spots mostly black,

but brownish on the cheeks, hind feet, and part of the forefeet; under parts white, unspotted except on the lower neck; tail with four complete rings and a white tip (Hilzheimer, 1913, pp. 287-288). Head and body, 1,150 mm.; tail, 650 mm. (Cabrera, 1932, p. 192).

In Senegal the Cheetah is met with as far south as Podor and even near St. Louis (Cligny, 1900, p. 289).

In Morocco it exists only in the Saharan district, south of the Grand Atlas and the Anti-Atlas. Strohl (1923) refers to the capture of a dozen specimens in the vicinity of Zenaga [region of Figuig?]. According to native report, it is well known, though not very common, in the Wadi Draa. Thence it extends across Mauretania to Senegal. (Cabrera, 1932, p. 192.) Laurent (1935, p. 350) records skins from Tamlelt, Morocco.

In North Africa the Cheetah is extremely rare, but is still found regularly on the Oran-Moroccan High Plateaus. It is also said to be distributed here and there in the entire Sahara. (Heim de Balsac, 1936, pp. 99, 179.)

In Tunisia this very rare animal exists only in the extreme south, in the Grand Erg. Sometimes solitary individuals range toward the north; thus some Cheetahs were killed at Fedjej and at El-Hamma in 1908 and 1913. The species is hunted by its tracks, which are easy to follow on the sand of the dunes. The natives of southern Tunisia do not utilize it for hunting, as the Afghans, Arabs, and Indians do with the Asiatic Cheetah. (Lavauden, 1932, pp. 7-8.)

The cause of depletion in Tunisia is the progress of civilization; there are no special protective measures. The animal is found accompanying herds of Addax and Loder's Gazelles. (Conservator of Forests, Tunis, *in litt.*, September, 1936.)

We lack precise information on the range of the Cheetah in the Libyan hinterland. Some are found in the southern steppe region of Cirenaica. A specimen was killed recently at Bir Scegga, between Tobruk and Jarabub. At the time of the Pharaohs the animal was employed in the hunting of antelopes. Its skin has slight commercial value. (Zammarano, 1930, pp. 13-15.)

In Egypt the species "is very rare, and found only in the country to the west of Alexandria. In 1909 Col. H. C. B. Hopkinson . . . saw the tracks of two Chitas that had been stalking gazelle in the Mariut district about 40 miles west of Alexandria." In 1910 "a Bedawin shot a Chita about 5 miles north-east of Moghara, Mariut district A few other specimens were shot later." In 1927 "three live Chita cubs from south-west of Sollum had been received recently at the Giza Zoological Gardens." (Flower, 1932, p. 392.)

The present range of this vanishing species in Egypt is restricted to the Western Desert. The cause of depletion is injudicious hunting.

The skins are sold and the meat is used for food. (Ministry of Agriculture and Zoological Garden, Cairo, *in litt.*, January, 1937.)

Indian Cheetah; Indian Hunting Leopard

ACINONYX JUBATUS VENATICUS (Hamilton Smith)

F[elis] Venatica Hamilton Smith, in Griffith's Cuvier's Anim. Kingdom, vol. 5, p. 166, 1827. ("India.")

FIGS.: Jour. Bombay Nat. Hist. Soc., vol. 37, no. 4, suppl., pl. 46, 1935 (*venaticus?*); Bodenheimer, 1935, pl. 9 (*venaticus?*).

The Cheetah is nearly extinct in India and has become very rare in southwestern Asia generally.

The general color is pale brownish yellow to bright rufous-fawn above and on the sides; almost everywhere with small round black spots; chin and throat buffy white, unspotted; a black line from the anterior corner of the eye to the upper lip, and another less marked (or a row of spots in some specimens) from the posterior corner of the eye to below the ear; ear black outside, base and margins tawny; spots on tail passing toward the end into imperfect rings. Head and body, about 4.5 feet; tail, 2.5 feet. (Blanford, 1888, p. 91.)

The Cheetahs ranging from Baluchistan, Persia, and Iraq to Syria, Palestine, and Arabia are here included provisionally with the Indian form (*A. j. venaticus*).

In India the Cheetah is all but extinct in the wild state. It once ranged from the confines of Bengal through the plains of the United Provinces, the Punjab and Rajputana, through Central India and the Deccan. . . . A Cheetah was killed in 1918 and another in 1919 in the Mirzapur District of the United Provinces. Five Cheetahs are recorded as having been obtained in this Province during the previous twenty-five years. In the Central Provinces, the Cheetah appears to have been not uncommon at one time in the Berars. Three were shot in the Melghat Forest area in 1890 and one in 1894 and one at Wano in 1895. Rumours of their existence in parts of Berar, the Seoni Plateau and Saugor still persist. They were apparently once common around Hyderabad, Deccan. The only part of the Bombay Presidency where Cheetahs were known to occur recently is the tract of rugged country known as the Tanga in the centre of the province of Kathiawar. In 1884 it was estimated that there were not more than twenty of these animals in this area. A female and four cubs were shot at Rajkot in 1894. (Anonymous, 1935, p. 147.)

"In the case of India, the cheetah appears to be verging on extinction, if not already extinct, as a wild animal. At all events the Mammal Survey of India . . . does not seem to have secured a single specimen; and . . . it seems that Indian cheetahs are now practically unobtainable, and that those used for the chase are imported from Africa." (Pocock, 1927, pp. 18-19.)

"I have heard that Princes and others who want cheetahs for hunting purposes now get them from Hyderabad. But the officer

in charge of the Gwalior shikar department . . . said that 50 or 60 survived in the state. They are found in Indore also." (Edward Thompson, London Times, August 19, 1932?) In Hyderabad State "there still remain a few cheetahs" (Salim Ali, in Anonymous, 1935, p. 231). In Mysore there are several old records (Morris, 1935, p. 386), but the animal is "probably now extinct" there (Phythian-Adams, in Anonymous, 1935, p. 241). Fears are entertained as to

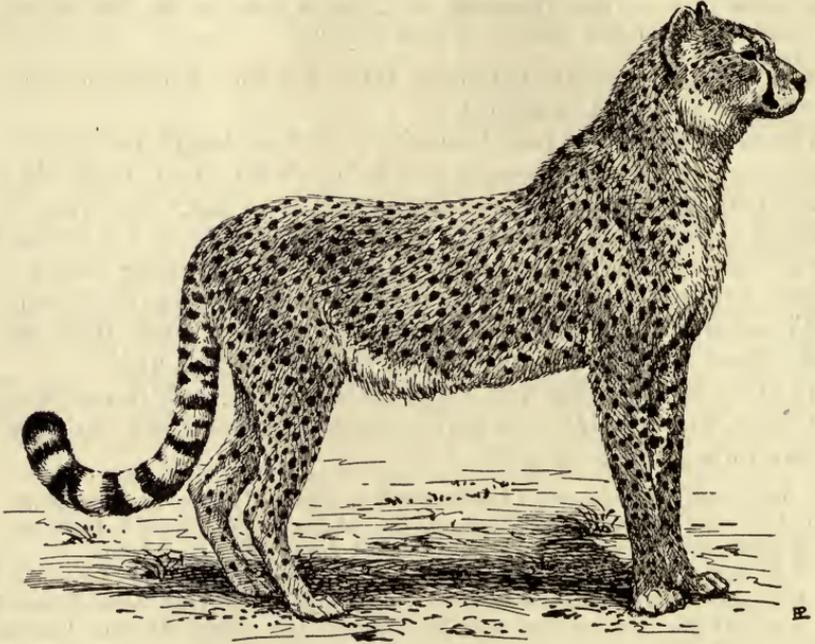


FIG. 31.—Indian Cheetah (*Acinonyx jubatus venaticus*)

its survival in the Madras Presidency (M. F. Budge, *in litt.*, November 12, 1936). Shooting is completely prohibited (Bombay Natural History Society, *in litt.*, December, 1936).

"The hunting leopard is certainly found in Persia, but I am unable to give any particulars as to its distribution. According to Eichwald it does not extend into the countries west of the Caspian, though found to the eastward. De Filippi says that it is found in Mazandarán." (Blanford, 1876, p. 35.) To this statement O. St. John adds that the species "is not used at present for sporting purposes in Persia." [The form of northern Persia may be *A. j. raddei*.]

"As regards its survival in Persia, Arabia and Palestine, I have no information beyond the inference to be drawn from the infrequency with which it is mentioned" (Pocock, 1927, p. 18).

"In South-Western Asia its range is believed to reach from the

frontiers of Sind through parts of Afghanistan, Baluchistan and Persia and Mesopotamia to Syria and Palestine To what extent it survives in these Asiatic countries is not known." (Anonymous, 1935, p. 147.)

In 1925 a cub was secured at Jumaimah, Muntafq, Iraq, and in 1928 two cubs were taken near Busiya on the Shamiyah Desert. None of the local Arabs had seen a Cheetah before. (Corkill, 1929, pp. 700-702.)

Danford and Alston (1880, pp. 52-53) report on the Cheetah in Syria as follows: "A skin of the Cheetah was presented to Danford at Biledjik, on the Euphrates, by his host Sheik Mustapha, who stated that the animal had been killed among the rocks near Sevi, a small village about five hours down the river on the Mesopotamian side; it was the only specimen which he had ever seen. This Society [the Zoological Society of London] has received more than one specimen from Syria, and it is not improbable that the species may be found in some parts of Asia Minor proper."

Tristram wrote in 1884 (p. 19) of this species in Palestine: "This graceful Leopard is scarce, but still haunts the wooded hills of Galilee and the neighbourhood of Tabor. East of Jordan it is far more common, and is much valued by the Arabs."

The Cheetah has now become very rare in Palestine. Yet it is still pretty common in the southern steppe. Its use for the chase is now quite outmoded. (Aharoni, 1930, p. 332.) It "still lives in the Negeb, in Transjordan and rare specimens also persist in the Palestinian mountains. The author saw many skins, sold by Beduins from Beersheba." (Bodenheimer, 1935, p. 105.) More recently Professor Bodenheimer writes (*in litt.*, March, 1937) that the animal is now on the verge of extinction or extinct and that nothing can be done to preserve it in Palestine, but that perhaps there is still a chance to do so in Transjordan.

In 1909 Carruthers (1935, pp. 60, 70) found Cheetah tracks on the north side of the Jabal Tubaiq, Arabia, approximately 150 miles east of the head of the Gulf of Akaba.

Turkestan Cheetah

ACINONYX JUBATUS RADDEI Hilzheimer

Acinonyx raddei Hilzheimer, Sitz.-ber. Ges. naturf. Freunde Berlin 1913, no. 5, p. 291, 1913. (Based upon a specimen purchased in Merv, Russian Turkestan (Turcoman S. S. R.).)

This Cheetah seems to occur in very small numbers in the southern parts of Russian Turkestan. The animals of northern Persia and northern Afghanistan may belong to the same form.

It is distinguished by its extremely thick, long fur; ground color light brownish gray; very large spots reaching to the toes; tail long-haired and very bushy, with five half-rings (one perhaps a complete ring) at the end (Hilzheimer, 1913, p. 291). (Cf. Satunin, 1909, pp. 254-256.)

"Only in the western portion of Turkestan have I met with this species, and even there only on the low plains" (Severtzoff, 1876, p. 49).

This is doubtless the commonest of the large cats in Transcaspia. It is distributed through the whole region—on the lowlands, along the river courses, and on the mountains. Each year the Turkomans bring young Cheetahs for sale into the cities and military posts. Training the animals for the chase is unknown to them. (Radde and Walter, 1889, p. 1012.)

The following data are from Ognev (1935, pp. 313-314): The Cheetah is found from time to time as far north as the Mangyshlak Peninsula (Karelin, 1883). It inhabits the Kara Tau, the western spurs of the Tian Shan, the lower Syr Darya, the Zarafshan Valley, and the steppes between Zarafshan, Syr Darya, and Kizil Kum, reaching an elevation of 600-1,000 feet (Severtzov, 1873). It also occurs on the Amu Darya (Zarudny, 1915) and in Tajikistan. It is particularly numerous along the Murgab, Tejend, and Sumbar Rivers (Bilkewicz, 1918). The Caucasian Museum has specimens from Merv, Kizil Arvat, and the Kopet Dagh. The Cheetah is also recorded from Mazanderan, northern Persia (De Filippi).

About 1884 two cubs were obtained in northeastern Persia near the Turbat-shaikh-jami River, a tributary of the Hari Rud (Aitchison, 1889, pp. 56-57).

The Cheetah is observed irregularly and in very small numbers in Turkestan on the frontiers of Persia and Afghanistan. Some are killed, but not every year. (W. G. Heptner, *in litt.*, December, 1936.)

King Cheetah; Cooper's Cheetah

ACINONYX REX Pocock

Acinonyx rex Pocock, Abstr. Proc. Zool. Soc. London, no. 283, p. 18, Mar. 1, 1927 ("Umoukwe [= Umvukwel] Range, N.W. of Salisbury, [Southern] Rhodesia"); Proc. Zool. Soc. London 1927, pt. 1, p. 250, pl. 1, April 6, 1927.

FIGS.: Pocock, 1927*a*, pl. 1, and 1927*b*, frontisp.; Dollman, 1929*a*, p. 3, fig.; Maydon, 1932, pl. 103.

The range as well as the numbers of the King Cheetah are distinctly limited, and special protective measures seem to be necessary in order to insure its survival.

It is similar in size and proportions to the Common Cheetah (*A. jubatus*) but distinguished from it by a bold pattern of black

stripes and blotches, which are longitudinal on the dorsal area and oblique or longitudinal on the flanks; legs blotched and spotted to the feet; basal half of tail with two longitudinal stripes, distal half with irregular transverse stripes; ground color mostly cream-buff; belly white. Skin measurements: head and body, 4 feet 2 inches to 4 feet 5 inches; tail, 2 feet 6 inches. (Pocock, 1927*a*, pp. 250-252.) The King Cheetah is by some considered as a color mutation of the Common Cheetah (G. M. Allen, MS.).

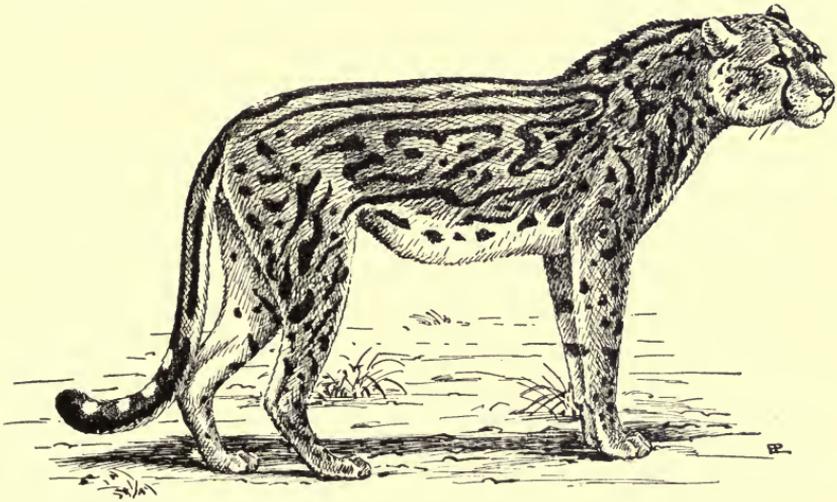


FIG. 32.—King Cheetah (*Acinonyx rex*). After Pocock, 1927.

The species is known only from Southern Rhodesia. Its range may lie wholly within the northern division of the Southeastern Veldt District of Bowen (1933, pp. 256, 260).

This superb new Cheetah was brought to scientific attention in 1926, by Major A. L. Cooper, who sent to the British Museum the skin of an animal trapped by natives in the Umvukwe Range (Pocock, 1927*a*, p. 245).

Cooper (in Maydon, 1932, pp. 335-336) gives the following account:

“That this animal was known for some time past is borne out by the fact that, twenty years ago, mention used to be made round camp fires by natives of a beast that was neither Lion, Leopard, nor Cheetah, and . . . I believe was referred to as the ‘Mazoe Leopard.’ It was apparently commoner in those days than it is now.”

The skin now in the Salisbury Museum was purchased from natives, who stated that they had killed the animal in the Macheke district. There were four or five in the troop.

H. M. G. Jackson reported a similar skin at the American Mission

at Utambara. "It was also an old native police sergeant of his, who, when shown the skin, said he knew the animal, told us its native name, and informed us of its habits, namely, that it is extremely shy, never attacked domestic animals except possibly a young kid, and, when chased by dogs, never took to a tree as a Cheetah occasionally does. . . .

"It was found that Mr. Watters, Native Commissioner at Bitika, possessed two such skins. . . . These were presumably obtained in his district. Apart from these two, I found Mr. Lacey of Salisbury also had a specimen, . . . killed some twenty miles south of Salisbury. . . .

"This is the history of the discovery, if it can be described as such."

Pocock reports (1927*a*, p. 246) that the animal whose skin was kept at the Utambara Mission "was shot in the Melssetter District close to the Portuguese Border. . . . The natives were not at all afraid of it as they were of leopards, and would attack it armed only with assegais." He says also (1927*b*, p. 19):

In the interests of the preservation of the new species of cheetah the following probabilities cannot be too strongly insisted upon. All the available evidence suggests that the animal has a restricted range and is nowhere plentiful. Its distributional area is within reach of Salisbury, an easily accessible centre; and the publicity now given to the existence of so handsome an animal will surely be taken advantage of by sportsmen and traders. All the big museums in the world will be eager for its skin, and every zoological garden will want live specimens for exhibition. It will, therefore, command a high price, whether alive or dead, and the result will be persecution by hunters and trappers on such a scale as to threaten its extinction unless the authorities in Rhodesia at once take such steps as may be necessary to protect it.

There seem to be no nature reserves within the known range of the King Cheetah.

Barbary Lion. Le Lion de Barberie (Fr.). El León berberisco (Span.)

LEO LEO LEO (Linnaeus)

Felis leo Linnaeus, Syst. Nat., ed. 10, vol. 1, p. 41, 1758. ("Africa"; type locality subsequently restricted to Constantine, Algeria, by J. A. Allen, Bull. Am. Mus. Nat. Hist., vol. 47, p. 222, 1924.)

Figs.: Reichenbach, 1836, figs. 1-2; Geoffroy and Cuvier, Hist. Nat. Mammif., vol. 1, pls. 114-115, 1824.

The Barbary Lion survived well into the twentieth century but is now extinct.

"Very large, dusky ochery, with the mane very thick and long, extending to the middle of the back; and a thick and heavy mane

on the under-parts. In the female the inside of the fore-legs is white." (Lydekker, 1908, p. 416.) The female is paler and smaller than the male (Cabrera, 1932, p. 181).

This extinct race ranged from Tripoli through Tunisia, Algeria, and Morocco. Apparently there are no definite records of Lions within the present confines of Egypt during historic times. The Lion of Senegal is described as a distinct race (*Leo leo senegalensis* (J. N. von Meyer)), although a single race of Cheetah (*Acinonyx jubatus hecki* Hilzheimer) is accredited to both Senegal and the Barbary States.

Tripoli.—"About two hundred years ago the lion was found quite commonly in Tunisia. About the same time, so far as records go, the last lion was killed in the adjoining Pashalik of Tripoli, where the animal now seems to be entirely extinct." (Johnston, in Bryden, 1899, p. 564.)

Tunisia.—"Down to the time of the French invasion of Tunis, in 1881, lions were still found in the extreme north-western part of the Regency, close to the Algerian frontier. . . .

"What has brought about the extinction of this animal is less the persistent attacks of French or Arab sportsmen than the opening up of the forests and the settling down of the people since the French occupation. The herds are now so carefully tended that the lion has little or no chance of feeding on them, while the Barbary stag and the gazelles have in that region become very scarce." (Johnston, in Bryden, 1899, pp. 562-564.)

The last Lion of Tunisia was killed in 1891 at Babouch, between Tabarka and Aïn-Draham. The species was common up to the time of the French occupation. Doubtless owing to troop movements, it then retired to the most remote massifs. It could not survive in contact with civilization. (Lavauden, 1932, pp. 5-6.)

Two specimens in the Leyden Museum (one killed in Tunisia in 1823, the other in "North Africa" about the same period) are probably the only wild-killed Barbary Lions that are preserved in any museum and can be studied at present (Cabrera, 1932, pp. 182-183).

Algeria.—Pease (in Bryden, 1899, pp. 564-566) gives the following account:

The North African lion was in bygone ages undoubtedly very numerous. . . .

The Algerian lion has become so rare that it may be said to be nearing extinction. . . . It lingers only in the country that might almost be described as the Mediterranean littoral zone, though an occasional lion is still shot or tracked in the interior, as far inland as the district of Soukarras, and certain places in the Aures. [During 1892-95] I do not remember hearing of more than three or four being obtained in the whole province of Constantine. In the provinces of Algiers and Oran they may be said to be extinct. So long ago as 1862 Général Marguerite wrote that . . . in the province of Algiers . . . the average number killed did not exceed three or four a

year. . . . Général Marguerite relates, that during his eleven years the Beni-Mahrez, a tribe not numbering more than 100 tents, lost on average annually, 3 horses, 25 cattle, and 75 sheep from the depredations of lions and panthers Before the French came, the Turks had encouraged the Arabs to destroy them by freeing the two great lion-hunting tribes, the Ouled Meloul and Ouled Cessi, from all taxes and paying liberally for their skins. The French gave only 50 francs for a skin.

Between 1873 and 1883 the process of extinction is measured in Government returns. The numbers killed for the whole of Algeria were, in the last six years of this period, 1878, 28; 1879, 22; 1880, 16; 1881, 6; 1882, 4; 1883, 3; (1884, 1); and for the decade—

Province of Algeria.....	29
“ “ Constantine	173
“ “ Oran	0
	202

There are a few lions still left in the Province de Constantine, in the thick forests between Soukarras and La Calle.

According to Johnston (in Bryden, 1899, p. 564), “Lions still linger here and there in South-East and South-West Algeria.”

On the other hand, Lavauden, an eminent authority on the North African fauna, fixes (1932, p. 6) the date of the Lion's disappearance in Algeria at about 1891, when the last one was killed in the region of Souk-Ahras.

Morocco.—To judge by the literature of several centuries ago, Morocco was then a veritable country of Lions. At the middle of the seventeenth century they still abounded on the Mediterranean coast. Toward the end of the eighteenth century the range extended to Cape Nun, Ifni. By the middle of the nineteenth century the Lion had retreated from the entire Mediterranean littoral. According to old native hunters, about 1880 not a Lion remained north of the low Bu Regreg and Taza Pass. Some years later many forests of the Middle Atlas served as a refuge for bandits, and this fact, together with the civil wars of those times, contributed to the disappearance of the Lions. Even in 1901 Lions were said to be frequent visitors to the forest of Budaa, near Azrú. According to the ex-Sultan Muley Hafid, there remained in Morocco about 1911 only a few Lions, which lived in the forests of the Zaián and the Beni Mguild. Apparently they survived at least to 1922 in the Middle Atlas, and it is probable that they inhabited the Grand Atlas likewise till a comparatively recent date. They inhabited especially the wooded mountains.

The Lion figures largely in the folklore of Morocco.

Its rapid disappearance from this country constitutes a very curious problem. Unlike the Cape Province and Algiers, Morocco remained wild and uncivilized up to a quarter of a century ago. Its inhabitants are far from being a hunting people, and few Euro-

peans have ventured there owing to the lack of security. (Cabrera, 1932, pp. 186-190.)

Heim de Balsac (1936, p. 98) places the disappearance of the species in Morocco in the decade 1900-1910—a considerably earlier date than Cabrera's.

Utilization by the Romans.—"There is . . . little doubt that the Romans drew their chief supply of lions for the arena and gladiatorial combats from Mauretania and Numidia." Pliny speaks of hundreds at a time being shown by Pompey and Caesar in the Roman arena. (Pease, in Bryden, 1899, p. 564.) This bespeaks a great abundance of Lions in North Africa at that period.

European Lion

LEO LEO subsp.

Of the Lion that still existed in Greece in classical times, no remains seem to have been found. If suitable material were available, the modern systematist would probably find means of distinguishing it from any living Lion as well as from its Pleistocene ancestor (*Leo spelaeus*) that once roamed over a large part of Europe. Up to the present time, however, it apparently has not received even a subspecific designation.

Meyer (1903, pp. 65-73) has provided a useful summary of our knowledge of the European Lion. Herodotus (ca. 484-430 B. C.) reports many Lions between the Achelous River in Acarnania and the Nestus River in Abdera (Thrace) and states that during Xerxes's march through Macedonia (480 B. C.) Lions killed some of his baggage camels. Aristotle (384-322 B. C.) assigns the same range to the Lion, but speaks of it as rare. By A. D. 80-100 it was considered entirely exterminated in Europe, as a result of a gradual retreat before man and his culture.

"The Greek name for the lion is very ancient, and this suggests that it refers to an animal indigenous to the country. Although the evidence is not decisive, it seems probable that lions did exist in Greece at the time of Herodotus; and it is quite possible that the representation of a lion-chase incised on a Mycenaean dagger may have been taken from life." (Flower and Lydekker, 1911, vol. 16, p. 737.)

Evidently Elliot regarded this Lion as identical with the prehistoric Cave Lion (*Leo spelaeus*). He writes (1883, text to pl. 1): "The Cave-Lion disappeared from Britain towards the close of the Postglacial period, and is considered to have retreated gradually from Europe and become extinct between 340 B. C. and A. D. 100. The cause of this disappearance, according to Dawkins, was the warfare carried on against it by the people of those periods, as

exhibited by the leonine remains found in the ancient dwelling places of the Postglacial men in Aurignac and La Madeleine. This is probably a correct supposition; for neither was the temperature unsuited for its continued existence nor had the supply of food failed."

Asiatic Lion; Indian Lion

LEO LEO PERSICUS (Meyer)

Felis leo persicus Meyer, Dissertatio inauguralis anatomico-medica de genere Felium [Vienna], p. 6, 1826. (Persia.)

SYNONYMS: *Felis leo goojratensis* Smee (1833); *Leo asiaticus* Jardine (1834). FIGS.: Trans. Zool. Soc. London, vol. 1, pl. 24, 1834; Jardine's Nat. Libr., vol. 15, Mammalia, pl. 11, 1842; Elliot, 1883, pl. 1, upper right-hand fig.; Pocock, 1930, pls. 1-3.

This Lion, once widely distributed from Asia Minor, Palestine, and Arabia to Persia and India, is now almost or entirely reduced to a small remnant in the Province of Kathiawar, in western India. There may be also a few solitary survivors in Persia and Iraq, but this is doubtful.

"On the average, the Indian lion has a scantier mane than the African and, curiously enough, . . . a fuller coat, a longer tassel of hair at the end of the tail, a more pronounced tuft of hair on the elbow joints and a fuller fringe of hairs on the belly. In size, there is little to choose between the two. . . . The largest recorded measurement of an Indian lion is 9 ft. 7 in., of an African lion 10 ft. 7 in." (Anonymous, 1935, p. 123.)

Asia Minor.—In 1878 or 1879 Sheik Mustapha informed Danford "that five years ago a Lion appeared near Biledjik [on the Euphrates toward the Syrian border], and after destroying many horses was done to death" (Danford and Alston, 1880, p. 53). This is the only definite locality record I have found for Asia Minor.

Syria, Palestine, and Arabia.—"The Lion has long been extinct in Palestine, and among the inhabitants there is no tradition of its existence. Yet of its former abundance there can be no question. It is mentioned about 130 times in Scripture Within the historic period it was common in Syria, Asia Minor, and Greece. . . . It seems to have disappeared altogether from Palestine about the time of the Crusades, the last mention of it being by writers of the twelfth century, when it still existed near Samaria. . . . It can scarcely be said now to exist in Asia west of the Euphrates, unless in Arabia, the latest trace being that a few years ago the carcass of one was brought into Damascus. . . . The Arabs state it is found in Arabia." (Tristram, 1884, p. 17.)

According to the Old Testament, the Lion was found in Lebanon

and on the Jordan. The ancient writers (Xenophon, Aristotle, Strabo, Pliny, etc.) speak of lion hunts in Syria and also in Arabia. (Meyer, 1903, p. 71.)

"To-day, the nearest [to Palestine] wild habitats of the lion are the jungles of the Upper Euphrates and several Arabian oases. But even in those places it must be on the verge of extinction." (Bodenheimer, 1935, p. 114.)

Iraq (Mesopotamia) and Persia.—In the early part of the last century Lions were noted fairly commonly along the Euphrates and the Tigris. The explorer Layard hunted them with the Bakhtiyari chiefs in Arabistan, whose sheep and oxen suffered from the Lions' depredations. By the middle of the century Layard reported the species as then found rarely on the Tigris as far north as Mosul, but frequently below Bagdad. He adds: "On the Euphrates it has been seen, I believe, almost as high as Bir On the [Jebel?] Sinjar and on the banks of the Khabour [in the northeast of the present Syria], they are frequently caught by Arabs. They abound in Khuzistan [western Persia]." (Kinnear, 1920, pp. 33-35.)

By 1891, according to Sir Alfred Pease (*Book of the Lion*), the "lion is no longer found in Asia Minor, but exists in Mesopotamia and Arabistan, between Poelis, west of Aleppo, and Deyr [in the present Syria], and in the Euphrates valley . . . ; it is also found in the lower part of the Karun river but is nowhere plentiful." (Kinnear, 1920, p. 36.)

Blanford writes (1876, p. 29): "The lion at the present day is found in Mesopotamia, on the west flanks of the Zagros mountains east of the Tigris valley, and in the wooded ranges south and south-east of Shiráz. It nowhere exists on the table land of Persia." To this O. St. John adds (in Blanford, 1876, pp. 30-31): "Lions, which are very numerous in the reedy swamps bordering the Tigris and Euphrates, are found also in the plains of Susiana, the modern Khúzistán, and extend into the mountain country south of Shiráz as far east as longitude 53°." Acorns of an oak (*Quercus aegilopifolia*) "feed the wild pigs whose presence tempts the lion into the mountains of Fárs. . . . The little valley of Dashtiarjan, thirty-five miles west of Shiráz, is notorious for the number of lions found in its vicinity. . . . Dashtiarjan is . . . a perfect paradise for swine, . . . so that the lions have plenty to eat Every year some four or five adult lions are killed in Dashtiarjan or the neighbourhood, and a few cubs are brought in to Shiráz for sale."

Edward Thompson (*London Times*, August 19, 1932?) gives the following reports for Mesopotamia: a Lioness and cubs seen by an Indian trooper near Ahwaz in 1917; a Lion cub brought through an Arab village near Sanniyat in 1916; and one shot in the Wadi

marshes a year later. He also mentions a report received by the Bombay Natural History Society of the continued existence of Lions in the Pusht-i-Kuh range of western Persia.

"There are Persian Lions, and the last time a pair of them was seen in the South of Persia by French and English Engineers (in 1928) The animals were carefully watched for several hours and were seen by hundreds of people. . . . I understand that the Persian ruler takes keen interest in their preservation and they are not allowed to be shot." (Hasan Abid Jafry, *in litt.*, August 17, 1933.)

The Persian Lion is a thing of the past. Firearms, whose use increased during the World War, were more dangerous to the Lion in Persia than in Africa. In 1923 the last of its kind was killed south of Shiraz. Yet the people still express belief in the existence of Lions. In the swamp and reed areas of the Euphrates and the Tigris I have been able to find no more trace of the Lion. The operations here during the World War paved the way for its extinction. Skins of Persian Lions are still found in some mosques. (Becker, 1934, pp. 439-440.)

The Lion may survive in the wilder mountains of Luristan and Khuzistan in southwestern Persia (Bombay Natural History Society, *in litt.*, December, 1936).

"The Syrians frequently used the lion motif as a frieze decoration, and at Persepolis, thirty miles northeast of Shiraz, where the magnificent ruins of the palace of Darius the Great may still be seen, the lion as a decorative architectural motif was constantly used. In the embrasures of some of the great doors of Persepolis the winged lions were magnificently carved." (Vernay, 1930, p. 82.)

Afghanistan and Baluchistan.—"There is no evidence to show that the lion inhabited Afghanistan or Baluchistan within historic times" (Kinneer, 1920, p. 37).

"I was told, while in Duzbad, the frontier town on the Baluch-Persian border, that the lion existed in Afghanistan seventy-five years ago. This is mere heresay, but it sounds quite reasonable." (Vernay, 1930, pp. 82-83.)

In 1935 Admiral Philip Dumas reported seeing a Lion at close range near the Bolan Pass, south of Quetta in Baluchistan (Jour. Bombay Nat. Hist. Soc., vol. 38, no. 2, pp. 381-382, 1935).

India.—"Within the present [19th] century, distributed over much of Central, West, and North-west India; but now confined in that country to the peninsula of Guzrat, unless a last remnant still maintains a lingering existence in the jungles bordering the Sind River in Bundelkund, which I now consider doubtful" (Blyth, 1863, p. 182).

Kinnear (1920, pp. 37-39) writes:

[The Lion] was formerly found in Sind, Bahawalpur and the Punjab, becoming extinct round Hariana, in the latter province, in 1842. It was however extinct in Sind before that date and the last on record was shot near Kot Deji in 1810. Exactly how far eastwards the lion was a regular inhabitant we do not know, though there is a statement of one being killed in the Palamaw district, Behar and Orissa, in 1814, but whether this was merely a straggler or not, there is no evidence to show. The southernmost limit appears to have been the Narbada. In 1832 one was killed at Baroda, while further north it was comparatively common round Ahmedabad in 1836. Central India in these early days was one of the strongholds of the lion and to give an idea of its numbers we may mention that Lydekker was informed that during the Mutiny, Colonel George Acland Smith killed upwards of 300 Indian lions and out of this number 50 were accounted for in the Delhi district!

The occurrence of the lion in Cutch is doubtfully recorded. The lion probably was found in Cutch at one time but the records are not satisfactory.

Dates of extermination in other parts of India, according to Kinnear, are: Damoh district (Saugor and Narbada territories), 1847-48; Rewah (between Allahabad and Jubbulpore), 1866; Goona, 1873; Abu and Jodhpur (Rajputana), 1872; Deesa (Guzerat), 1878; Palanpur (Guzerat), 1880.

A map, showing dates of extermination of the Lion in various localities in India, is given by Pocock (1930, facing p. 661).

"A small number [of African Lions] were imported into Gwalior" about 1890-1900, "but after a few years they became a pest, killing not only the cattle of the natives, but also the natives themselves, so that the African lions were all eventually shot out. Also, the tigers of Gwalior are famous, and as tigers will not permit lions to remain in their territory, they must have helped to kill off the lions." (Vernay, 1930, pp. 81-82.)

"In India the lion is verging on extinction. There are probably a very few still living in the wild tract known as the Gir in Kattywar, and a few more in the wildest parts of Rájputána, especially Southern Jodhpur, in Oodeypur, and around Mount Abu." (Blanford, 1888, p. 57.)

"In 1893 . . . a rough census was taken [in the Gir Forest], and the number remaining was estimated at twenty-six, which subsequent estimate raised to thirty-one. . . . There are now estimated to be only twenty lions remaining in the Gir, of which eight are cubs. (Lydekker, 1900, pp. 270-271, quoting from *The Asian* newspaper of June 19, 1900.)

"It is only in the Province of Kathiawar, a small peninsula north-west of Bombay, that the true Asiatic lion can still be found. Even there it exists only in the Gir Forest, an area of four hundred square miles in the State of Janagadh. . . .

"It is only a question of time before the lion will disappear even from this district, although at present it is closely protected. The number, which is roughly estimated at 200, is not increasing. The inevitable diminution of the forest, in spite of the restrictions against cutting, and the possibility of disease owing to the confined area, mean ultimate extermination." (Vernay, 1930, p. 81.)

Economics and conservation.—The Lions "commit considerable havoc amongst the cattle, which are brought into the Gir for grazing purposes during the greater part of the year, besides helping themselves liberally to the sambar, nilgai, spotted deer, and pig with which the forest abounds. . . . A large number of lions are kept in captivity in the State gardens at Junagarh, where they breed very freely." (L. L. Fenton, in Lydekker, 1900, pp. 410-412.)

"It is reasonable to suppose that the factors which exterminated it in Europe, Asia Minor and Syria and have brought it to the verge of extinction in Mesopotamia and Persia, even if they have not already achieved that end, were the same as the factors which exterminated it over almost the whole of the area it occupied in India. In my opinion there is no reasonable doubt that the main, if not the sole, factor in the case of Europe and southwestern Asia was man. At all events it was most emphatically not the tiger. . . .

"It is not unlikely, in my opinion, that the Kathiawar stock is deteriorating in size from inbreeding." (Pocock, 1930, pp. 641, 665.)

"I . . . hear that the status of the Indian lion, as far as preservation and numbers are concerned, is most satisfactory. They have of late been overflowing from their original reservations in the Gir Forests of Kathiawar and Junagadh State, and have made themselves unpopular by cattle killing. Their numbers are estimated to be not less than 150.

"It must be remembered that there is no wild life in their present habitat on which they can prey, and they live almost entirely on village cattle. There are, of course, far more cattle there, as in other parts of India, than are economically desirable; but . . . if the local native rulers were to withdraw their protection, the lion would speedily disappear. There is, however, little danger of this happening, and the villagers at present cooperate loyally in the protection of these animals; even to the extent, in a recent case, of pulling a lion out of a well into which he had fallen, with no little risk to themselves." (C. H. Stockley, *in litt.*, May 29, 1933.)

"Even in the Province of Kathiawar, where tigers do not exist and where no struggle for supremacy between these two giants of the tribe could have taken place, the lion was slowly driven from the Barda and Aleche hills, from parts of Dhrangadra and Jasdan as a result of human settlement and the progress of cultivation.

"The number of lions in the Gir is computed to be well below a hundred." (Anonymous, 1935, p. 125.)

Cadell (1935, pp. 165-166) writes as follows:

The animals are easily enticed across the boundary [of Junagadh State] by a succession of tie-ups. . . . To our certain knowledge . . . twenty-two animals have been so slain within the three seasons ending in 1934. . . .

If every year the State has the very real honour and pleasure of entertaining distinguished guests for a lion shoot, it is a distinction which costs a good many thousands of rupees. There is also the steady annual cost of the sums paid in compensation to villagers and herdsman whose cattle have been killed by lions. . . .

There were supposed to be less than a dozen [lions] in 1880 As a result of the strict preservation during the [British] Administration [from 1911 to 1920] the number was believed to have increased to fifty It has since been stated . . . that there are now two hundred lions. . . . My own opinion . . . is that there are not much more than 75 to 80. . . .

The pressure on Junagadh of suggestions for invitations to shoot lions is . . . increasing year by year Unless an agreement is reached [to limit the number shot in one year to some such figure as five or six], and is faithfully observed, the danger of the disappearance of the lion from the fauna of India, and consequently from its last home in Asia, is obvious.

Cape Lion. Leeuw (Boer)

LEO LEO MELANOCHAITUS Hamilton Smith

Leo melanochaitus Hamilton Smith, Jardine's Naturalist's Library, vol. 15, Introd. to Mammalia, p. 177, 1846. ("Cape of Good Hope.")

Figs.: Griffith's Anim. Kingdom, vol. 2, pl. facing p. 428, 1827; C. H. Smith, 1846, pl. 10; Harris, 1840, pl. 29; Pocock, 1931, p. 208, lower fig.

The Cape Lion was the first of the African subspecies of *Leo leo* to become extinct. The last record for the Cape Province is apparently 1858; for Natal, 1865.

"The species is of the largest size, with a bull dog head; . . . large pointed ears edged with black; a great mane of the same colour extending beyond the shoulders; a fringe of black hair under the belly; a very stout tail, and the structure in general proportions lower than in other Lions" (C. H. Smith, 1846, p. 177).

Pocock (1931, p. 208) writes as follows concerning a mounted specimen in the Junior United Service Club, London, which is "said to have been killed near the Orange River about 1830, probably . . . near Colesberg":

The mane is not only remarkable for its luxuriance, length and extension over the shoulder, but also for its blackness. It is indeed wholly black except for the tawny fringe round the face and a certain amount of the same pale hue low down on the shoulder.

The elbow-tuft and tail-tuft are likewise big and black; but the belly fringe, long and thick behind, becomes gradually shorter and thinner and gradually disappears in front of the chest.

The interest of this lion lies in its being, so far as I am aware, the only

representative, in this country at all events, of the now extinct race of splendid lions which formerly inhabited Cape Colony. . . .

The former range and the date of the extermination of the handsome South African race are alike unknown.

Pocock adds that Smith's type specimen appears to have been a rickety captive.

Roberts (1929, p. 92) quotes from Paterson (1789) the following measurements of a lioness from the southern part of Cape Province: total length, 8 feet 9½ inches; tail, 3 feet; "height before," 3 feet 8 inches.

Owing to lack of material, the exact limits of the range of the Cape Lion will never be known. For present purposes the Cape Province and Natal will be considered to comprise the former range.

"Civilization's steady march in South Africa during the past twenty years has considerably limited the range of the lion. The vast herds of game upon which he depended for food being swept away, he has been forced to retire into remoter regions. From much of the South Africa of Gordon Cumming he has vanished completely and forever." (Kirby, in Bryden, 1899, p. 549.)

"With regard to past times—Kolben (1731), states that lions were not uncommon near Cape Town as late as 1707, Sparrman (1785), Paterson (1790), Thunberg (1795), and Barrow (1801), all met with these animals as soon as they got away from the immediate neighbourhood of Cape Town especially on the karoo and in Uitenhage. The last record I have met with of the occurrence of a lion south of the Orange River is of one killed with assegais near Commetjes Post on the eastern frontier in 1842, as noted by Hall. General Bisset shot a lion in Natal in 1865, which is probably the last record for that Colony." (W. L. Sclater, 1900, vol. 1, p. 31.)

"Their food . . . consists of the larger game, mainly antelopes of all kinds, but also includes zebras, giraffes, and buffaloes. They will kill the donkeys and cattle belonging to prospecting and hunting parties, and will raid Kaffir kraals when driven to it by hunger. Man-eating lions are generally old animals with bad teeth." (Haagner, 1920, pp. 69-70.)

"It is stated that a lion was shot on the Ingonyama Tributary of the Tsomo River, Transkei, in 1858. One was reported from Port Alfred in 1846, and one was killed by shot from a spring gun on the farm Lombards Post near Southwell, near Bathurst, about 1850." (Hewitt, as quoted by Shortridge, 1934, vol. 1, p. 80.)

The nearest areas to the former range of the Cape Lion, that are still inhabited by some form of the species, are South-West Africa, the Kalahari, and eastern Transvaal. The last-mentioned area (especially the Kruger National Park) is the home of the Sabi Lion (*Leo leo krugeri* Roberts).

Manchurian Tiger; Siberian Tiger; Amur Tiger; Mongolian Tiger

PANTHERA TIGRIS LONGIPILIS (Fitzinger)

Tigris longipilis Fitzinger, Sitz.-ber. Akad. Wiss. [Wien], math.-nat. Cl., vol. 58, pt. 1, p. 455, 1868. ("Korea and Japan through northern China, Manchuria, Mongolia, and Dzungaria north to southern Siberia, and west through northern Tatory, Bokhara, and northern Persia to Mount Ararat in western Armenia"; type locality restricted by Lydekker (1901, p. 288) to "Amurland." Cf. Harper (1940, p. 194).)

SYNONYM: *Felis tigris* var. *amurensis* Dode (1871).

FIGS.: Pocock, 1929, pl. 4, pl. F (upper fig.); Morden, 1930, p. 548, fig.; Pocock, 1937, p. 770, fig.

This Tiger, whose principal range is in northern Manchuria and southeastern Siberia, seems to be declining rather rapidly in numbers.

It is somewhat larger and has a longer and thicker coat than the Bengal Tiger; ground color paler; stripes less pronounced and tending to become brown on the flanks. It is said to reach a length of 13-14 feet.

Siberia.—The following information is from Ognev (1935, pp. 292-293). Radde (1862) found the species along the Argun River near Ust Strielka and near Nerchinskiy Zavod. Baikov (1925) places its northern limits at the Shilka and the lower Zeya and Bureya Rivers. It is numerous in certain parts of the southern Ussuri district. A specimen in the Zoological Museum of the University of Moscow was said to have been taken in 1828 near Balagansk, west of Lake Baikal (Severtzov, 1855). (This record can not be definitely allocated as to subspecies.)

Ford Barclay (1915, pp. 225-228) gives the following account:

Careful inquiries made in the summer of 1899 along the present route of the Siberian Railway, as far as Chita and Niertschinsk on the Amur and thence east along that river as far as Khabarovsk, elicited practically no information

At Khabarovsk . . . plenty of information was forthcoming, and many tales were floating about of the depredations of these animals during the winter in close proximity to, and even in one case within, the town itself. . . . The best ground was reported to be in the neighbourhood of Irma, . . . a little more than half-way to Vladivostok, [where large numbers of Wild Pigs attracted the Tigers.]

At Irma I learnt that a number of skins were undoubtedly brought in every winter, but it was believed that in most cases their wearers had been accounted for by poison. . . .

In 1899 it was still not uncommon to find fresh footprints of tiger on a winter's morning in any of the outlying streets of Vladivostok

In the mountainous district between Harbin and Vladivostok a certain number are poisoned by the natives every winter.

According to Sowerby (1923, p. 31), this Tiger occurs throughout the forested areas of the Amur and the Ussuri, into Primorsk in the

extreme east. It is said to be most plentiful in the Amur Province, round the mouth of that river; it is also numerous in the Ussuri Valley. Westward it probably extends almost to the Yablonoi Mountains.

"North of Khabarovsk they are extremely rare in the East, though I understand there are a few in the Bureya Mountains. We saw the tracks of only one in the region of Troitskov. In the Ussuri River region they seemed to be relatively plentiful. East of Bikin the forest seemed to be well tracked with tiger trails, but one tiger throughout the winter can make a lot of tracks. We secured three tigers fifty miles east of Bikin, during the winter 1929-30. As far as I could learn, these were all the tigers taken in this region during that winter. That the tigers have been able to hold their own up to now seems somewhat encouraging, though the present extended lumber activities of the Soviet Government take many Russian hunters into the forest. Previously about the only people who hunted the tiger were the Tungus tribes, with their primitive traps and snares. I, personally, am under the impression that it is only a matter of time until the tigers are reduced to the point of extermination.

"Tigers bring a big price in China, as medicine, but the hunter has to cover a lot of territory and work hard to get even one animal." (G. G. Goodwin, *in litt.*, May 18, 1937.)

Referring to the Maritime Province, Sowerby says (1934c, p. 40): "Tigers of the long-haired species, whose skins are so valuable, were being secured in greater numbers than before, for, whereas formerly about ten of these great cats were killed in the province each year, over twenty had been killed during the first three months of the present year."

W. G. Heptner writes (*in litt.*, December, 1936) that more than ten are killed each year in eastern Siberia. Hunting is allowed throughout the year. Protection is given, however, in the reserve of Sikhota Alin.

"Schrenck (1859, pp. 95-96) reported *Felis tigris* from Sakhalin as a rare winter visitor from continent, but his statement seems very doubtful" (Kuroda, 1928, p. 226). Ford Barclay (1915, p. 225) could find no evidence of its occurrence there.

Manchuria.—In this country, says Sowerby, the Tiger is "the most dreaded of the carnivores." He continues (1923, pp. 30-32):

His thick winter coat fetches a high price in the fur-markets of the world, being worth far more than those of the Bengal, Persian or Sumatran tigers. Not only is his skin of value, but his whole carcass; for the Chinese believe that the bones, blood, heart, and even the flesh of the tiger have medicinal properties of rare power, and will pay a goodly price for decoctions brewed by the apothecary that contain such ingredients as powdered tiger's knee-cap,

or clotted tiger's blood. The heart of the tiger is supposed to impart to the consumer the courage and strength of the tiger itself.

On this account the tiger has been hunted till he is almost extinct in most districts of North China, where once he was common, and now survives, even in Manchuria where he was once plentiful, only in the more remote and inaccessible forest areas, such as the Ch'ang-pai Shan, the Khingan Mountains, or the more or less unexplored and thinly settled areas of the Amur and Ussuri. . . .

Formerly the tiger was extremely plentiful in all the forested areas of Manchuria. Indeed, it is said, they were so plentiful along the route of the western portion of the Chinese Eastern Railway when under construction, that they became a positive pest, killing and carrying off workmen, till a regiment of Cossacks had to be sent to cope with the situation. . . .

In the forests of North Kirin and in Central and Western Heilungkiang tigers are killed by the local hunters every winter.

The same author adds (p. 33) that the Russian hunters in Manchuria track the Tiger down in the snow, camping on its trail and following it for as much as ten days or a fortnight. The Chinese usually employ traps, pitfalls, and poison.

Mongolia.—In view of the fact that one of the names applied to the present subspecies is "Mongolian Tiger," it is surprising to find such a dearth of definite records from that wide country. According to Ognev (1935, p. 292), Radde (1862) reported the Tiger from the district of Uriankhai (the present Tannu-Tuva), but later explorers have not found it there. (The subspecies of this region has not been determined.) Various other references in the literature to Tigers in Outer Mongolia give no information as to specific localities. Apparently the only likely areas for their occurrence are in north-eastern and eastern Mongolia, along the Siberian and Manchurian boundaries.

Korean Tiger; North China Tiger

PANTHERA TIGRIS COREENSIS (Brass)

Felis tigris coreensis Brass, Nutzbare Tiere Ostasiens, pp. 4-5, 1904. (Korea.)
(Fide Kuroda, 1938, p. 40.)

FIGS.: Ford Barclay, 1915, pls. 84, 85; Sowerby, 1923, pl. 2 (*coreensis?*);
Sowerby, 1933, pl. facing p. 166; Ognev, 1935, pp. 285-286, figs. 129-131.

This Tiger apparently occurs in small numbers from Korea and southern Manchuria westward through the eastern border of Inner Mongolia and through North China. Its southern limits, where it presumably intergrades with the South China form, are not definitely known but perhaps may be roughly fixed at the divide between the Hwang Ho and the Yangtze Kiang Basins.

The North China form differs from the Manchurian Tiger "in being smaller, much darker and more fully striped and in having a shorter less woolly winter coat" (Pocock, 1929, p. 531).

Korea.—"In the Korea great value is apparently placed upon the skins, which are reserved for the chiefs" (Elliot, 1883, text to pl. 3).

Ford Barclay (1915, pp. 228-231) gives the following account:

Tiger are probably more numerous in the north than in the southern part of Korea

In the neighbourhood of the foreign mining concessions, near the Yalu, dynamite is or was used with some success by native hunters, a small, specially constructed bomb being somehow concealed in the bait. Lately, however, . . . the Japanese police have forbidden the supply of dynamite for this purpose. Drop traps, weighted with stones and huge logs, are very common, and many tigers are accounted for in this way every year.

[In Manchuria] the natives lay down poison wholesale. This is forbidden now in Korea

My own most successful hunts have been in the island of Chindo, . . . situated at the south-west corner of Korea. . . . Early this year (1914) the body of a tiger was washed up on the west coast of Japan south of Matsue, at least 120 miles from the nearest mainland, from whence alone it could have come; yet, as reported in the press, its condition was such that the skin was removed for dressing and parts of the flesh sold for consumption! . . .

This demand for tiger flesh on the part of the Japanese is a curious survival of barbaric superstition in such a highly civilized race. One of their chief officials sent me an urgent request for a shoulder on hearing of a successful hunt. This joint for some reason is supposed to possess greater medicinal virtue than any other, and the shoulder blade ground to powder is a certain cure in the most advanced stages of insanity!

When a tiger is killed [in Korea] notice is at once sent to the elders of all villages within a radius of five miles, [and on their arrival a] wrangle ensues as to who are to be the privileged half-dozen to partake of a cupful of the ambrosial liquid left in the abdominal cavity, after the removal of the intestines. . . .

Among both Chinese and Koreans, tiger's blood is believed to have an extraordinarily rejuvenating effect, greater even than the highly prized wapiti or sika horn

Of the twenty odd skins I have seen in South Korea all have been much darker in colour than the half-dozen brought for my inspection in East Siberia

In the happy days before the Japanese occupation and the consequent confiscation of fire-arms, when the depredations of a tiger became too pronounced, the active male inhabitants of the villages in the neighbourhood, perhaps half a dozen, armed with matchlocks, and as many more with heavy spears, would arrange for a day or two's driving in the adjacent hills. Occasionally these hunts were successful.

"In North Corea tigers are said to be still fairly numerous, and every year some are killed there by sportsmen" (Sowerby, 1923, p. 31).

In 1922 Kermit Roosevelt (in Roosevelt, Roosevelt, Derby, and Roosevelt, 1927, pp. 41-84) undertook an extensive but unsuccessful Tiger hunt with beaters in various localities of northern Korea. Some old tracks were found, but apparently the species is by no means common there.

Manchuria.—Sowerby's records (1923, p. 30, pl. 2) from the

Ch'ang-pai Shan, close to the Korean border, may refer to the present subspecies rather than to *longipilis*.

Inner Mongolia.—"A stuffed tiger's skin used to repose in a temple in Lama Miao (Dolonor) It was said that the animal . . . was killed in the streets of Lama Miao itself, having wandered from the Wei-ch'ang, or Hunting Grounds, to the east of that town." (Sowerby, 1923, p. 32.)

China.—Sowerby (1923, pp. 31-32) writes of this Tiger in China:

How far west it extends is difficult to say, but it certainly reaches the western border of the province of Shansi, in North China, and southward reaches at least to the middle of the southern half of that province. From there it extends northward into Mongolia and in a north-easterly direction through Chihli, where it still occurs in the wilder parts of the Tung Ling and Wei Ch'ang (the Eastern Tombs, and Imperial Hunting Grounds) to the North-east and North of Peking

In North China the tiger is becoming increasingly rare. In 1909 I saw the tracks in the snow of what must have been a very large animal in the mountains of West Shansi, in the Ning-wu district. I also heard of tigers in the Ko-lan Chou area and the Chao-ch'êng Shan, both heavily forested districts further south in the same province. Further south still near P'ing-yang Fu a tiger was killed by the natives about the year 1912. I have seen skins of tigers that were said to have come from the Kuei-hua Ch'êng area in North Shansi, and they were undoubtedly of the true long-haired type. The natives in this area also insisted that tigers occurred there. . . .

According to Chinese accounts tigers also exist in Kansu, and on the Thibetan border, but I have been unable to get any satisfactory verification of this. It is more than likely that these animals occur for a considerable distance west of Kuei-hua Ch'êng into that little known mountainous country leading to the Ali Shan.

In the early part of the present century an old native hunter reported the occurrence of three Tigers in the Eastern Tombs forest, in Hopei, during his lifetime. In 1932 a Tiger was killed after it had invaded a shop in the Yu Hsiang district of South Shansi. (Sowerby, 1933, pp. 167-168.)

Owing to lack of specimens, it has not been determined whether the occasional Tigers reported in Szechwan (*cf.* Wilson, 1913, pp. 178-179, and Weigold, 1924, p. 74) belong to the North China or to the South China form.

"Tiger-bones . . . are a highly prized Chinese medicine, and are supposed to transmit vitality, strength, and valour to those who partake of them. In the Imperial Maritime Customs Trade Returns of Hankow for 1910 is the following item: 'Tiger-bones, 77 piculs; value, Tls. 6522.'" (Wilson, 1913, p. 179.)

"It is problematical whether or not predatory animals should be protected in a thickly populated country like China, but it seems a pity that such fine carnivores as the Chinese tiger (*Panthera tigris styani* Pocock), the Amoy tiger (*Panthera tigris amoyensis* Hilz-

heimer) [,] the Manchurian tiger (*Panthera tigris amurensis*, Dode) . . . should not be preserved as part of this country's wonderfully rich mammalian fauna" (Sowerby, 1937, p. 257).

[In South China, from Chekiang and Hupeh southward, and also westward to Yunnan, the Tiger occurs somewhat more commonly than in the more northerly regions. To this form Hilzheimer has given the name of *Felis tigris* var. *amoyensis* (Zool. Anz., vol. 28, p. 598, 1905; type locality, presumably the vicinity of Hankow, Hupeh). It is recognized by G. M. Allen (1938, p. 480), who regards *Panthera tigris styani* Pocock (1929) as a synonym. W. L. Smith (1920, pp. 355-363) gives an extremely interesting account of the methods of the native hunters in the vicinity of Amoy, who, armed only with torches and trident spears, track the Tigers into caves. There is also an account of the Tiger of Fukien by Andrews (in Andrews and Andrews, 1919, pp. 44-66).

In French Indo-China, Siam, and the Malay Peninsula the Tiger seems to be moderately common. For example, the number in Cochin China is estimated at 200-300; here it is of interest from the point of view of big-game hunting, but not commercially (Roche, Chef du Service Veterinaire du Cochinchine, *in litt.*, 1937). Rodolphe M. de Schauensee informs me that the Tiger is common in Siam (Thailand) but preys chiefly on the wild game and does not seem to be regarded as a serious pest. The Tiger of these regions is not distinguished by Pocock (1929, pp. 532-533) from the Indian Tiger.

The Indian or Bengal Tiger (*Panthera tigris tigris* (Linnaeus)) ranges westward through Burma to India, where it inhabits the greater part of the Peninsula from the southern slopes of the Himalayas southward, but avoids the treeless and desert areas. It is not yet rare enough to call for any special discussion in this report.]

Tiger of Chinese Turkestan

PANTHERA TIGRIS LECOQI (Schwarz)

Felis tigris lecoqi Schwarz, Zool. Anz., vol. 47, no. 12, p. 351, 1916. ("Gebiet von Kurla, Lop-nor-Gebiet" (probably near Bagrash Kul), Chinese Turkestan.)

All the Tigers of Chinese Turkestan will be treated for convenience under this name, although the exact limits of the subspecies are unknown. Evidently the animal is not at all numerous, and its numbers may have declined to the point of extinction. In his review of the Tigers, Pocock (1929) seems to have overlooked the name of this subspecies as well as the occurrence of any Tiger in Chinese Turkestan.

This is a very brightly colored Tiger, with regular pattern, fore-legs unstriped in front, conspicuous shoulder tufts, short neck mane, thick cheek whiskers, slightly lengthened abdominal hair, and a thick winter pelage. It differs from the form of Russian Turkestan in having smaller stripes and dull brown instead of black thigh markings. (Schwarz, 1916, p. 352.)

J. H. Miller (in Carruthers, 1913, pp. 582, 609-610) writes of this Tiger:

The dense jungles which cover so large a portion of the [Dzungarian] lowlands . . . are the haunts of the tiger

The tiger inhabits the same country as the wapiti, though, perhaps, keeping rather more to the dense reed-jungle. It is, however, not entirely restricted to the plains, for in the Kash, Kunguz, and Jingalong valleys, on the Upper Ili River, it is found at an altitude of from 4,000 to 5,000 ft. among the thick scrub on the edge of the spruce forest. Every year a few tiger-skins find their way into the Urumchi, Manas, or Shi-Kho bazaars. They are, in nearly every case, secured in winter, by the farmers and herdsmen living on the edge of the jungle, by means of poisoned carcasses of sheep or goats. Very few of the natives would dare to fire at a tiger Wild-pig . . . are undoubtedly the tigers' staple food, but during the winter they occasionally raid a farmer's flocks, and it is then that poisoned carcasses are laid out for them. . . .

I doubt if they are anywhere numerous. . . .

It must be remembered that the tiger which inhabits Dzungaria and the Tarim basin, also the Ala Kul, Balkash, Syr Darya, and other portions of Russian Turkestan, is a very different animal to the Manchurian variety. It is not so long-haired, and it is considerably smaller and less finely marked.

Theodore Roosevelt (in Roosevelt and Roosevelt, 1926, p. 166) writes of Tigers in the Tian Shan: "We were told that they existed no longer in the Tekkès. . . . They [the natives] said that during the last ten or fifteen years the native hunters had killed them off with poisoned meat."

"The tiger . . . formerly ranged in the forests on the edges of the Tarim Basin and the swampy areas along the northern slopes of the Thian Shan. . . . The tiger seems to have been exterminated." (Morden, 1927, p. 123.)

Alphéraky (1891) reported the species from the Tekes and the lower Kunges, tributaries of the Ili River in Dzungaria (Ognev, 1935, p. 291).

"The . . . tiger, which formerly inhabited the woods of the middle Tarim, seems to be dying out" (Hedin, 1940, p. 149).

Caspian Tiger; Persian Tiger

PANTHERA TIGRIS VIRGATA (Illiger)

Felis virgata Illiger, Abhandl. K. Akad. Wissen. Berlin, 1804-11, physikal. Kl., pp. 90 and 98, 1815. ("In Persien und am Kaspischen Meere"; type locality restricted by Harper (1940, p. 194) to the "Province of Mazanderan, northern Persia.")

SYNONYMS: *Felis (Tigris) tigris septentrionalis* Satunin (1904); *Felis tigris trabata* Schwarz, 1916.

FIGS.: Heck, *Lebende Bilder*, p. 157, 1899; Kennion, 1911, pl. facing p. 251; Pocock, 1929, pl. D, lower fig., pl. 3; Ognev, 1935, figs. 121-124.

While the Indian or Bengal Tiger (*Panthera tigris tigris*¹) probably exacts a greater annual toll in human lives than any other carnivorous mammal, some of its races in western, central, and eastern Asia and in the Malay Archipelago conflict to a far less degree with the interests of mankind. In any event, their numbers have been reduced to a point where they are entitled to a place in the present work.

The Caspian race is "generally a medium sized or smallish tiger with a thick longish winter coat, dark in colour, with numerous, close-set stripes showing a marked tendency to brownness on the whole or parts of the body." Length of male, about 10 feet 8 inches; of female, about 8 feet 6 inches. (Pocock, 1929, pp. 522, 540.)

The range of this Tiger extends from Transcaucasia (formerly through northern Persia to northern Afghanistan; presumably the same form occurs northward to the Aral Sea and Lake Balkash in Russian Turkestan (formerly to the upper Ob Basin and the Altai region).

Transcaucasia.—"A few are annually killed in Turkish Georgia" (Blyth, 1863, p. 182).

Satunin reports (1906, pp. 308-309) as follows on the Tigers of Talish:

At the time of Radde's first expedition to Lenkoran in 1866 Tigers were still very numerous there. In seven weeks six fresh skins were offered him. But in 1879-80, in the course of eight months, he could not secure a single fresh skin. Tigers still occurred, but were very rare. According to the hunters' reports, the animals were quite extirpated somewhat later, but in the 90's they began to increase, and at the time of my expedition (1897-99) two to four specimens were taken annually. At present they occur chiefly in the Prišib district of Lenkoran, both in the lowland forests and in the foothills. In 1899 Tiger tracks were found on the Mugan Steppe, where the animal had gone apparently in pursuit of Wild Boars.

Satunin also expresses here the conviction that the numerous reports of Tigers in other localities of Transcaucasia are due to a confusion of this species with the Leopard. In a previous paper (1896, pp. 289-290) he had stated that they occurred formerly as far as the ridge of the Great Caucasus, and he had quoted Nordmann's report of Tigers killed near Tiflis in 1835. The species is now exterminated in Transcaucasia (W. G. Heptner, *in litt.*, December, 1936).

¹ *Felis tigris* Linnaeus, *Syst. Nat.*, ed. 10, vol. 1, p. 41, 1758. (Bengal.)

Persia.—Gmelin (1774, vol. 3, pp. 485-486) reports the animal as pretty common in the forested mountains of Mazanderan. It seldom makes unprovoked attacks on man. The skin is highly prized, and is used for a horse-covering.

Blanford writes (1876, p. 34): "The tiger is only found in Persia in the Caspian provinces, Mazandarán, and Ghílán, lying to the north of the Elburz mountains . . . These provinces, unlike the plateau of Persia, are covered with dense forest, and in them the tiger ranges up to an elevation of at least 5000 or 6000 feet."

To this St. John adds (in Blanford, 1876, p. 34): "Tigers are very numerous in the Caspian provinces of Persia, and in the Caucasus as far as the mouth of the Araxes. . . Cubs are often captured in Mazandarán and brought to Tehrán. I have seen specimens in the Bágh-i-Wáshi quite equal in size to Bengal tigers."

In Mazanderan, sometime prior to 1911, "Col. Kennion only came across two examples of this tiger; and there is reason to fear that the race is on the wane" (Pocock, 1929, p. 522). "Considering the abundance of game and the fewness of the tigers' foes, it is quite a problem why the latter are not more numerous in these parts" (Kennion, 1911, p. 246).

The British Museum has a specimen obtained at Astrabad in 1882 or earlier. In Astrabad and the adjacent portion of Turkestan the Tiger occurs in various localities, including the Gurgan, Atrek, Sumbar, and Chandir Rivers (Ognev, 1935, pp. 289-290).

Afghanistan.—In this country, as in Persia, the species appears to be restricted to the northern part. "The tigers of the Perso-Turkestan district . . . were doubtless excluded from India by the Hindu Koosh and the desert areas of Persia and Baluchistan" (Pocock, 1929, p. 509).

"Ferrier in his 'Caravan journeys' speaks of tigers in the jungles of the Hari Rúd north-west of Herat" (St. John, in Blanford, 1876, p. 34).

The Afghan Delimitation Commission (1884-85) obtained a specimen from Karaol-khana on the Murgab close to the Turkestan boundary. Tracks were reported in the valley of the Hari Rud, and were also found at the Chashma-sabz Pass, at an elevation of 5,000 feet, in the Paropamisus Range. "During summer . . . they wander over the great rolling plains of the Badghis [on the north side of the Paropamisus Range], ascending to higher altitudes with the increase of heat, depending for their food on Pig, Oorial, and even Ibex. In winter they resort to the . . . thickets of the larger streams and main rivers, to which their usual food, the Pig, also retires. The Turkomans say that an old and toothless Tiger is especially destructive to sheep." (Aitchison, 1889, p. 56.)

Russian Turkestan and Western Siberia.—Ehrenberg reports (1831, p. 389) that Tigers are frequently observed on the Tarbagatai Mountains southwest of Zaisan Nor; also that the Cossacks of the Irtish have several times killed Tigers on the Kirghiz Steppe, spearing them from horseback.

“North of the Hindu Kosh, Tigers occur in Bokhara, and proved troublesome to the Russian Surveying Expedition on the shores of the Aral in midwinter. They are also found on the banks of the Irtisch, and in the Altai region.” (Blyth, 1863, p. 182.)

Atkinson (1858, p. 282) mentions four specimens in the museum at Barnaul, western Siberia. “The tigers were killed in Siberia at different places, some at a distance of about five hundred versts from Barnaul; they had come from the Kirghis Steppe, and crossed the Irtisch into the Altai in the region around Bouchtarminsk. . . . They are rarely found in Siberia; it is only when they are driven from the steppe by hunger that they cross the Irtisch—most probably when following the track of their prey: many peasants do not even know them by name.” Atkinson also reports (p. 486) many Tigers about the western end of the Ala Tau, southeast of Lake Balkash.

According to Severtzoff (1876, p. 49), the Tiger “is common in Turkestan, especially up to about 4000 feet altitude; but beyond that it is rare in winter, and only in the summer does it visit localities which are higher than 7000 feet.”

Carruthers writes (1915, pp. 149-150): “In the same locality [Oxus or Amu Darya Valley] inhabited by the Bokharan stags, tigers are fairly numerous. These we know range the whole course of the Oxus from the Sea of Aral to the foot of the mountains near Kulab. They are seldom hunted or seen. I have good reason to believe they wander across the desert from the Oxus to the lower Zarafschan. The natives speak of them, and I am certain I heard one one night in the saxaul forests which surround the swamps where the river loses itself in the sands, and where large numbers of wild pig roam.”

The British Museum has a skull from the vicinity of Pindjeh, on the Murghab (Pocock, 1929, p. 522).

In Turkestan the Tiger reaches its northwestern limit at the Gulf of Karabugas on the Caspian Sea, avoiding the Ust Urt Plateau. It was formerly numerous on the Murghab and Tejend Rivers, the last having been killed in that region in 1904. During a period of some years prior to 1915 nine Tigers were killed in the Syr Darya region. The species also occurs in the valley of the Chu and on the Amu Darya delta. In 1887 it was reported as abundant on the lower Ili River and on the southeastern shore of Lake Balkash; by 1930 its numbers in this region were few. There are old records from the

Tarbagatai Mountains southeast of Zaisan Nor, and from Zmeinogorsk, Bisk, and Barnaul in the Ob Basin of western Siberia. The Tiger has entirely disappeared from its former haunts in the Dzungarian Alatau. In Tajikistan it occurs on the upper Vashni and on the Kafiringan Darya. (Ognev, 1935, pp. 273, 290-292; map, p. 295.)

The following information is from W. G. Heptner (*in litt.*, December, 1936): The Tiger is found in limited numbers, but regularly, at the mouths of the Amu Darya and the Syr Darya and on Lake Balkash. It is more common on the upper course of the Amu Darya and on its right tributaries. It comes over accidentally from Persia and Afghanistan to Kopet-Dag, the upper Tejend, the upper Murghab, and Transcaucasia (Talish). During the past 50-70 years the numbers have been considerably reduced by hunting. The range has also been reduced, and in certain areas (Transcaucasia, middle Syr Darya, and Murghab) the Tiger is now exterminated. It is difficult to estimate the total number, but there may not be more than 200 in Russian Turkestan. The best areas are the headwaters and the mouth of the Amu Darya. The Tiger is rarely met with at the mouth of the Ili River on Lake Balkash, where probably only ten or twelve animals exist. At the mouth of the Syr Darya it is probably only a visitor, coming from Amu Darya. Hunting is allowed throughout the year.

Javan Tiger

PANTHERA TIGRIS SONDAICA (Fitzinger)

Tigris sondaica Fitzinger,¹ Sitz.-ber. Akad. Wiss. [Wien], math.-nat. Cl., vol. 58, pt. 1, p. 454, 1868. ("Java und Sumatra"; type locality restricted by Schwarz (1912, p. 324) to Java.)

The meager information available concerning the status of the Javan Tiger indicates that it is no longer very numerous or generally distributed on that island.

"Ground-colour light rusty; stripes very narrow, often duplicated. . . . Fur short and close." (Schwarz, 1912, p. 325.) "Apparently closely resembling the Sumatran race in size and coloration, but distinguished from it, and from all other tigers, by the marked constriction of the occiput" (Pocock, 1929, p. 541).

In 1851 Horsfield (p. 44) remarked that Tigers were "numerous and destructive . . . in many parts of Java."

"Many tigers . . . may be found" on the Oedjoeng koelon Penin-

¹This name is antedated by *Felis tigris sondaicus* Temminck (Coup-d'oeil Possessions Néerlandaises, vol. 2, p. 88, 1847). It is highly questionable, however, whether Temminck's excessively brief and insufficient description ("le grand tigre rayé de Sumatra et de Java forme une espèce distincte du tigre rayé du continent de l'Inde") is nomenclaturally valid.

sula, at the extreme western end of Java, which constitutes a nature reserve (Dammerman, 1929, p. 34).

"In Java, the tigers living up to 1914 in the swamp country near Maoek, are now extirpated. In 1931 they were seen on the Goenoeng Malabar. They are also found in the Baloeran District, southern Banjoewangi, in the Southern Mountains, and near Banjoemas. Two to four are shot every year at Tampomas. Finally a number of tigers are also reported from S. E. Garoet" and from the Midangan district. (Heynsius-Viruly and Van Heurn, 1936, p. 58.)

[The Sumatran Tiger (*Panthera tigris sumatrae*¹), although less common than formerly, is still numerous in various districts, and its protection is not urged at present. (Heynsius-Viruly and Van Heurn, 1936, p. 59).]

Bali Tiger

PANTHERA TIGRIS BALICA (Schwarz)

Felis tigris balica Schwarz, Ann. Mag. Nat. Hist., ser. 8, vol. 10, p. 325, 1912.
("Den Pasar, Süd-Bali.")

Fig.: Schwarz, 1913, p. 71, fig.

In Bali the Tiger seems to be in rather imminent danger of extinction.

It is very similar to the Javan Tiger, but smaller; ground color somewhat brighter, and the light markings clearer white; fur short and close. Head and body, 1,530 mm.; tail, 580 mm. (Schwarz, 1912, p. 326.)

About 1909-12 the Tiger was considered fairly common in Bali; yet information concerning damage done by it was not forthcoming (Schwarz, 1913, p. 73).

"A few yet live in West Bali, but they are having a hard time because they are much sought by hunters from Java, so that they will certainly disappear within a few years. The species also exists in N. W. and S. W. Bali." (Heynsius-Viruly and Van Heurn, 1936, p. 58.)

Order PROBOSCIDEA: Proboscideans

Family ELEPHANTIDAE: Elephants

The Elephants are composed of an Asiatic genus (*Elephas*) and an African genus (*Loxodonta*). Lydekker (1916) recognizes 4 Asiatic forms and 11 African forms, but Dr. Allen (1939b) ques-

¹ *Panthera tigris sumatrae* Pocock, Jour. Bombay Nat. Hist. Soc., vol. 33, no. 3, p. 535, pl. H, 1929. ("Deli, Sumatra.")

tions the taxonomic status of all but 4 in the latter group. The distribution of the family covers southeastern Asia (India, Burma, Ceylon, Thailand, French Indo-China, Malay Peninsula), Sumatra, Borneo (introduced?), and the greater part of Africa south of the Sahara. Accounts of three forms are supplied herein.

Malay Elephant

ELEPHAS MAXIMUS HIRSUTUS Lydekker

Elephas maximus hirsutus Lydekker, Abstr. Proc. Zool. Soc. London, no. 130, p. 20, 1914. ("Kuala Pila district of the Negri Sembilan province of the Malay Peninsula" (Lydekker, 1914*b*, pp. 285-286).)

Figs.: Lydekker, 1914*b*, p. 285, fig. 1; Lydekker, 1916, vol. 5, p. 84, fig. 25.

The Elephant of the Malay Peninsula is regarded by competent authorities (*e. g.*, F. N. Chasen, *in litt.*, March 31, 1937) as "a vanishing form."

This subspecies is "characterized by the square, instead of triangular, form of the ear, the early date at which its upper margin is bent over, and the presence in the young condition . . . of a thick coat of black and in part bristly hair" (Lydekker, 1914*a*, p. 20).

The northward range of the Malay Elephant has not been determined; it will here be provisionally considered to extend as far as the Isthmus of Kra, in Peninsular Siam. In the remainder of Siam and in French Indo-China the Elephant belongs presumably to the Indian subspecies and is reported as more or less common (Gyldenstolpe, 1919, p. 169; James L. Clark, *in litt.*, June 26, 1936; P. Vitry, *in litt.*, December, 1936; Roche, *in litt.*, 1937).

Malay States—Flower says (1900, p. 365): "Wild elephants do not occur in either Penang or Singapore, nor are tame ones employed there; but on the continent, both in Siam and the Malay Peninsula, elephants are found wild in suitable localities, and are trained for various purposes. . . . I saw more or less trained elephants in . . . Kedah, and Perak, but in the Southern Malay States the people do not seem to catch and tame them." He also (p. 366) quotes H. J. Kelsall (1894) to the effect that "the elephant appears to be common throughout Johore"; and H. N. Ridley (1894) as remarking that "the elephant, though common all through Pahang, is never caught and tamed."

Referring to conditions from 1900 on, Burgess writes (1935, p. 249): "Elephants roam all over the peninsula and are common as far south as Johore. . . . Since only a small fraction of the jungle has yet been cleared, the probabilities are that large herds have not been seen."

Hubback (1923, pp. 24-25) reports on "the damage done to plantations by elephants" in the Malay Peninsula:

It is a very extraordinary thing, but all wild animals which browse seem to acquire an unholy craving for the bark and leaves of *Hevea brasiliensis*. Wild elephants especially, once they have tasted the bark, seem to go mad for it. I have absolutely trustworthy evidence of an eye-witness who has seen elephants strip the bark, from rubber-trees by first catching hold of a small piece with the tip of the trunk and then pulling upwards, so that a strip of bark is taken off the tree. In an incredibly short time the tree is ruined. Then they love to lean against the trees, and I suppose are surprised and annoyed when they fall over. Undoubtedly these wild elephants are in certain places a serious nuisance.

A further account is given by Hubback in the Report of the Wild Life Commission of Malaya (vol. 2, 1932). He says that elephants are not uncommon south of Gunong Sinting, between that mountain and the Pahang border, and continues:

It is a fact beyond question that wild elephants do and have done considerable damage amounting to values of thousands of pounds. Had it not been for elephants in Malaya still larger areas planted with rubber would now be yielding latex. These facts are not in dispute. . . .

The elephants known as the "Carey Island Herd," which lived on a large island on the coast of Selangor, which island was given out for agriculture, were all ultimately destroyed. Their death warrant was really signed when the grant for the land was made out. Then there is the "Kuala Selangor Herd" which has been almost totally exterminated; a cow and a calf being reported as the sole survivors. The destruction of the survivors was advocated. This herd must have consisted of 40 or 50 animals thirty years ago. The "Labu Herd" in Negri Sembilan has been practically eliminated. In Lower Perak the "Chikus Herd" of elephants has given a lot of trouble and many of them have been shot. In many other places elephants have been harried and driven from locality to locality in alleged defense of agriculture. The records of elephants that have been killed in Malaya during the last few years under the agriculturist's exemption are incomplete—reports are seldom sent in of elephants that have been wounded—but there is reason to believe that the Malayan elephant is on the way to extermination. It is extremely doubtful if the yearly toll of destruction is being made up by the yearly production of calves, and that means extinction unless a halt is called. One must take into account the fact that wild animals when much disturbed have a habit of curtailing their breeding, and it is almost certain that this affects elephants as well as the other large forms of our fauna.

In Kuala Selangor, Lower Perak, Labu, and elsewhere, despite the supposed sanctuary provided by Forest Reserves, the elephants have not been left undisturbed, and have been unable to find in the areas that they have receded to that tranquility essential to an elephant's well-being.

Where elephants have been forced to live in jungle areas which are insufficient for their normal existence, and where they have become a serious menace to cultivation, it is advocated that they should be destroyed by persons whose business it would be to undertake the work. . . .

It is an established fact that wild elephants, always providing they are not suffering from wounds, can be driven away by fire crackers and noise. In cases of absenteeism, which is frequently the contributory cause when elephants visit native cultivation, these methods cannot be applied. A woven

wire fence properly upkept and with a path kept reasonably clean on the jungle boundary . . . would in most cases keep elephants from entering the cultivated area. . . .

The removal of protection from Elephants, a measure taken in 1929, was condemned by the vast majority of English speaking witnesses before the Wild Life Commission of Malaya. This order was liable to accentuate the trouble from wounded elephants and undoubtedly, as evidence showed, forced elephants into localities where they had never been known before. This unwise order was rescinded on the 15th of May, 1931, and the elephant cannot now be shot at by an unlicensed person except in alleged defence of property. . . .

Raids on native cultivation are often due to neglect. Persons familiar with the habits of elephants can often move a herd from the vicinity of cultivation by following them up all day until they are miles away from the locality they visited the previous night. . . .

How do *Sakai* in their primitive state handle the planting of crops in elephant country? Showing more wisdom than their white brothers, they leave elephants alone. . . . In the *Sakai* country, which lies between the main range and the Kelantan Railway, the *Sakai* suffer no damage from elephants. The elephants, not being disturbed and harried, have not learned to "answer back."

[Some hold an opinion] that a very large percentage of the so-called damage done by elephants is only done to patches of abandoned cultivation, and when inhabited land is attacked it is not infrequently done by bad-tempered elephants suffering from wounds of sorts which are caused by some home-made bullets fired from a shot gun.

F. N. Chasen writes (*in litt.*, May 5, 1937): "The question of protecting the elephant in the Malay Peninsula raises and crystallizes the whole policy of local big-game preservation. Can big-game co-exist with modern agriculturalists? My view is that the elephant should be protected in reserves: outside the reserves he must behave himself, or be shot. These are, of course, the extremes of the case and a middle course is, sometimes, permissible when directed by an experienced game-warden. The Malayan elephant is decreasing in numbers, rapidly, in the settled areas. It is still numerous elsewhere."

Peninsular Siam.—The following two accounts relate to the uninhabited country about the northern end of the Inland Sea:

"On the plain and in the forest a herd of about 300 wild elephants are roaming. . . . These elephants have from time to time been captured, but their death has always resulted after some comparatively short time." (Havmöller, 1926, p. 365.)

"From government officials with whom I was traveling I learned that a herd of at least 200 elephants ranges over the vast grassy plain extending southward from near Nakon Sritamarat almost to Singora on the west side of the Inland Sea and practically from the Gulf of Siam to the high mountains in the west. This plain, suitable for rice growing, is entirely uncultivated owing to the ravages of the elephants." (H. M. Smith, 1926, pp. 365-366.)

Elephants are protected in Siam because "they are considered

property of the State, and therefore a special permit must be obtained from the King before an elephant may be killed" (David E. Kaufman, *in litt.*, March 8, 1933).

Sumatran Elephant

ELEPHAS MAXIMUS SUMATRANUS Temminck

Elephas Sumatranus Temminck, Coup-d'oeil Possessions Néerlandaises, vol. 2, p. 91, 1847. ("Sumatra.")

Figs.: Lydekker, 1916, vol. 5, p. 83, fig. 24; Pieters, 1932, p. 58, fig.

This Elephant, while still existing in considerable numbers in Sumatra, is evidently losing ground in contact with cultivation, and concern is felt over its future.

It is said to be characterized by its small size, its tessellated skin, the pyriform shape of its ear, and the infolding of the posterior edge of the ear (Lydekker, 1916, vol. 5, p. 84).

Sumatra is the only part of the Malay Archipelago that has possessed a native stock of Elephants within historic times. Those now found in Borneo are considered descendants of domesticated individuals introduced from the Malay Peninsula (Mjöberg, 1930, pp. 15-16).

In 1906 W. L. Abbott (in Lyon, 1908, p. 622) saw many trails in eastern Sumatra opposite Pulo Rupert.

Only mature males may be hunted, and the open season may not exceed six successive months. The export of either living specimens or the skins of Elephants is prohibited, and the export of ivory is restricted within certain limits. During the past ten years an average of only 350 kilograms of ivory has been exported annually from the Netherlands Indies. The published value is only 10 to 20 guilders a kilo. Animals with very large tusks have disappeared for the most part, and the present average weight of a pair of tusks is estimated at 10 to 12 kilograms. Thus the above-mentioned export figures represent the annual taking of about 35 Elephants. (Dammerman, 1929, pp. 13-14.)

"The two principal ports to which the ivory is sent, are Singapore and Penang. Much ivory is also carved here locally, so we may suppose that yearly many more elephants are killed than the 35 the tusks of which are exported. With the new regulations export of elephant-tusks weighing less than 5 kilograms a piece, is forbidden." (Dammerman, 1929, p. 14.)

The same author (in Skottsberg, 1934, p. 422) considers the Sumatran Elephant threatened with extermination. According to Pieters (1932, p. 58), the greatest danger is the encroachment of cultivation on its habitats.

"There are still some elephants in Langkat District, but not as

many as, say 10 years ago. There are some on Lapan, Besitang, and Namoe Oengas. Elephants are shifting from one place to another, and then come back to the starting point again." (J. Gourin, *in litt.*, August 7, 1933.)

The following account is given by Heynsius-Viruly and Van Heurn (1936, pp. 48-50):

Very detailed reports on the elephant were received from many districts. While some believe they will be exterminated within the next twenty-five years, others think that they are holding their own as there are yet about 2000 elephants in Southern Sumatra alone. This estimate is, however, called in doubt by competent observers. In the subdivision Ogan Oeloe there were at the most about 45 elephants in 1926. There is much difference of opinion about the damage these animals do. In Rokan they have increased so rapidly that they have become a nuisance; nevertheless they are not hunted much.

A report from Soengi Radja relates that in 1929 a herd of 14 head was discovered; efforts are being made to preserve them. Elephants were also seen near Soengi Roka in May 1932. In Siak their number is estimated as still quite large, likewise in Indragiri, although they do not appear there in the swampy coastal districts. In the lowlands they are found only in Reteh, and the largest herds in South Seberida in the Boekit Tiga Poeloh. In the first-named district a reward of twenty-five Dutch guilders is offered for every elephant tail. The controller of the district, which comprises the middle course of the Siak River, paid twenty-eight such premiums in 1930. A correspondent estimates that about 200 elephants roam over Siak and urges the repeal of the old local regulation concerning the premiums, as well as not extending the permits for the fire-arms kept in the kampongs.

In Djambi, Moeara Tambesi and Moeara Tebo they are fairly common; also even now, in South west Bangko, where the controller estimates they will be extinct within 10 years. They are very rare in Moeara Boengo. In Djambi they are estimated at about 250-350.

There is a herd of about 30 in Korintjih, and seven in the Ophir district (July 1932) viz: one young male, and six females. In 1915 this same group numbered still 18. In 1916 the herd of North Korintjih were hunted by men specially appointed for the purpose by the Demang of Korintjih and the Civil Authority of Air Hadji. Not even the females and the young were spared at that time. Along the Mesoedjih River elephants are caught in pitfalls by the Natives and the younger ones are sold in Palembang. The older ones are left to starve, in order to obtain the tusks to sell. It is generally thought that the present regulations merely postpone the extermination of the elephant. Only establishing extensive reserves might bring adequate protection. . . .

The report of a herd of 14 in Soengi Radja is of much interest, for these animals occupy a rather small area that has been completely surrounded by cultivation for a quarter of a century, and though much hunted they have succeeded in holding their own. The establishing of a reserve here was urged in 1929. In 1932, the Netherlands Committee for International Nature Protection requested this from the Government of the Netherlands Indies, but as yet no actual steps have been taken.

A second important fact, emphasized by our enquiries, is that at certain seasons elephants migrate periodically from the mountains to the lower coastal areas. This too had been exhaustively recorded in print. It was one of the strongest arguments used by the Netherlands Committee, when sub-

mitting their proposal for requesting the Indian Government to include in the reserve certain lowland swampy areas. This has not been done at present; but the Committee intends calling the Government's special attention to the new information received which further supports their claim. The protection of the elephants remains, moreover, a separate problem. Even after reserves are established, and, of course, after the Decree on Hunting becomes effective in Sumatra, the careful listing of existing herds will be imperative. The continued gathering of data regarding each herd, in order to determine which way they travel, their increase or decrease, and what damage they do, will furnish the foundation for their protection and for the preservation of the remaining herds. . . . May complete cooperation by the Department of the Interior facilitate this task of the Netherlands Committee.

South African Bush Elephant

LOXODONTA AFRICANA AFRICANA (Blumenbach)

Elephas africanus Blumenbach, Handbuch der Naturg., ed. 5, p. 125, atlas, pl. 19, fig. C, 1797. (Selected as Orange River, South Africa.)

SYNONYMS: *Elephas capensis* F. Cuvier, Tableau Elém. de l'Hist. Nat. des Anim., p. 149, 1798 (Orange River region, South Africa); *Elephas africanus toxotis* Lydekker, Proc. Zool. Soc. London 1907, pp. 385, 388, Aug. 1, 1907 (Addo Bush, South Africa); *Loxodonta africana zukowskyi* Strand, Arch. für Naturg., vol. 90, sect. A, pt. 1, p. 68, footnote, July 1924 (Kaokoveld, South-West Africa).

FIGS.: (Of the Tanganyika animal) M. Maxwell, 1930, 11 plates from photographs.

Because of its great size, its strength, its tusks of ivory, its remarkable trunk, or proboscis, and its intelligence, the African Elephant is one of the most interesting of mammals. At first confused by early naturalists with the Indian Elephant, it is, however, so different that the two are now placed in separate genera. The African Elephants (*Loxodonta*) differ in many points, such as the structure of the tip of the proboscis, with its two instead of single fingerlike tips, the huge ears extending back to cover the sides of the neck as far as the shoulder blade, the forehead, which is less globular than in the Indian species, the cheek teeth having fewer of the high enamel prisms which form their essential grinding structure, the six successive teeth with usually 3, 6, 7, 7, 8, and 10 prisms, respectively, against 4, 8, 12, 12, 16, 24 in the Indian Elephant (W. L. Sclater). The African Elephant is slightly the larger, but seldom exceeds 11 feet in height at the shoulder, a distance not easily measured with accuracy even when the animal lies dead. The weight of the famous "Jumbo" was about 6.5 tons. In color the skin is slaty gray but may appear in life of different tints, according to the light, the dryness of the skin, and the amount of earth clinging to it if animals have been dusting or wallowing. A sparse coat of short stiff hairs is insufficient to obscure the hide, but near the tip of the tail these hairs become stout coarse bristles growing from the edges of the

compressed terminal part, several inches in length. The upper pair of incisors are enormously enlarged to form tusks, which are larger in the male than in the female, or may in the latter sometimes be lacking. These are used as weapons or in digging for roots. The largest tusks come from Kenya Colony, with a record length on the outside curve of 11 feet 5½ inches, and a weight for the two of 293 pounds (Roland Ward, 1935).

The African Elephants have at various times been subdivided into local races by systematists, but there is still much doubt as to the value of the characters claimed, and the number of valid geographical forms. In general one may distinguish the larger "Bush Elephants" and the smaller "Forest Elephants," the former distinguished by minor additional points such as the larger, more elongated ears, the more forwardly directed tusks, less abundant hair. There is a question whether these two types should be regarded as merely races or as separate species, but the likelihood is that they have evolved side by side though in different habitats, the former avoiding the denser forests, the latter keeping more strictly to their shelter, with the result that at present the two types seem different enough for separation as distinct species. The larger Bush Elephants, again, have been regarded as of several local races, of which that of South Africa, the first to be named, is at present much reduced in numbers. Farther to the northeast, the East African animal has been named *L. a. knochenhaueri*, and the Sudanese Elephant, *L. a. oxyotis*. There is still much doubt as to the validity of the characters distinguishing these races, but until series of skulls and measurements can be compared one can only await further information. The character of the ear lobe invoked, for example by Lydekker, is so subject to modification through distortion in dried or mounted specimens that little reliance can be placed upon it. One may then consider the status of the Bush Elephants as a whole, with special reference to the South African race.

In classical times elephants were found over most of Africa except the most desert areas. There seems to be evidence that in ancient times they were found abundantly in Abyssinia, for under the Ptolemies, in the third century B. C., elephants for use in warfare were captured and trained in Ethiopia on the shores of the Red Sea and were taken thence in specially constructed boats to Egypt. Entire army corps were sometimes engaged in their capture. In Carthaginian days elephants were captured in Libya and in Mauretania among the forest-covered foothills of the Atlas Mountains. Here, however, they have long ceased to exist and are not now found north of the southern borders of the Sahara. In the eastern Sudan elephants still occur in small numbers (I myself saw their "sign" on the Blue Nile, near the Abyssinian border in 1913), but have

long ago retreated from the borders of the Red Sea. Swayne wrote a quarter of a century or so ago: "There is practically no elephant shooting to be got in Somaliland north of the Haud Plateau, or in the Haud, at the present time. In the gorges which descend from the highlands of Abyssinia to Ogaden—in the country about the head-waters of the Webbi Shabeyleh and Juba Rivers there are still plenty of elephant. A few herds, it is believed, wander down those river valleys to the Marehan Country far to the south-east of Berbera." A certain amount of ivory-hunting by natives may keep these herds in check. But recent travelers up the Nile report large numbers of elephants in the practically impenetrable papyrus swamps of "the Sudd" where they will doubtless find sanctuary for a long period to come. Between this area and Uganda there are large numbers of elephants, and in the Kenya forests and thorn-bush a good many still survive.

For the purposes of the present report, chief interest centers in the elephant of South Africa, which nowadays with increasing settlement of this part of the continent comes into close association with white men and has had to suffer in consequence. The following brief notes are given in summary from Shortridge (1934, vol. 1, p. 362) and W. L. Selater (1900). This, the typical race of African Elephant, at present seems to be characterized in part by its rather short stout tusks as compared with the other Bush Elephants, but how far this may have been due to the process of selecting largest tusks and eliminating these animals in ivory hunting is not clear. "In the days of van Riebeck (1653) elephant were plentiful as far south as the Cape Peninsula," but by the beginning of the next century seem to have become rare, for according to Theal the last one shot in this region was killed "just beyond Cape Flats in 1702; the expedition of Captain Hop, in 1761, found plenty just north of the Oliphant River in what is now the district of Clanwilliam, while in the eastern half of the Colony, elephant hunting was regularly pursued till about 1830. . . . In Natal a few survived till 1860; in the north the hunters of the early part of the century made large bags near Kuruman; Harris in 1836 shot chiefly in Magaliesberg of the western Transvaal; Gordon Cumming in 1846 in Sechele's country in northern Bechuanaland, and Livingstone and Baldwin, in 1849 and 1858, found elephants innumerable on the Botletli River and near Lake Ngami, and finally Selous' hunting ground in the seventies and early eighties was in what is now Matabeleland and Mashonaland." Elephants were formerly so plentiful in the southeastern part of the Cape that an important ivory market was established in 1824 at Fort Willshire. After 1860, however, the herds in the Knysna Forest and the Addo Bush were placed under government protection. The last elephant in Zululand was said to have been a solitary bull,

which was killed in February, 1916, and its skeleton is now mounted in the Natal Museum. In Matabeleland, elephants existed in large numbers in 1872 and had been little hunted, but in the few succeeding years Lo Bengula's hunters in addition to Europeans swarmed into the region and in three years took out an estimated 100,000 pounds of ivory. Even then, tusks over 70 pounds in weight were rare, and the average was 40 to 50 pounds, rather small as compared with those farther north. By 1902 elephants had disappeared from the Transvaal, but in late years a few have come back into Kruger Park from adjacent areas of Portuguese East Africa. Shortridge sums up the present situation in the Cape Province and adjacent territory: "Scattered and comparatively small herds of elephant still wander in Ngamiland, Southern Rhodesia, Portuguese East Africa. . . . In the Cape Province, the remnant of a herd is preserved in the Addo Bush. There may still be half a dozen or so in the Knysna Forest." In South-West Africa, there may be from 600 to 1,000 head in the Kaokoveld, but larger estimates are probably unwarranted. The other region where they occur is in the Caprivi, where two fair-sized herds are said to survive, one near the Kwando River, the other between Popa and Kagera. There are still elephants in southwestern Angola and especially along the Kwando in the southeastern part. An estimate of the elephant population of any district is not easy to make, however, since on account of their wandering habits the same animals may appear within a short time at points far apart.

In South Africa, aside from the restricted herds of Caprivi and the Kaokoveld, there exist four other herds: (1) that in the Knysna Forest, said to number, in 1935 about a dozen animals, which are under Government protection; (2) the Addo Bush herd, near Port Elizabeth, numbering, in 1933, about 16; (3) the Kruger Park herd, which seems most favorably situated and is believed to receive occasional increments from animals seeking this sanctuary from adjacent Portuguese territory; and (4) a small number that occasionally appear in straggling parties from across the Limpopo in times of drought and enter the northern Transvaal. Concerning the Addo Bush herd, in the early part of 1920 its numbers were 126, more than could well be maintained there, and so by Government order 110 were killed, and the remnant was confined to a more limited space, which apparently the animals more or less recognize and keep within its limits. A boring to supply them with water has been made to help in keeping them within these bounds, but the difficulty of restricting their wanderings is not easily overcome. In Kruger National Park there are said to be (1933) approximately 150-200 elephants, in five separate groups. They tend to spread out from their fastnesses among the reed beds of the Letaba River (1934).

Apart from its great interest, from both esthetic and zoölogical

points of view, the African Elephant has for centuries supplied a large part of the world's demand for ivory; it is a source of meat for many native tribes; and in recent years it has again been the subject of attempts at domestication, in this instance in the Belgian Congo, where imported mahouts from India as well as tame Indian Elephants have succeeded in rendering the Forest Elephant more or less tractable. Their timidity, however, often impairs their usefulness, while the large amounts of food they require add to the difficulty of an economical value. According to Lavauden (1933, pp. 21-22), in 1921, ivory to the amount of 800 tons of elephants' tusks was sent to the world's markets; in 1925 this had fallen to 500 tons, but the average weight of the tusks had considerably decreased as well. Elephants, on the other hand, often do much damage to the crops of the agricultural natives, wrecking their fields, granaries, and even houses at times. This damage, although "it is very doubtful if it would amount to 1 percent of the entire crop," is nevertheless at times a considerable loss, and of late years measures have been taken in countries under British rule to cope with this, by appointing an official to undertake elephant control through killing a certain number in areas where they are reported to be doing such damage. In his book *Elephant*, David E. Blunt (1933), who had charge of this work in East Africa, reports that elephants seem very quickly to learn the bounds of regions to which they must be confined, and after a few of a marauding herd are shot the trouble to plantations is stopped for at least the time being. Thus while it is possible by this means to reduce greatly the elephant damage in agricultural areas near large forests or other country inhabited by herds of these animals, it is likely that with increase of settlement this protection of crops will become less needed, and the animals will gradually give way. Nevertheless there will undoubtedly be plenty of elephants in some sections of Africa for many years to come, in spite of hunting. Moreover, these will prove an asset on account of the returns from purchases of big-game licenses and additional fees for each elephant. In East Africa animals with tusks under fifty pounds in weight (the two together) may not legally be killed under penalty and confiscation of the ivory. This limit, according to Brocklehurst (1933), has been lately reduced in Abyssinia from 30 to 20 pounds so that females now are killed.

It appears from statistics that Uganda is likely to be one of the regions where elephants will long hold out and may be an asset in the way mentioned. In 1929, the Game Department reported a kill of 1,439 elephants, of which 1,135 were accounted for by the Government control operations. In 1931 the Game staff killed 1,211; in 1933, the number was 1,380, and yet "with the exception of the Toro district, the southern portion of West Nile, and possibly the Mubende district, there is no reason to believe that elephant num-

bers are other than steadily increasing in all parts of the protectorate in which this great beast occurs." In 1934, it is said that 2,716 elephants were killed in Tanganyika Territory. Taylor, in *East Africa*, July 9, 1936, believes that the method of control adopted is "the most humane method possible of enabling men and elephant to live in peace and concord in one territory." With the stopping of such methods of slaughter as once were practiced by natives in encircling elephant herds by grass fires and using pitfalls, and with the reduction of poaching for ivory, and the licensing of hunters, no doubt the hazards for the species are sufficiently lessened to counterbalance the large numbers just noted that are killed in control measures. The ivory from such elephants as are killed in this way is Government property and a source of revenue. Ivory is also a regular product of the Belgian Congo, where many animals must annually be killed, although at the present time this requires special license.

For the future, the opinion of those conversant with the situation seems to be that in South Africa the relatively small areas of national reserves may continue to hold elephant herds indefinitely, but the size of the herds must be regulated by the area of the reserve and its suitability to their needs. With reduction to small numbers there is always a danger of an unlooked-for change which may be unfavorable. In South-West Africa, the numbers yet remaining are under government protection, so far as it may be enforceable, but the elephants here doubtless owe their continuation quite as much to the inaccessibility of their habitat. In the less settled parts of East Africa, they will continue in numbers and with the present efficient supervision of the game departments should prove on the whole a decided asset and attraction, notwithstanding a certain amount of local damage to plantations. In Uganda, where the herds are still abundant, there is evidence of slight increase in numbers in some districts, while in the great papyrus swamps of "the Sudd" of the upper Nile, they are present in great numbers and are likely to find this a safe retreat. Airplane photographs taken by the late Martin Johnson in this region show some astonishingly large herds. The game warden of Uganda in his report for 1925 believes that with the spread of settlement and development elephants will have to be killed out or "expelled" from certain areas, but that, since extermination is impossible and impracticable, good sanctuaries are necessary, which shall protect the main breeding areas of the herds. Elephants quickly learn to recognize the areas in which they are free from molestation, so that this trait will help to keep them within such bounds. A proper sanctuary, however, must include sheltered valleys with abundance of food and sufficient water, else at periods of drought the animals will move off in search of better localities.

G. M. A.

Order PERISSODACTYLA: Odd-toed Ungulates

Family EQUIDAE: Horses, Zebras, and Asses

Some conservative zoölogists recognize but one genus in this family, while granting subgeneric status to the Horses (*Equus*), Zebras (*Dolichohippus*, *Hippotigris*), and Asses (*Asinus*). Others raise these subgenera to generic rank, and Shortridge (1934, vol. 1, p. 397) proposes an additional genus (*Quagga*) for the Quagga and Burchell's Zebra. Dr. Allen maintains a conservative viewpoint and employs the generic name *Equus* for all the Zebras (including the Quagga), while I prefer to keep both the African and the Asiatic Asses in a separate genus, *Asinus*. The single surviving species of Wild Horse (*Equus przewalskii*) is now confined to Mongolia. The nine forms of Zebras (two extinct) occupy eastern and southern Africa. One extinct and two living forms of African Wild Asses (*Asinus atlanticus* and *A. africanus* subsp.), with ranges in the northern and eastern portions of that continent, are herein recognized; also six forms of Asiatic Wild Asses (*Asinus hemionus*), ranging from Mongolia and Tibet to Syria. The generally precarious status of the family is indicated by the fact that all but one of the Asiatic forms and all but six of the African forms are treated in the following pages.

Przewalski's Horse; Mongolian Wild Horse; Mongolian Tarpan

EQUUS PRZEWALSKII Poliakov

Equus Przewalskii Poliakov, Izvestiia Imper. Russk. Geogr. Obshestvo, vol. 17, p. 1, 1881. (The type specimen was obtained by a "hunting expedition sent by M. Tihonof from the post Zaisan to the sand deserts of Central Asia" (Poliakov, 1881, p. 19). Type locality restricted by Harper (1940, p. 195) to the oasis of Gashun, eastern Dzungaria (approximately lat. 44° 30' N., long. 90° E.).)

SYNONYM: *Equus hagenbecki* Matschie (1903).

FIGS.: Poliakov, *op. cit.*, pl. 1; Przewalski, 1883, pl. facing p. 40; Lydekker, 1901, p. 284, fig. 65; Salensky, 1902, pl. 1, pp. 12, 16, 17, figs. 2-4; Proc. Zool. Soc. London 1902, vol. 1, pl. 13; Matschie, 1903, p. 582, fig.; Ridgeway, 1905, p. 27, fig. 18, p. 29, fig. 19; Wrangel, 1908, vol. 1, p. 3, fig. 1; Lydekker, 1916, vol. 5, p. 8, fig. 4; Peake, 1933, pl. 31, fig. a; Pocock, 1937, p. 715, fig.; Reed and Lucas, 1937, p. 129, fig. 44; Schmidt, 1938, pl. 10.

A very special interest attaches to this animal, as the only truly wild horse surviving in the world today. There is a remarkable dearth of first-hand information concerning it, especially during the past quarter of a century or so. Only one of the numerous scientific expeditions to Central Asia during recent years seems to have come into contact with it. It is somewhat doubtful if the alleged Mongolian Tarpans now exhibited in American zoos are purebred animals.

Przewalski's Horse is distinguished from other horses by its erect mane and lack of a forelock. The following description is derived from Salensky (1902, pp. 7-18), who had more than a dozen specimens at his disposal, rather than from Poliakov (1881), who had only one.

This species is of the size of a small ordinary horse; grown male with a height at the rump of 1,240 mm.; head relatively larger than that of the Wild Ass; average length of ears, 140 mm.; mane erect, highest (160-200 mm.) in the middle of its length; tail long, reaching in some individuals nearly to the hoofs, and provided on the dorsal side toward the base with short hairs, elsewhere with long hairs; hoofs rounder than those of the Kiang and the Kulan; "chestnuts" on all four limbs.

Winter pelage lighter than that of summer; yellowish on the back, becoming lighter on the sides and almost white on the under parts. Summer pelage much shorter than that of winter, smooth, not wavy; back and sides light reddish brown, gradually changing to yellowish white on the belly; head colored like the back, but white on the muzzle about the nostrils and on the lips; ears light brown basally, darker at the tips; inner surface of ears white. Pronounced tufts of hair on sides of head in winter, and along entire lower part of head in summer. Mane dark brown, with shorter tufts of light gray hairs on each side; a median dorsal stripe of reddish brown, about 5 mm. wide, and distinctly visible only in summer pelage, extending along the entire back and on to the tail; a brown or black shoulder stripe, more noticeable in summer than in winter; lower part of limbs more or less black (occasionally gray in younger animals); a black ring, up to 80 mm. wide, bordering the hoofs; inner side of legs gray, generally with distinct bars, up to the knees.

The principal range seems to have been on both sides of the Altai Mountains in western Mongolia and in Dzungaria. But Prejevalsky (1876, vol. 2, p. 170) also reported Wild Horses much farther south, in western Koko Nor and in southeastern Chinese Turkestan: "Wild horses, called by the Mongols *dzerlik-adu*, are rare in Western Tsaidam, but more numerous near Lob-nor. They are generally in large herds, very shy, and when frightened continue their flight for days, not returning to the same place for a year or two. Their colour is uniformly bay, with black tails and long manes hanging down to the ground. [This last expression is, of course, wholly erroneous as applied to the manes.] They are never hunted, owing to the difficulties of the chase." This report, apparently based upon native information, does not seem to have been substantiated by later records, and is open to question. In this connection, however, it may be recalled that Sven Hedin has remarked (1903, vol. 1, p. 357) on

the increasing scarcity of even the Wild Camel east of Lob-nor, owing perhaps to the increasing desiccation of the region.

The animal must have been somewhat rare in the Altai region even before the advent of Europeans. Atkinson (1858), who made extensive explorations in that region about the middle of the past century, and comments frequently on the other large animals, does not refer to any personal encounter with the Wild Horse. However, in a later work (1860, p. 325), he describes the Kirghiz method of hunting "wild horses, which at this season [May] are found in great herds near the foot of the mountains" beyond the Ili River, apparently toward Issyk Kul. But his description of these horses as "varying in colour from black, bay, grey and white" creates considerable doubt as to whether they were truly wild or merely feral. Possibly the herds were composed of a mixture of both kinds of animals. Atkinson gives the Kirghiz name for the wild horse as "muss."

Brehm (1876, p. 339) received a report of a second kind of Wild Horse (besides the Kulan), called "Surtake," which was said to occur about 250 versts southeast of the boundary post of Zaisan, in the Kanabo area. It was described as light yellow, with many light spots and a shorter tail than the Kulan's.

Younghusband, referring to the region about the southern base of the eastern Altai, at about long. 96°-100°E., says (1888, p. 495): "We . . . saw here . . . wild horses too—the *Equus Prejevalskii*—roaming about these great open plains."

Ten years after Przewalski's discovery, the brothers Grum-Grshimailo took some specimens in 1889 at the oasis of Gashun, northeast of Guchen in eastern Dzungaria (Wrangel, 1908, vol. 1, p. 2).

The following report of Grum-Grshimailo (in Morgan, 1891, pp. 217-218) probably refers chiefly to the Gashun area: "Springs enable the numerous animals inhabiting Dzungaria to exist; of these the most interesting is Prejevalsky's horse. . . . Prejevalsky himself, though he crossed the desert of Dzungaria in three several directions, never came across any of these wild horses, and if he wrote otherwise he was mistaking kulans he had seen in the distance for wild horses, a mistake the most experienced hunters are liable to make, for at that distance it is almost impossible to distinguish between them. . . . We were the first Europeans who, for twenty days, made a study of these interesting animals, adding the skins of three handsome stallions and one mare to our collection."

Salensky (1902, pp. 2-3) records specimens from the following localities, chiefly in or near the Dzungarian Gobi: Gashun; the Kobdo region; behind the Baitik-Bogdo (Charamelechetai); between Nursu and Simigendse; Ebi Spring, near the Kobdo-Barkul route; Guchen Lake; and the River Bulunga. He gives the range (p. 63) as

extending north to the Urungu River and Kobdo; east to longitude 90°-91° E.; south to latitude 46° N.; and west to longitude 84° E. [=86°?]. (This range is too restricted on the east and south.)

In 1899 three newborn foals were captured and in the following year were brought to the estate of Herr Falz-Fein in Ascania Nova, southern Russia (Salensky, 1902, p. 20).

In 1901 Carl Hagenbeck sent a large expedition to Dzungaria for Wild Horses. His animals were caught in three different districts lying south of the Mongolian city of Kobdo. In the west the area consists of a wide plain, bordered on the east by the Altai Mountains. It is bordered on the north by the Kui-Kuius River, and on the south by the Urungu River, both of which rise in the Altai and discharge into the Tusgul [Ulungur?] Lake. This lake forms the western boundary of the plain. The second area is a plain which lies about 322 km. south of Kobdo and is enclosed by the Altai Mountains. The third group comes from the vicinity of Zagan Nor [apparently near long. 95° E.]. Foals from the three groups differ in color characters, though quite alike in general appearance (Wrangel, 1908, vol. 1, pp. 2-3).

The foals are dropped between the end of April and May 20. Their capture takes place as follows. Hundred of Mongols lie in ambush behind hills. As soon as they see a considerable number of mares and foals together, they rush upon them with loud cries. Since the foals can not keep up with the fleeing mares, the Mongols soon catch them with nooses on long poles. They are then conducted to near-by corrals, where Mongolian mares are ready to take over the duties of foster-mothers. Of the animals thus captured by the Hagenbeck expedition, 28 arrived in Hamburg in 1901 (Wrangel, 1908, vol. 1, p. 4).

"There is no doubt that the wild-horse . . . also inhabits the northern portions of that region [Dzungaria]. We were never lucky enough to see any, but the natives, both Kalmuk and Kazak, all told the same tale, often volunteering the information that, in addition to the kulon, there were wild-horses. . . . They said, the meat was not so good [as the kulon's]. They told us that there were large herds of them in the vicinity of Lake Ulungur, and eastwards along the southern foot of the Altai; also north of that range." (J. H. Miller, in Carruthers, 1913, p. 608.)

From a point on the north side of the Altai, about 100 miles west of Ikhe Bogdo, R. C. Andrews reports (1926, p. 322): "The wild . . . horses were two hundred miles to the southwest, they [some Chinese caravan men] said, just above the border of Chinese Turkestan."

Morden writes (1927, p. 286) concerning a place in eastern Dzungaria, northeast of Kucheng: "Around the spring, which our men

said was called Kainar Bulak . . . we heard that the wild horses of western Mongolia and Dzungaria . . . were sometimes seen by caravans approaching the place."

The range of the species was extended eastward by Lattimore (1929, p. 228). In a journey of 1926, he mentions passing the "Yehma Ching" or Wild Horse Well, which is situated in the Khara Gobi

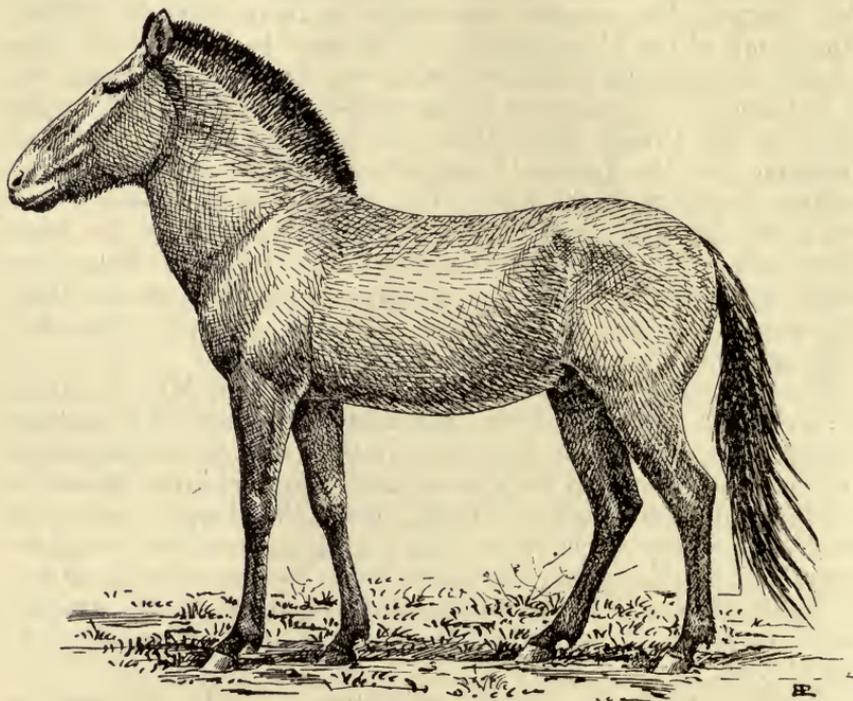


FIG. 33.—Mongolian Wild Horse (*Equus przewalskii*). After photograph in Brehm.

west of Edsin Gol, at about latitude 42° N., longitude 98° E. "They say that on this fringe of the Khara Gobi there are wild horses (*equus prjevalskii*) and wild asses." This recalls Ridgeway's statement (1905, p. 28): "Mr. Hagenbeck informs me that wild horses of another variety are said to exist 600 miles south of Kobdo, that is, somewhere in the great Gobi desert."

Teichman also passed by the Wild Horse Well, in 1935, and makes the following remarks (1937, pp. 74-75): "The Hardt-Citroen expedition followed from Suchou to Mingshui a camel trail which took them through this range. They found a region of rich pastures, abundant water, the haunt of . . . the wild horse and wild ass. . . . Wild horses and wild camels are said to exist in this neighbour-

hood. We saw no direct evidence of either. The wild ass is common and is often, with characteristic Chinese lack of accuracy, referred to as *Yeh Ma* ('wild horse'), which may explain the name of *Yeh-ma Ching*."

Reymond, the zoölogist of the expedition mentioned by Teichman, records (1932, pp. 807-809) a Wild Horse seen in May, 1931, and a carcass recently devoured by Wolves near the northern border of Inner Mongolia at longitude 105° 30' E., latitude "40°" [=42°] N. The skull of the latter was identified by Professor E. Bourdelle of the Paris Museum. Reymond also heard that a favorite haunt of Wild Horses was the plateau of Pei Chan, occupying the extreme western triangle of Inner Mongolia. Other members of the Haardt-Audouin-Dubreuil Expedition (as it is here called) saw in 1931 two solitary animals in this general region: one in June, 20 km. west of Hou Hung Chuan (long. 96° E., lat. "40°" [=42°] N.), and one in December near Hsin Hsin Chia on the Kansu-Sinkiang frontier. The first of Reymond's records is by far the easternmost one to date.

"Przewalski's wild horse is found in small herds in Chinese Turkestan (Sinkiang) and Western Mongolia. It does not appear to be at all numerous, and should be protected if possible, if only because it is the sole surviving true wild horse in the world to-day. It is too small to be of any economic value, the so-called Mongol pony used by the Mongols and other Central Asian people easily supplanting it. The latter is probably a cross between Przewalski's horse and various domestic breeds, and is sufficiently hardy to live in the great wastes of Central Asia in a feral state." (Sowerby, 1937, p. 250.)

Antonius writes (1938, pp. 558-559):

The statements of the brothers Grum-Grshimajlo and the expeditions of Falz-Fein and Hagenbeck for obtaining living specimens make it possible to give the geographic distribution about 1900. There was only one district on the Northern ranges of the Ektag Altai: the neighbourhood of the Zedsig-Nor, called also Zagan-Nor, and three or four in the deserts on the southern ranges: the steppes on the upper Urungu, the Ebi-mountain, the Gashium-desert. If my Russian information is correct—and I have, alas! no doubt that it is,—the Przewalski horse has been extirpated since the great war and the Russian revolution, the old fork-muskets of the Mongolian hunters having been replaced by modern fire-arms of great power. Therefore it is probable that the descendants of the Falz-Fein and Hagenbeck-imports living in Ascania Nova, Woburn Abbey, and in a few Zoos in Europe, America, and Australia, are the last survivors of the Przewalski-horse, and of the true wild horse in general.

There would appear to be considerable likelihood that Przewalski's Horse, if not exterminated outright, has proceeded far along the road to extinction through dilution with the ponies of the Mongols. In Salensky (1902, p. 21) we find a report of domestic mares mating with wild stallions. In remarking on the variations in color exhibited

by Przewalski's Horse in different parts of its range, Lydekker says (1912, p. 89): "These differences suggest that there has been some admixture with domesticated breeds." Who can even say that the type specimen was purebred?

The chances of mixture with domestic stock are suggested by Carruther's report (1913, pp. 532-533) of "immense droves of horses running half wild over the prairies" in the vicinity of Barkul, southern Dzungaria. "We . . . believe that the real 'wild animals' of the Barkul basin signify the great herds of unridable horses which roam untamed over the steppes. These form an Imperial Stud, and are said to number fifteen thousand, the pick of which are transported yearly to Peking."

Domestication.—On this subject Peake (1933, pp. 99-100) says:

There can be no doubt that the horse was first tamed in the grasslands of Central Asia, for it is only there that the wild horse, known as Przewalsky's horse, is to be found to-day. The first mention of the horse that has been met with is in a document from Babylon, dating from before 2000 B. C., in which it is called the ass from the East. This indicates the direction from which it came, but it does not seem to have been introduced into Mesopotamia before the arrival of the Kassite conquerors about 1746 B. C. We have, however, some reasons for believing that it had been tamed at an earlier date. Into the north of Mesopotamia there had arrived some centuries earlier a people known as the Kharians, some of whom were later called the Mitanni. These, we know, were great horsemen. They occupied the country around Haran, which lies between the Tigris and the Euphrates just below the points at which they emerge from the mountains, and they seem to have arrived in that district from the North-east, probably from the Persian plateau, whence later the Kassites descended upon Mesopotamia. The horse was well known also to the Hittites, the capital of whose kingdom lay in the centre of Asia Minor. These people are believed to have arrived there about 1900 B. C. from the North-west. All this evidence tends to show that the horse was used as a means of transport both in Persia and upon the Russian steppe well before 2000 B. C. It seems likely that it was first tamed in that part of the world, or still farther east in Mongolia, as early as 3000 B.C., if not before that date.

Lamut Wild Horse

Equus sp.

Surprising news of a generally overlooked and probably extinct Wild Horse in the Kolyma Basin of northeastern Siberia is furnished by Pfizenmayer (1939, pp. 112-113). While excavating the frozen carcass of a Mammoth on the Beresovka River in 1901, he questioned two Lamut visitors as to

what sort of wild animals they found in their distant hunting-ground on the Omolon. To our great astonishment Taitshin mentioned the wild horse. As zoologists thought wild horses existed only on the steppes of central Asia, we received his statement very doubtfully, though Amuksan confirmed it by a quite professional imitation of horses neighing. The reliability of the natives

is such that we did not imagine they were spinning a yarn when they told us about the wild horse in the tundras bordering the forests of this vast area. They described in detail its size—equal to that of a Yakut horse—its long whitish-grey hair, and its flesh, which was very fat and pleasant to taste. If the description were really that of wild [=feral] horses, it was a puzzle how and when their tame ancestors could have reached this quite uninhabited Arctic region. And if they actually existed in the district between the two largest tributaries of the Kolyma—the Omolon and the Anjui—which had never yet been explored by any scientist, it was a very interesting matter which scientists would find it well worth while to investigate.

Pfizenmayer's assumption that these horses were descended from tame ancestors is by no means necessarily correct. In this connection it is of interest to recall Hay's opinion (1913, p. 9) that in the Yukon Basin and adjacent parts of Alaska horses "became extinct about the middle of the glacial epoch."

Pfizenmayer writes further (pp. 176-177):

The prehistoric wild horse—to which is probably related the animal that Przevalski, the Russian explorer of Asia, discovered in 1870 and called a wild horse—has left remains everywhere in central and northern Siberia. There is hardly one place on the banks of rivers and lakes in the district of Yakutsk in which prehistoric remains of animals have been found that has not yielded skeletal fragments of the prehistoric wild horse.

In the landslide on the Beresovka we found, among the debris between the larch trunks lying around in confusion and the masses of fallen earth, the perfectly preserved upper skull of a prehistoric horse, to which fragments of muscular fibre still adhered. . . .

An exiled student told me, in Verkhoyansk on my way back from Kolymsk, that an ivory hunter had found the carcass of a horse four years before, sticking half out of the frozen earth in a fissure in the bank of a lake in the tundra, in the northern part of the district. According to the description by the man, who puzzled over the find—unusual there—the parts of the body sticking out of the ground showed a covering of very long greyish-white hair. Certainly the Yakut horse, a vigorous breed of pony, with probably a strain of the wild horse, also has long hair to protect it from cold. Since, however, there were no Yakut settlements for hundreds of miles round the site of the find, we may conclude that the body was that of a prehistoric wild horse. But it was naturally neither investigated nor salvaged.

Determination of the relationship between this prehistoric horse and the Recent Lamut Wild Horse must await the acquisition of suitable museum material.

In commenting upon some earlier publication of Pfizenmayer's findings, Antonius writes (1938, p. 559): "One might suppose that these white horses are descendants of any semiferaral Jakute-breed—the Jakutes being the most northern horse-breeders,—but . . . it could be possible that these wild horses of the Lamutes are the last survivors of a northern branch of the *Caballus*-Group, and there are some indications for a formerly much greater distribution including not only Eastern Siberia, but also Alaska. Since the excavation of the Beresovka-Mammoth there are no records of the Lamute horses."

The plausibility of a *white* horse on the Siberian tundra is enhanced by Janikowski's account of present-day domesticated descendants of the Wild Horse of Poland. He refers (1942, p. 682, figs. 4-5) to two survivors "which had the remarkable and unique property of turning *white* in winter Every winter they changed the mouse-grey summer coat . . . into a snow-white coat, only the face, fetlocks, mane and tail retaining the dark colour."

European Wild Horses

Equus spp.*

The taxonomic and nomenclatural status of European Wild Horses, especially during the more recent historical times, becomes extraordinarily complicated owing, on the one hand, to the lack of adequate material and authoritative data and, on the other hand, to the probability of interbreeding with domestic types. The technical nomenclature is too involved to be discussed in detail in this brief account. Opinions differ as to whether some of the described forms were truly wild or were mixed with the blood of domestic horses. Only purebred wild animals come properly within the scope of the present report.

Remains of Pleistocene or older horses have been recorded in various localities from India and Turkestan to Spain, France, and England; some of these were doubtless ancestral to the present-day horses.

In classical times Strabo reported Wild Horses in Spain. In the Middle Ages there are records of Wild Horses in Germany, Poland, Lithuania, and Russia; but there is some question as whether all of these records refer to purebred wild animals.

In 1768 S. G. Gmelin collected four Tarpan in the Government of Voronesh, Russia. Pallas (1811) reported Wild Horses as inhabiting the steppe country from the Dnieper to the Altai and beyond into Central Asia, but as partly mixed with feral animals. Hamilton Smith (1845-1846, pp. 160-166, pl. 3) received information from Cossacks and others early in that century concerning truly wild animals in Russian Turkestan and Mongolia.

Antonius (1912, p. 513) mentions three animals captured alive in Russia as late as the period 1853-66; he considers these the last Wild Horses taken in Europe. However, Lydekker (1912, p. 81) suspects that even Gmelin's specimens were hybrid Tarpan, and it is all the more to be doubted that the animals of 1853-66 were purebred. Antonius (1912, p. 516) has given the name of *Equus gmelini* to the three last-mentioned animals, at the same time stating that Gmelin's specimens were probably though not certainly identical with them. If the specimens on which the name *Equus gmelini* was based were

not purebred, the name can hardly be applied to their truly wild forebears in Russia, which have been extinct for probably more than a century. In the present rather chaotic state of the nomenclature, I feel unable to fix upon any one of the numerous names proposed as applying strictly and validly to the form represented by the last truly wild and purebred horses of Europe.

A few quotations from the literature will indicate some of the varying opinions on a complex subject. The later accounts can hardly refer to purebred wild animals. Poliakov (1881, p. 20) says:

The information regarding the tarpan collected by Rytchkof, Gmelin, Georgi, and Pallas is of so contradictory and confusing a nature that many zoologists have decided that the so-called wild horses, or "tarpans," were not, strictly speaking, wild, but tamed horses which had resumed their wild state on recovering their liberty Pallas . . . assumed the feral horses . . . roaming over the steppes of the Yaik [Ural] and the Don as well as on that of Baraba to have originated from domesticated horses owned by Kirghiz, Kalmuks, or other wandering tribes, and to have become wild. . . . Unfortunately we have no reliable information on this legendary tarpan since the end of the last century, not a single traveller either in Siberia or Russia having communicated any information concerning it during the present century.

"The nearest approach to truly wild horses existing at present are the so-called Tarpans, which occur in the steppe-country north of the Sea of Azoff, between the river Dnieper and the Caspian. They are described as being of small size, dun color, with short mane and rounded, obtuse nose. There is no evidence to prove whether they are really wild . . . or feral." (Flower, 1892, p. 83.)

Calinescu (1931, p. 82) reports *Equus caballus gmelini* as surviving in Moldavia, Rumania, up to 1716.

Vetulani (1933, pp. 281-282) gives the following account for Poland. Hacquet (1794) describes wild horses kept in a zoological garden near Samosch. They increased to such an extent that some were shot and others were sent to Lemberg for use in combats with carnivores. In Kajetan Koźmian's reminiscences of the years 1780-1815 (published in 1858), we read likewise of wild horses in a zoological garden near Zamosc or Samosch. They were allowed to become extinct, apparently because in winter it was necessary to provide barns and hay for them. These two references concern the last wild Forest Tarpans of Poland ("*E. c. gmelini* ssp. *silvatica*"). From Brincken (1874) we learn that this stock was derived from the last wild horses in the Forest of Bialowies, and that finally they were captured in the zoological garden near Samosch and divided among the peasants. This represented the last stage in the domestication of the European Wild Tarpan. We still find in this vicinity representatives of the Forest Tarpan type in an especially pure and

typical form. It is proposed to introduce and preserve some of them in the Polish National Park at Bialowies.

"According to Vetulani, the enigmatic wild white horse described by Herodotus as grazing in the northern marshy land may well have been the Polish wild pony grazing in the Polesie bogs situated close to the Bielowieza Forest" (Janikowski, 1942, p. 682).

According to Niezabitowski (1934, p. 196), *E. gmelini* Antonius lived formerly in the steppe region of eastern Poland, while *E. gmelini silvaticus* Vetulani inhabited the Bialowies Forest up to the middle of the eighteenth century.

Heptner reports (1934, pp. 431-433) that the last example of Tarpan was seen in 1914-18. It lived at that time on an estate in Dubrowka, Mirgorod district, Government of Poltava, and was very old. It had been purchased as a young animal from German colonists, who shortly before had destroyed a small herd of wild horses. Hitherto the last Tarpan in South Russia were supposed to have died out in the 1870's. They survived longest on the steppes of the Government of Cherson.

From the foregoing it may be gathered that it is virtually impossible to state even approximately when the last truly wild representatives of the genus *Equus* perished in the various European countries. Even the names that should be applied to them are far from settled. The type of *Equus caballus caballus* Linnaeus is the Scandinavian domesticated horse of the time of Linnaeus—obviously at least subspecifically distinct from the Russian Wild Horse. Certainly all Wild Horses are now extinct, with the exception of Przewalski's Horse of Central Asia.

For a fuller account of the Wild Tarpan and its relations, Lydekker (1912, pp. 71-116) may be consulted. For a discussion of some of the nomenclatural problems involved, see Harper (1940, pp. 195-197).

Antonius (1938, pp. 557-558) gives the following illuminating account of the *caballus*-group of horses:

In times not long before the beginning of historical days there were true wild horses of the *Caballus* type spread over the whole Eurasiatic continent from the Atlantic to the Pacific, and from the shores of Northern Siberia to the Indian Ocean. Only two, or at the utmost three, of the many local and geological races have survived until our days. The first of these was a mouse-dun horse, which Albertus Magnus, the great interpreter of Aristotle, means when he calls the colour of the wild horse "cinereus," *i. e.*, ash-coloured. There can be little doubt that these ash-dun or mouse-dun wild horses were often intermingled with escaped domestic horses of the feral breeds, thence spread over Europe. But there are some indications by which in many cases their true wild nature may be ascertained. The one is the high value of these horses for princely gifts, the other the short upright mane, and the third the uniformly ash colour, so often recorded. If the first Duke of Prussia, Albert von Hohenzollern, sent wild horses as highly esteemed gifts to the mightiest sovereign of his days, the Emperor, and also to the Arch-

duke Ferdinand and others, there can be no doubt that these horses were a truly royal game—like the Urus and Bison—and not of a little valued feral breed. And if the mouse-colour and the short mane are recorded for some of the last survivors in Poland and Southern Russia, it must be almost certain that there was at least a strong strain of true wild blood in these horses. S. G. Gmelin, one of the many German explorers of Russia in the days of the great Catherine, hunted these "Tarpans" in 1763 in the surroundings of Bobrowsk, Woronesh. After him the author named these horses scientifically "*Equus gmelini*," but perhaps there is an earlier name: *Equus silvestris* v. Brincken, dedicated to the mouse-dun wild horses of Poland, surviving in the forest of Bialowieza until the middle of the eighteenth century, and in another game park until 1812. Although protected very strictly against poaching and illegal hunting, the wild horse in Prussia vanished in the second half of the sixteenth century. In the well-known forest of Bialowieza, Poland, the "Tarpans" were hunted as royal game in 1409, when King Wladislaw Jagiello arranged a great chase in honour of his cousin, Witold of Lithuania. In the immense forests they survived until the eighteenth century, when they were extirpated before the time of the famous hunting of the Saxon Kings. Their last refuge in the Poland of to-day was—according to Vetulani—the great game park of the Count Zamoyski, situated at Zwierzyniec, near Bilgoraj. Here they were strictly protected, until in a severe winter between 1810 and 1820, probably from 1812 to 1813, the feeding was impossible. The last survivors were captured and given to the peasants of the surrounding country. According to these facts there are in no other district of Poland more typical "Tarpans" among the little horses of the peasants than in the surroundings of Bilgoraj [cf. Janikowski, 1942]. Vetulani has proved these Polish wild horses as a more or less degenerated branch—according to their being adapted to the unsuitable wood life—of the Eastern or Russian Tarpan.

The latter vanished from the fertile country of Woronesh before 1800, but survived on the steppes of Tauria and Cherson until the middle of the nineteenth century. The last herds were certainly more or less intermingled with feral horses, but the short mane being recorded even for the last example, demonstrated the predominance of true wild blood. F. von Falz-Fein, the well-known founder and owner of the matchless Ascania Nova Zoo, has told the life-history of that last wild horse of Europe, an one-eyed old mare, lingering for years around the feral horses of a certain Durilin, covered by a domestic hehorse, captured, escaped with its filly, and some years later hunted and killed on the ice by the peasants of Agaiman.

There is only one drawing from a living example hitherto known: in the description of the travels of Gmelin, edited by Pallas after the tragic death of his comrade. This picture, drawn by Borisow from a one year old mare, was later on copied by Schreber in his "Naturgeschichte der Säugetiere."

It must be recorded that experiments for the rebreeding of the mouse-dun Tarpan were started both in Germany and in Poland. In the Schorfheide near Berlin and in the Munich Zoo the Germans try the rebreeding by crossing the true yellow-dun Mongolian wild horse with mouse-dun mares of various domestic breeds, while in Bialowieza the Poles settled upon some most typical descendants of the last Bilgoraj wild horses, selected out of a great number of peasant-horses in that district, without any interbreeding of strange blood. The question is, which of the two trials will have the better results.

The home of the mouse-dun Tarpan extended eastward over the river Don and probably to the right bank of the Wolga. It is possible in earlier

days that these horses were also spread over the Caspian steppes, but as it is difficult to distinguish the different records about other Equidae, *e. g.*, the Kulan, it is impossible to confirm that opinion.

The hillier steppe-country between the Wolga and the Ural-Mountains, in the days of Pallas already crossed by a line of Kossak-posts, were roamed by another wild horse. Pallas gives in his great travel-work, the well-drawn portrait of a young filly, captured in the surroundings of Tozk—then a little Kossak post. That picture resembles in a high degree the Przevalski-fillies, imported by Hagenbeck in 1899 and 1900. Together with the statements of Pallas about the colour (Isabella to light bay), the "suberect" mane, the tail, etc., there can be no doubt that these horses were almost as pure-bred wild horses of the yellow-dun Przevalski-type as ever roamed the Dzungarian Gobi. In the time of Pallas the wild horses were spread in scattered troops, more or less intermingled with escaped domestic horses, over the steppes of Western Siberia. Georgi, one of Pallas's fellow-workers, reports that they were extirpated by a desolating horse-sickness in 1785 which destroyed also the herds of the Kirghises and Kossaks, causing the death of about 85,000 horses. In 1876 the species was rediscovered by the great Russian explorer Przevalski in the Dzungarian steppes south of Kobdo and named after him by Poljakoff "*Equus przewalskii*."

Quagga

EQUUS QUAGGA Gmelin

Equus quagga Gmelin, Linnaeus' Syst. Nat., ed. 13, vol. 1, pt. 1, p. 213, 1788. (South Africa.)

FIGS.: G. Edwards, Gleanings of Natural History, p. 29, pl. 223 (col.), 1758; Ridgeway, Proc. Zool. Soc. London 1909, pp. 563-586, text-figs. 157-180. reproductions of early figures and photographs of preserved specimens.

The vernacular name, Quagga, of this handsome zebra-like species is said to be derived from the Hottentot *khous khous*, in imitation of its bark-like cry. The Boers, however, often applied the same name to the Burchell's type of zebra, and it is sometimes loosely used for that animal by writers.

Harris, whose folio *Portraits of the Game and Wild Animals of Southern Africa*, 1840, provides some first-hand information on this species, wrote that it stands 4.5 feet at the withers and has a total length of 8.5 feet, but Cuvier (quoted by W. L. Selater, 1900, vol. 1, p. 295) gives the height at the shoulder as slightly less, about 4 feet 1 inch. The general ground color of head, neck, and body was dark rufous brown or bay, becoming gradually more fulvous and fading off to white behind and beneath. The midline of the back was marked by a broad dark stripe. Against the background of bay, the forehead was marked with longitudinal stripes and the cheeks with narrow transverse stripes of buff, "forming linear triangular figures between the eyes and the mouth." Muzzle black; neck and anterior half of the body banded and brindled with creamy brown, broader and more regular on the neck (extending across the short erect mane), but becoming finally lost in spots and blotches on the rear

half of the trunk. The legs, tail, and under surfaces were white, with sometimes a short midventral dark line, and usually a black spot behind the fetlocks. Individuals appear to have varied considerably in the width and extent of the paler stripes and in the amount of whitish on the rump, tail, and belly. These differences have been made the basis of several subspecific names, but it is now agreed that they are best considered as only variations of a single species. Although Pocock earlier believed that the Quagga was merely a southernmost form of the Burchell's Zebra, and that certain

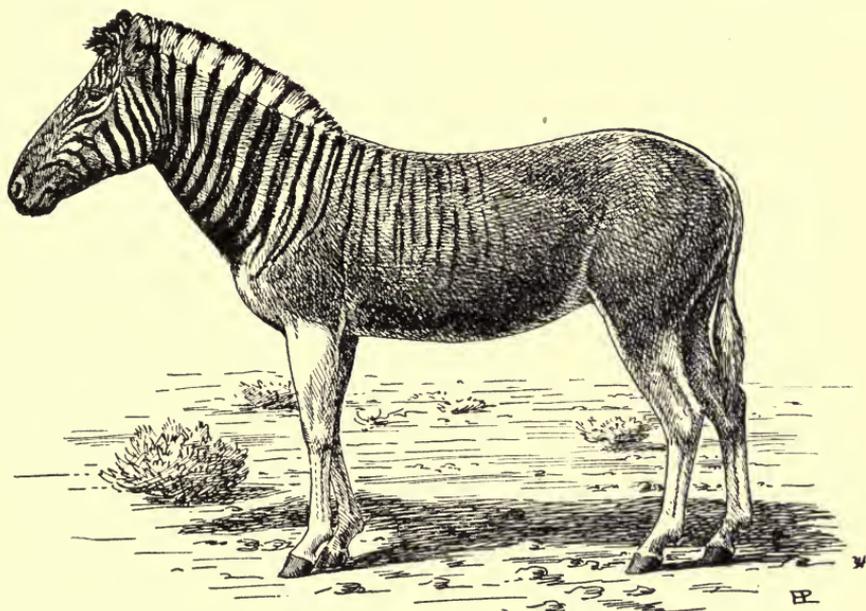


FIG. 34.—Quagga (*Equus quagga*). After Standard Natural History.

individuals nearly bridged the gap between the extremes, it has since been shown that the two are doubtless separate species, and that the Quagga, in addition to the well-marked color characters, was further distinguished by cranial differences as well. For according to Schwarz (1912b) the skull is the smallest of the three South African species of zebras, and is characterized by its relatively wide zygomatics, narrower bony eye ring, broader forehead, greater separation of the temporal ridges, the presence of a small suborbital pit, and by having the posterior border of the nasals heart-shaped. While such characters may be subject to individual variation, they may for the present be regarded as valid.

The Quagga seems first to have been brought to the notice of naturalists by George Edwards, who in his *Gleanings* (1758) published

a colored plate of a female, which he supposed to be the female of the Mountain Zebra. Buffon in 1782 (Hist. Nat., Suppl., vol. 6, p. 85) was the first to give an authentic account of the animal on the basis of notes supplied him by Allamand, from Colonel Gordon, a South African resident. Subsequently Edwards' description became the basis of Gmelin's name *Equus quagga*. So far as the records show, the Quagga always had a somewhat restricted range and was confined chiefly to the southeastern corner of the Cape region, from Algoa Bay westward at least to Prince Albert (where Barrow reports it in 1801), and Swellendam, some 100 miles east of Cape Town, where Sparrman first saw it, northward to the Orange Free State and the Vaal River, and coastwise to the Kei River. There is practically no record of travel in South Africa between the days of Kolben in 1705 and the visit of the Swedish naturalist Sparrman in 1775. The latter, however, found the Quagga as near the coast of Algoa Bay as Uitenhage. He secured a foal which is still preserved in the Riksmuseum at Stockholm. Quaggas were apparently still plentiful in the first quarter of the last century, especially in the districts of Aberdeen (Lichtenstein, in 1804) and in Fraserburg and Hanover where Burchell in 1812 found them abundant, in troops of 30 to 50 on the plains. These made an impressive sight traveling in single file as was their curious habit, or when startled, wheeling in unison like a squad of cavalry. It was said that they frequently associated on the plains with the White-tailed Gnu or with ostriches; whereas the Burchell's Zebras preferred the companionship of the Brindled Gnu. Where, as in the Orange Free State, the range of the Quagga met or overlapped that of Burchell's Zebra, it is said the two did not mingle.

The Boer farmers evidently took heavy toll of them in these years, greatly reducing their numbers, and using the meat to feed their workers although themselves preferring more tasty kinds of game. The result of this constant persecution was that by the late 50's the Quagga was practically extinct south of the Orange River. According to Bryden (1889) the last known instance was of two shot in 1858 near the Tygerberg, a solitary mountain rising abruptly from the plains near Aberdeen. His informant, the successful hunter, recalled the affair well. Farther north, however, in the Orange Free State, Quaggas were still numerous. About 1865, the Boers of this state began the exploitation of the large game of the region for their hides. With characteristic industry and deadly skill they gathered and shipped to the coast hides by the wagonload, among which those of Quagga and Burchell's Zebra were especially in demand. They also made use of Quagga hides for grain sacks, and Bryden (1889) mentions seeing old Quagga-skin sacks still in use at the time of his visit. The exact date of the final extermination of the Quagga is unknown, but it is generally believed that the species continued well into the

'seventies in the Orange Free State, probably, according to W. L. Sclater (1900), "till 1878 at least," but he adds, "it is difficult to obtain any accurate information on the subject, as in so many cases this and Burchell's Zebra are confused together, especially as they were both known under the name of quagga."

In the earlier days of the last century and even shortly before, Quaggas were occasionally tamed and also exported alive to the zoölogical gardens of Europe. In disposition it was said to be much more tractable than the Burchell's Zebra, in captivity quickly becoming docile and tamable. On various occasions they were broken to harness, and Sir William Jardine even mentions that a Mr. Sheriff Parkins early in the nineteenth century drove a pair in London, and was often seen in Hyde Park riding in a phaeton after them. Probably one of the first Quaggas to reach Europe alive was the one belonging to His Royal Highness the Prince of Wales, from which in 1751 George Edwards made his colored drawing. The specimen now in the Paris Museum was brought to the menagerie of the King, at Versailles, in 1793. Others were later imported by animal dealers such as Frank at Amsterdam. Of the various specimens extant in the museums of Europe, the larger part were brought in alive and received by the museums after having died in captivity. Thus the locality of capture is in most of these cases unrecorded. In 1858, Sir George Grey presented to the Zoological Society of London a male Quagga which died six years later, in 1864. "It is the mounted skin, skull and skeleton of this male which is now in the British Museum" (Ridgeway, 1909). Previously in 1851 the Society had purchased a female Quagga which survived in Regent's Park, until 1872, apparently nearly the last living example of the species of which any positive record exists. Further, this was the only living Quagga ever to be photographed, and the picture has been reproduced by Lydekker in his *Guide to the Specimens of the Horse Family* and by Ridgeway in his paper of 1909. The skin was not in condition to be preserved; but it is said that the skeleton was saved and mounted, although at the present time it has been lost sight of and is evidently not the one now in the British Museum. Finally, the last known living specimen seems to have been one that died in the Berlin Zoölogical Garden in 1875. The skin is mounted in the Zoölogical Museum in that city, and the skeleton is also preserved there.

Combining the lists of Ridgeway (1909) and Hilzheimer (1912), the known specimens of the Quagga in the museums of the Old World are the following (arranged alphabetically by location):

1. Amsterdam Museum.—Mounted specimen, and separate skull. Figured by Lydekker (Proc. Zool. Soc. London, 1904, vol. 1, p. 430, text-fig. 86) and by Ridgeway (1909, p. 579, text-fig. 170).

2. Basle Natural History Museum.—A mounted female from Silo (Shiloh),

Cape Colony, presented in 1864. Figured by Ridgeway (1909, p. 565, text-fig. 157).

3. Berlin, Zoölogical Museum.—Mounted female, that died in the Berlin Zoölogical Gardens in 1875; also its skeleton and two other skulls. Figured by Ridgeway (1909, p. 578, text-fig. 168).

4. Cape Town Museum, South Africa.—Mounted foal, from Beaufort West, about 1860. Figured by Ridgeway (1909, 580, text-fig. 171).

5. Darmstadt Museum.— Mounted specimen.

6. Edinburgh, Royal Scottish Museum.—A mounted specimen, purchased by the University of Edinburgh during the year ending June 1818. Figured by Ridgeway (1909, p. 575, text-fig. 165).

7. Elgin Museum, Scotland.—A mounted head and neck, from King William's Town, 1861. Figured by Ridgeway (1909, p. 581, text-fig. 172).

8. Frankfurt a.M., Senckenberg Museum.—A well-mounted skin and its skull, received in 1831 by exchange with the Leiden Museum.

9. Leiden, Dutch State Museum of Natural History.—Mounted male and its skeleton, shot near Steenberg, June 15, 1827. Figured by Ridgeway (1909, p. 577, text-fig. 166).

10. London, British Museum.—Ridgeway (1909, p. 574) has cleared away the confusion regarding the number and origin of the specimens in this Museum. Apparently the only one is a male skin, mounted, and the skeleton of the same animal, which had been presented to the Zoological Society of London by Sir George Grey in 1858 and lived in the Society's Gardens until its death in 1864. The female Quagga which lived in the Gardens from 1851 to 1872, was photographed in life, but its skin, upon its death, was in too poor a state to be preserved. Its skeleton, however, was mounted but cannot now be traced. The male specimen as mounted is figured by Ridgeway (1909, p. 573, text-fig. 163) and the living female is figured by Ridgeway (1909, p. 575, text-fig. 164) from York's photograph of the animal.

11. Mainz Museum, Germany.—According to Hilzheimer (1912) there were four mounted Quaggas in this collection, but Schwarz (1912) who also examined them, asserts that one of the four is a Burchell's Zebra.

12. Munich Natural History Museum.—A mounted specimen purchased in 1835, and a separate skull that may or may not belong to the same individual. It was this specimen that was the original of the figure by Wagner in "Schreber's Säugthiere, Supplement." Figured by Ridgeway (1909, p. 579, text-fig. 169).

13. Paris Museum of Natural History.—A mounted specimen. According to the communication of Dr. E. L. Trouessart, it was received living after the institution of the Museum's menagerie from the old menagerie of the King, at Versailles in 1793. No more precise locality is given for it than "Cape of Good Hope." Figured by Ridgeway (1909, p. 577, text-fig. 167).

14. Stockholm, Riksmuseum.—The mounted specimen here is a full-grown fetus, brought back by the Swedish traveller Sparman in 1775. It is therefore the oldest extant specimen and appears to have the pale stripes clearer and extending farther back than usual. While the exact locality is unrecorded, Sparman mentions that he first saw Quaggas at Swellendam. Figured by Ridgeway (1909, pp. 570, 571, text-figs. 160, 161), both from a photograph and from a recent painting.

15. Stuttgart Museum, Germany.—According to Hilzheimer (1912) this museum contains a skull and footbones of the Quagga. He further mentions that in the Stuttgart Altertums Collection is a miniature model of a Quagga, of which he gives a figure, and suggests that it was probably prepared from the two animals which Frederick I had in his menagerie in 1812-16. It may therefore have a certain authenticity.

16. Tring Museum, England.—A mounted specimen, interesting for the distinctness of the posterior stripes. It was described and figured by P. L. Sclater (Proc. Zool. Soc. London, 1901, vol. 1, p. 166) who believed that it was the same as the animal formerly living in the London Zoological Gardens from 1851 to 1872. That this, however, is not the case was made clear by Ridgeway, who publishes a letter from E. Gerrard (who sold the specimen to Lord Rothschild) stating that he had purchased the animal as an old mounted specimen from a Mr. Frank of Amsterdam and had remounted it before selling it to the Tring Museum. Figured by Ridgeway (1909, p. 569, text-fig. 159).

17. Turin, Zoological Museum.—A mounted female, and its skull. The specimen was purchased in 1827 from the English dealers, Leadbeater father and son. It was made the type of *Equus trouessarti*, figured and described by Camerano (1908, pl.).

18. Vienna Museum.—A mounted female, procured by Ecklon, in 1836. The specimen was described by Lorenz (Proc. Zool. Soc. London, 1902, vol. 1, p. 32) and figured from a photograph which is again reproduced by Ridgeway (1909, p. 568, text-fig. 158).

19. Wiesbaden Museum, Germany.—A mounted specimen, male, which was bought in 1865 from Frank, the Amsterdam dealer. It has no more definite locality than "South Africa." Figured by Ridgeway (1909, p. 572, text-fig. 162).

From this enumeration it appears that there are in the museums of Europe 17 mounted skins (one a fetus), a mounted head, 3 skeletons, and 7 skulls; while elsewhere the only known specimen is a mounted skin of a foal, in the South African Museum.

G. M. A.

Burchell's Zebra or Bontequagga

EQUUS BURCHELLII BURCHELLII (Gray)

Asinus burchellii Gray, Zool. Journ., vol. 1, p. 247, 1824. (Little Klibbolikhoni Fontein, Bechuanaland, South Africa.)

FIGS.: Gray, *op. cit.*, pl. 9, figs. 1, 2; Lyon, M. W., Jr., Proc. U. S. Nat. Mus., vol. 32, pls. 1-3, 1907 (photographs of mounted specimen); Cabrera, Jour. Mamm., vol. 17, p. 97, figs. 1-5 (pattern diagrams), 1936; Pocock, Proc. Zool. Soc. London, vol. 1, p. 485, fig. 48, 1909 (photo.).

Although, on account of its somewhat variable pattern, the Burchell's Zebra has been divided into many nominal races, only four of these are regarded as valid by Cabrera (1936) in his recent review. Of these four, the typical *burchellii* is now extinct, and there are few specimens preserved.

About the size of a small horse, with erect mane and tufted tail, the color pattern consists of alternating dark-brown or black stripes and whitish stripes. Of the former, there are about ten on the neck, a vertical shoulder stripe, four body stripes, then on the flanks three or four that turn back dorsally, somewhat paralleling the median black stripe. The characteristic feature of typical Burchell's Zebra is that the lower haunches and both fore and hind legs lack the small

transverse stripes that are increasingly developed in the more northern races, and the tail is white.

The former range of this race was rather limited and covered what is now the Orange Free State and southern Bechuanaland, in South Africa, but apparently did not extend to the south of the Orange River. Over the plains of this region it once abounded "in countless thousands," but with the coming of white hunters, followed by settlers in the Orange River colony, it had already become rare by the middle of last century. Many were exported to Europe for



FIG. 35.—Burchell's Zebra (*Equus burchellii burchellii*). After Brehm.

zoölogical gardens, and it is in part from these that have come the few specimens still preserved in museums. There is a specimen in the British Museum, one in the Tring Museum, and a third in the Bristol Museum, in England, and there is a mounted one in the U. S. National Museum, and one in the Paris Museum, with a few others in other museums, as Berlin, Leiden, and South Africa. The last living specimen, so far as known, was one kept in the London Zoological Gardens, where it was received apparently in 1909, after evidently having been in captivity for a period.

From Benguela west to Southern Rhodesia and Zululand, this race is replaced by the race *antiquorum*, with more cross-striping on the upper parts of the limbs. At the present time this animal still exists in some numbers in the west of South-West Africa. From the Limpopo River northeastward to the Loangwa and Rovuma Rivers is

found the race *selousii*, distinguished by "having the limbs striped to the coronet, and the body with numerous narrow stripes and few and faint shadow stripes." Still farther northeastward, is the race *böhmi*, inhabiting the plains country of eastern Africa north to Lake Rudolf, in which the shadow stripes (between the clear black stripes) are absent and the haunch stripes broad and black, and the limbs cross-striped nearly to the hoof. This race is still common.

The chief enemy of the zebras, apart from man, is the Lion, which seems specially fond of zebra meat and finds it easily obtainable. The zebras go in herds which may at times be of large size. Frequently Gnus, of one species or another, associate with these herds, as if for companionship. Zebras have at times been tamed and trained to harness but are of rather uncertain disposition and no great use of them in this way has been made. Their meat, though relished by the natives, is not popular among white hunters, according to Selous. The hide is often used as leather. In regions where agriculture is practiced, Zebras often become a nuisance to the ranchers by stampeding and breaking through barbed-wire fencing. They are said to have a good deal of curiosity, and especially where mules or donkeys are in camp, will often approach closely to survey them. According to Major Flower, they often in captivity live over 12 years, and have been known to reach 28 or 29 years in zoölogical gardens. The name "quagga" is said to be derived from the noise they make, a sort of honking bark. They are much dependent on water, and drink at least once a day, often at night, but approach the waterhole with caution, for fear of lurking lions.

Although, with the exception of the typical *burchellii*, none of the races is in present danger of extinction, their numbers will undoubtedly diminish except in areas where large extents of grasslands as in East Africa afford them range.

G. M. A.

Mountain Zebra. Wildepaard (Boer). Dauw (Hottentot)

EQUUS ZEBRA ZEBRA Linnaeus

Equus zebra Linnaeus, Systema Naturae, ed. 10, vol. 1, p. 74, 1758. (Probably the Drakensberg and other mountain ranges, Cape of Good Hope.)

Hartmann's Mountain Zebra

EQUUS ZEBRA HARTMANNAE Matschie

Equus hartmannae Matschie, Sitzber. Ges. Naturf. Freunde Berlin, p. 174, 1898. (Between Hoanib and Unilab Rivers, South-West Africa.)

FIGS.: Of typical form: Lydekker, 1912, pl. 20, fig. 1; J. E. Gray, Knowsley Menagerie, pl. 56, 1850; Pyeraft, 1936, p. 850, fig. Of *E. z. hartmannae*: Haagner, 1920, fig. 66; Zukowsky, 1924, fig. 6; Maydon, 1932, pl. 125; Shortridge, 1934, vol. 1, pl. opp. p. 389; Pocock, 1937, p. 717, fig.

Since there is still some doubt (Shortridge, 1934, vol. 1, p. 389) whether the Mountain Zebra of the dry South-West African uplands is recognizably distinct from the typical *E. zebra*, the two may be treated together, pending further study of specimens. Also some authors, among them Captain Shortridge (*op. cit.*), prefer to regard this as a genus distinct from *Equus* or from the South African Quagga, calling it *Hippotigris*. Since in skeletal and tooth characters it is very little different from the horses, a conservative course is to regard the latter as a subgenus of *Equus*.

The Mountain Zebra was the first of the zebras known to Europeans and is the smallest of the three species, standing about 12 hands high (48 inches) at the shoulder. Length of head and body 7 feet 4 inches; tail, with terminal hairs, 23 inches (W. L. Sclater, 1900). Sclater gives the following description:

Body, head, and limbs closely covered with black or almost black stripes, broader than their white interspaces; on the face the dark markings below the eyes become reddish passing into large nostril patches of the same color, but the muzzle itself is black; . . . ears long and rather narrow, posteriorly the basal two-thirds striped, the terminal third black, the extreme point white; . . . longitudinal dorsal stripe only noticeable over the haunches, transverse stripes of the barrel extending back over the haunches to the base of the tail forming here the so-called gridiron pattern; no shadow stripes; hairs along the back to the shoulders reversed; belly white, except for a longitudinal dark band running along its anterior portion which is never reached by the transverse body stripes; limbs transversely marked down to the hoofs, . . . the pasterns being quite black; . . . hoof rather narrow, compact and solid; tail reaching the hocks with a median black line and traces of transverse bars at the base; the distal quarter with a tuft of long black hairs.

Hartmann's Zebra is believed to differ from the typical race in its larger size and more widely spaced stripes, so that the pale stripes are equal to or even slightly wider than the black ones. The legs "are almost evenly banded black and buff—the black not predominating as in *zebra*." However, this pattern varies individually and as yet it is uncertain whether the characters claimed are relatively constant.

As its name implies, this zebra was an upland species, living in the mountains, "from Great Namaqualand (and possibly Damara-land), through the various ranges of Cape Colony to the Great Drakensberg chain, and thence to the end of that range. . . . At the present day," wrote Bryden (1899, p. 94), "it is only to be found in small troops here and there in Cape Colony. It is very doubtful whether any now remain in Great Namaqualand, where, sixty years ago, Sir James Alexander found them in considerable numbers. It is probable that the Hottentots . . . , who are excellent shots . . . , have destroyed the last remnants . . . in . . . Great Namaqualand.

In Cape Colony, where these zebras are, as far as possible, preserved, small troops are to be found in the mountains of the Sneeuwberg, Witteberg, Tandtjesberg, Zwartberg, the Winterhoek, and one or two other ranges. A few still linger along the Drakensberg. . . . Near Cradock, . . . only a few years since, a troop of twenty was seen." Under date of January 23, 1935, Herbert Lang, the well-known explorer and authority on large game mammals of South Africa,

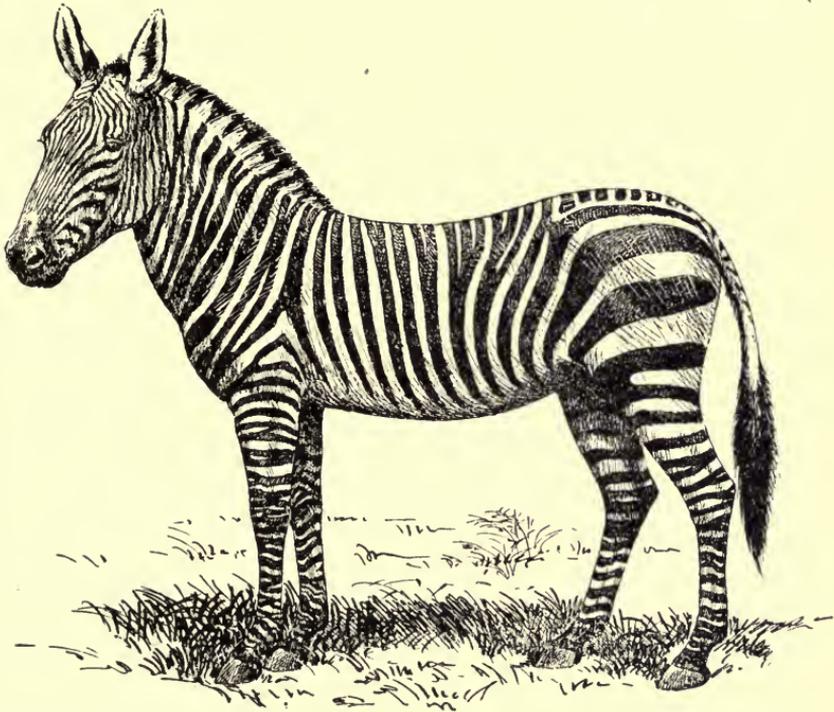


FIG. 36.—Mountain Zebra (*Equus zebra zebra*). After photographs in Brehm and Newnes.

wrote that "there must be still about a hundred Mountain Zebras in various places in spite of the reports to the contrary. In 1926 I traveled through all these regions to observe these zebras in their haunts. One must have seen these herds of Mountain Zebras on their actual trails to be enthusiastic about them and their protection. There can hardly be anything more fascinating." By 1937, according to editorial notes in the *Journal of the Society for the Preservation of the Fauna of the Empire*, a census of these zebras showed the following 45: in the Oudtshoorn Area, near George, 20 on the farm of Peter Heyns; in the Cradock Area, 10 on the farm of Paul Michau, 8 on the farm of Lombard, 7 on that of Osborn. The

proportion of sexes among these animals was believed to be very uneven with "a great shortage of mares." This number is still less than a few years previously, for E. L. Gill, writing in December 1932, said that at Cradock there were "two or three small herds which seem likely to die out. The Oudtshoorn herd on the farm Mount Hope, has been carefully preserved by the owners, the brothers Heyns, and is still flourishing. It numbers somewhere about 70 animals and constitutes the chief hope for the survival of the species."

Efforts have been made at various times in recent years to induce the Government to purchase a portion of the Mount Hope Farm as a permanent Mountain Zebra reserve. In 1937, the Government at last voted to ask the Parliament of the Union of South Africa for £7,600 for the establishment of such a reserve and hopes are high that it may actually be created, before it is too late. Notwithstanding that the species is protected at all times by the South African Government, the actual enforcement of this protection has in the past been difficult. It is one of the species listed for complete protection by the London Convention of 1933.

While "the advance of civilization" is blamed for the reduction in numbers of this zebra, no doubt much blame must also be laid upon the native and white poachers with modern rifles, as well as to other methods of extermination. Bryden (1899) wrote that occasionally the weather is so "severe among the Cape mountains that even the tough zebra succumbs" and that in "the old days in Cape Colony, the Boers were in the habit of hunting these animals for the sake of their hides and of capturing the young alive for the purpose of being broken to harness." For in the last century "a fashion for using Mountain Zebras in harness seems . . . to have sprung up in the Mauritius, and . . . a good many of these animals were exported from the Cape to meet the requirements of the French colonists. . . . A premium of £20 was at the same time offered for the young of these animals delivered in Cape Town." "The Boers, to save themselves the trouble of shooting, occasionally succeeded in driving a number of these animals over the edge of a precipice, thus securing the skins at their leisure" (Bryden, 1899).

Although Bryden (1899) feared that within the "next fifty years this zebra will have joined the ranks of extinct creatures," there seems still some hope of preserving a remnant, owing chiefly to the interest of those farm owners on whose lands the survivors still hold out, and an awakened enthusiasm on the part of the Government to do what it can.

While the future of the Mountain Zebra in the Cape Province is none too rosy, it still occurs in the form *hartmannae* in small numbers among the mountain ranges of the western and northwestern parts of South-West Africa and northward across the Cunene into south-

western Angola at least as far as Elephant Bay, 100 miles north of Mossamedes, where, however, it is not found more than 30 miles inland. Shortridge (1934, vol. 1, pp. 390-396) has gathered together the available information concerning it in this region. The eastern limits are found in the Kaokoveld about a hundred miles from the west coast. Here it is sometimes found in association with the Bontequagga (*E. burchellii antiquorum*) but is much fewer in numbers. It is partial to the crests of arid gorges, and its small cupped hoofs are adapted for rough country. Large numbers are said to be found in the Omaruru and the Maltahohe districts, but elsewhere they are less common. Steinhardt saw them digging for water in sandy river beds of this arid country, making pits half a meter deep. They may not drink regularly but sometimes keep away from water as long as three days. They are shy and suspicious and difficult to approach under usual conditions. The Cape Mountain Zebra is believed to be a slow breeder, with foal every second year or so. The period of gestation is said to be about twelve months. The height at the shoulder is said to be in *hartmannae* about 52 to 54.5 inches, hence somewhat taller than the typical race.

G. M. A.

Nubian Wild Ass. Nubischer Wildesel (Ger.)

ASINUS ASINUS AFRICANUS Fitzinger

Asinus africanus Fitzinger, Naturgesch. Säugethiere, vol. 3, p. 667, 1857. (Lydekker (1916, vol. 5, p. 38) gives the type locality as "Nubia (according to Matschie, Erythraea).")

SYNONYM: ?*Asinus asinus diana*e Dollman (1935).

FIGS.: Proc. Zool. Soc. London 1884, pl. 50, fig. 2, 1885; Lydekker, 1904, pl. 20, 1912, pl. 20, fig. 2, and 1916, vol. 5, p. 37, fig. 16; Antonius, 1929, p. 290, fig. 1; Zammarano, 1930, p. 87, fig.

This subspecies is "by no means common" (Brocklehurst, 1931, p. 15).

"General colour of upper-parts greyish-fawn, with the muzzle, a broad ring round each eye, . . . and the under-parts, white or whitish; the legs being of the same pale hue, with some greyish on the front surface, and a few small dark spots on each side of the fetlocks. The mane . . . is short, upright, and dark brown or blackish The narrow dorsal stripe . . . is continued as a thin line well on to the tail"; the two branches of the shoulder stripe are about 5-6 inches in length. "The long hairs of the terminal tail-tuft . . . are mingled black and grey. The ears are about 10½ in. in length, and are black at their tips On the inner side of the lower part of the fore-leg is a chestnut patch." Height of male at shoulder, 45½ to 47½ inches. (Lydekker, 1904, p. 594.) Baker (1867, p. 56) gives the height of a male from the Atbara River as 55-56 inches.

A. a. diana Dollman (1935), from south of Tokar near the Eritrean boundary, is so weakly differentiated from *africanus* as to seem scarcely worthy of recognition; it may represent a slight intergradation toward *somaliensis*.

"The Nubian wild ass . . . inhabits . . . Sennar and Nubia, its range formerly extending as far as the fifth cataract of the Nile

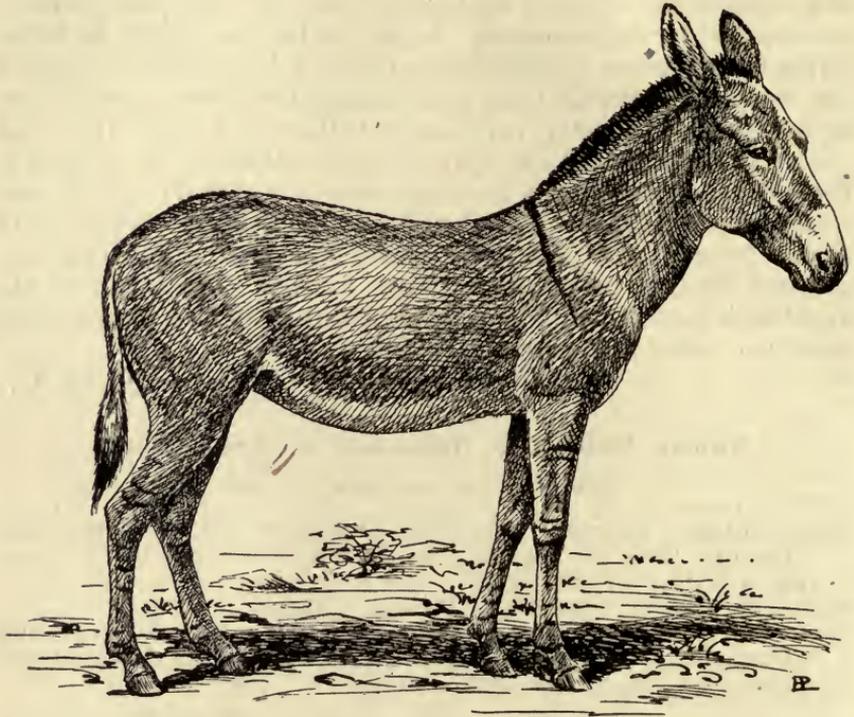


FIG. 37.—Nubian Wild Ass (*Asinus asinus africanus*)

. . . . Year by year the range of this race appears to become more restricted; and unless protective measures be taken, there is danger that it may be exterminated." (Lydekker, 1908, p. 66.)

Heuglin (1861, p. 19) reports Wild Asses as occurring from Suakin to the Nile at Berber, in all northeastern Sennaar, and in the plains of the Barka River. He says he met with them commonly about the ruins of Wadi Sáfra, then on the Atbara, and along the route from Taka toward Suakin; and during the rainy season they appear as far north as the Desert of Korosko. (Korosko is on the Egyptian part of the Nile, at about lat. 22° 30' N.; but Flower remarks (1932, p. 432): "There appear to be no certain records of genuine wild asses having occurred in Egypt during the nineteenth century.")

Sir Samuel Baker (1867, pp. 55-56) writes concerning the Wild Ass along the Atbara River: "Those who have seen donkeys in their civilized state have no conception of the beauty of the wild and original animal. . . . The animal in its native desert is the perfection of activity and courage; there is a high-bred tone in the deportment, a high-actioned step when it trots freely over the rocks and sand, with the speed of a horse when it gallops over the boundless desert. No animal is more difficult of approach; and, although they are frequently captured by the Arabs, those taken are invariably the foals, which are ridden down by fast dromedaries, while the mothers escape."

Matschie gives (1894, p. 73), as the northernmost locality, the Wadi el Homar, a little north of Berber.

"Their flesh is eaten by the Arabs of the Soudan. They are ordinarily met with in twos and threes, or small herds." (Bryden, 1899, p. 70.)

"This animal is found at the foot of the Gebel Hennah, near Tokar. It is common in the Khor Sabbat parallel to the Khor Baraka. Captain O'Connor informs me that he has often seen them at the Khor Sabbat, on the plain of Tokar." (Anderson, in Anderson and de Winton, 1902, p. 330.)

"Neither the wild asses nor the zebras of Africa are pursued with much enthusiasm by sportsmen, and the first-named animals are so shy and wild that whilst it is very difficult to get within shot of them on foot, if they are hunted on horseback they are so fleet and enduring that they can only be overtaken with great difficulty even by a really fast horse. . . . Thus the wild ass is seldom shot, and is probably of less interest to the average sportsman than any other African game animal." (Selous, 1914, p. 36.)

"The Wild Ass is found in the Sudan in the neighbourhood of the Atbara River in the provinces of Berber and Kassala; it is also found in the Red Sea Province south of Suakin.

"They have been strictly protected for a number of years, and although by no means common there is not, at present, any danger of their being exterminated." (Brocklehurst, 1931, p. 15.)

Some years before 1932 Wild Asses were fairly common in the region of the Baraka Wadi near the border of Eritrea (Maydon, 1932, p. 203).

In all probability the very few Eritrean specimens now extant live in the region of Upper Barca (De Beaux, 1935, p. 12).

Powell-Cotton (in Dollman, 1935, p. 134) writes concerning Wild Asses south of Tokar near the Eritrean boundary: "Between 18 February and 2 March 1934 we saw the animals on four occasions, as follows, 1, 2, 2, 3, and secured the two specimens permitted us. . . . The Arabs . . . leave the Wild Ass unmolested as they do not

eat its flesh, and they told us they were more numerous across the Eritrean boundary."

Antonius (1938, p. 560) writes:

[The Nubian Wild Ass] until recent times spread over the mountainous semi-deserts of Nubia and the Eastern Sudan from the Nile to the shores of the Red sea. The last specimens of Nubian origin known to European observers were two males shot by Sir Reginald Loder about 1925, near the Gebel Raboba, on the Erythrean frontier, and an old female, living in the Zoological Gardens at Rome for many years, the photograph of which is reproduced by Zammerano in his "Fauna e Caggia." To-day there is a living specimen in the New York Zoological Park, and also a stallion in the Zoo at Rome. The Nubian ass was domesticated by the ancient Egyptians at least in 3500 B. C., and being hunted by the King Rameses III.—as is shown at the temple of Medinet Habu—it was well known as a wild animal in Egypt until at least 1100 B. C. . . .

The so-called "Nubian Asses" shown in many Zoos, are by no means pure bred descendants of the true wild stock; therefore it seems nearly certain that the Nubian ass is to-day as thoroughly extinct as his Atlantic cousin. [This remark on extinction is somewhat premature, in view of the statements just quoted from Brocklehurst, Maydon, De Beaux, and Powell-Cotton.]

All forms of the Wild Ass in Africa enjoy complete protection under the London Convention of 1933.

Domestication.—According to Lydekker (1916, vol. 5, p. 37), the typical subspecies of the African Wild Ass (*A. a. asinus*) is represented by the Domestic Ass of Asia. He also states (1912, p. 217) that the wild animal was first tamed in the Mediterranean countries. This ancestral wild animal was doubtless distinguishable from the present domesticated animal, but whether it was identical with any of the wild forms now recognized (*africanus*, *atlanticus*, or *somaliensis*), it is impossible to say. Werth (1930, p. 351) suggests Abyssinia as the place of first domestication. If, however, the wild ancestor inhabited the eastern Mediterranean region, where no wild representative of *Asinus asinus* now exists, it may have differed from any of the currently recognized forms. In the account of *Asinus hemionus hemippus* (p. 368) I have suggested the possible occurrence of some wild form of *Asinus asinus* in the Palestine region within comparatively recent times.

While space does not suffice to discuss the subject of domestication at any length, the following quotation from Peake (1933, pp. 98-99) is appropos here:

The ass was used at a very early date, both in Egypt and in Mesopotamia, but it is impossible to say at present to which region to ascribe the priority. Towards the close of the predynastic period in Egypt, just before 3400 B. C., the Libyan tribes, who dwelt in the desert to the west of the Nile Delta, possessed large herds of asses, and this indicates that this animal had been known to and possessed by them for a long time. At Ur, in Mesopotamia, asses were used by those kings and queens who were buried in the famous death-pits, accompanied by their slain retainers, and these must be relegated

to quite as early a date, and are probably much earlier. All our evidence goes to show that asses had been tamed, and were used as beasts of burden, both in Egypt and Mesopotamia, between 4000 and 3000 B. C., and may have been domesticated at a considerably earlier date.

On the island of Sokotra there are herds of wild or feral asses closely resembling *A. a. africanus* in color but of smaller size (standing from 38 to 40 inches at the shoulder). They are regarded as "the survivors of Nubian ancestors brought from the Red Sea coast by, probably, the ancient Egyptian incense collectors." Their introduction is presumed to date back "for some thousands of years"—perhaps a sufficient length of time for their insular habitat to have produced degeneration in size. "As they are never shot at and rarely molested by the natives, they were by no means wild." (Cf. H. O. Forbes, 1903, pp. xxxviii, 6, 9-11, pl. 2.)

[There has been much discussion as to the possible existence of Wild Asses in the Sahara. Tristram (1860, p. 318, as quoted by Blyth, 1862, pp. 363-364) "heard that wild Asses were to be occasionally found in the Soufa desert, on the route to Ghadames." He was shown one that "had been caught when very young, and was considered unusually tame for one of his species." It was "of a rich slatish ash-colour"; dorsal stripe and shoulder stripe present; nose and limbs white; mane and tail blackish. The adults were said to be "very difficult to entrap and impossible to train."

On a journey through the Tuareg country in 1913-14 Geyr von Schweppenburg (1917, p. 298) learned that wild or feral asses were not uncommon there in previous years, but by that time had virtually disappeared, having been captured, shot, and fed to dogs. The local Mohammedans did not eat the flesh. He was inclined to consider that at least some of the asses were genuinely wild, and not merely feral. He also mentioned reports of Wild Asses in this region by previous travelers (Duveyrier, Bissuel, Benhazera, and others).

According to Spatz (in Werth, 1930, p. 347), these wild or feral asses constantly molested the domesticated animals and often led them astray.

Antonius (1931, pp. 133-136, pl. 3, fig. 3) calls attention to some wild-living asses reported by Fräulein von Wagner-Jauregg in the Hoggar massif in the southern territories of Algeria, where the Tuaregs distinguish them by name from the Domestic Asses. A captured foal showed evidence of a strong wild-blooded component, even if it could not be considered a pure-blooded wild ass. It is feared that these wild-living asses of the Hoggar will disappear if energetic protective measures are not adopted.

On the other hand, Hiltzheimer and Spatz (Zeitschr. für Säugetierk., vol. 17, p. 15, 1932) express the opinion that the animals of the Hoggar are merely Domestic Asses that have run wild. Selous

(1914, p. 35) and Lavauden (1933, p. 20) state that Wild Asses do not pass west of the Nile.

Antonius (1938, p. 560) says:

It is very interesting that the only mention of a wild ass captured in the Western Sahara, given by Canon Tristram, agrees not with the appearance of the Atlantic, but with that of the Nubian, race. Although very exactly describing the coloration of his wild born ass, Tristram does not say anything about banded limbs. The wild asses once roaming in the neighbourhood of the caravan route to Chadames [Ghadames] and Chat [Ghat] were therefore probably not of the strongly marked Atlanticus-type, but of the Nubian with unbanded limbs. This opinion is strengthened by the colours of the so-called "ahouli" of the Tuareg—wild or feral asses, lingering in the Ahaggar mountains in single pairs and small troops. A filly of these ahouli, captured in 1927 in the heart of the Ahaggar mountains for the Schonbrunn Zoo, but dying before transported to Europe, was of exactly the same Nubian type. Probably there is in these ahouli at least a strong strain of originally wild blood, more or less intermingled with the Atlanticus blood of escaped domestic Tuareg donkeys.

Finally comes the extremely interesting information from Malbrant (1936, p. 27) that in French Central Africa Wild Asses are restricted to the massif of Tibesti. Views differ as to their origin and systematic status, but Malbrant inclines toward the opinion that they are genuinely wild animals of the subspecies *africanus*. They exist in the region of Zouar and, farther north, in the Tarsoa, mountainous ridges situated north of Emi Koussi. Here they are not rare. The plateau of Daski and the region of Trotron (between Yebi and Zoumri) likewise shelter many. They live in bands of as many as 30 or 40 individuals. The natives capture young ones in snares near the water-holes, train them, and use them as pack animals.

A view differing from Malbrant's is held by Thesiger, who remarks (1939, p. 441) that in Tibesti "donkeys are extensively used, and many have run wild among the mountains probably for generations."

The solution of the problem of the Tibesti Asses awaits the collection of specimens.]

Somali Wild Ass. Somali-Wildesel (Ger.)

ASINUS ASINUS SOMALIENSIS Noack

- A[sinus] taeniopus* var. *Somaliensis* Noack, Zool. Garten, vol. 25, no. 4, p. 101, 1884. ("Somaliland"; type locality restricted by Lydekker (1916, vol. 5, p. 39) to "Berbera district of [British] Somaliland.")
- FIGS.: Nouv. Arch. Mus. Hist. Nat. Paris, vol. 5, Bull., pl. 5, 1869 (subsp.?); Proc. Zool. Soc. London 1884, pl. 50, fig. 1; Akeley, 1914, pp. 112, 115, 117, figs.; Zapparano, 1930, p. 88, fig.; Schmidt, 1938, pl. 11.

In British Somaliland this Wild Ass "is strictly preserved, but . . . much reduced in number" (Antonius, 1938, p. 560).

It is more strongly built than *A. a. africanus*; general color a deli-

cate reddish ash-gray; snout gray; behind it a broad, light gray band from the nose to beyond the corner of the mouth; a light ring about the eye; inner surface of ears ash-gray, with black border and tip; outer surface of ears yellowish red; mane light gray basally, fuscous above; shoulder stripe absent; a dark but not very pronounced median dorsal stripe extending from the lumbar region to the tail tuft; forelegs yellowish gray anteriorly, light gray posteriorly; dark bands about all the legs up to the level of the body, but only on the anterior side of the forelegs (Noack, 1884, pp. 101-102). Height at shoulder about 51 inches (Menges, 1887, p. 262). Pocock (1909, p. 528) remarks on a seasonal change of color, from clear gray in summer to sandy fawn in winter.

Menges (1887, pp. 263-267) gives the following account:

The range is apparently restricted to Somaliland and part of the Red Sea coastal plain south of Massaua, Eritrea; it probably includes the Danakil region and extends south to the Webi Shebeli. A particular habitat is the coastal lowlands, where the animal is not exactly rare; another favored haunt is the barren Hekebo Plateau (2,000 feet high), southeast of Bulhar. It is commonly found in herds of 5 to 20 head, and is extremely shy and cautious.

In general it leads a rather undisturbed existence, though occasionally falling victim to the Leopard or the Lion. Most of the Somalis do not touch the flesh, but one or two tribes pursue the animal to some extent. Only a few hides are brought from the interior to the coastal markets. On the other hand, in the coast districts of the Red Sea the Wild Ass is eagerly pursued, with the object of shipping captured animals to Arabia, where they are used for crossing with the Domestic Ass. One result of this crossing is the hardy and beautiful riding ass of Yemen. Among the Somalis themselves one finds many Domestic Asses bearing evidence of crossing with the wild animals.

"In certain parts of Guban, notably in the sterile district lying near the coast, about twenty miles east of Berbera, the Wild Ass is not very uncommon. We met with it also in considerable numbers on the high plateau west of Laferug, and also saw some individuals south of the Golis Range The flesh of these animals is very good, almost the best we ate in Somaliland It does not seem to be a very plentiful species even in the country of its nativity, and I should judge it would not require much persecution to speedily extinguish the race." (Elliot, 1897, pp. 139-140.)

"The Somali wild ass is fairly common. I first met with them about twenty miles to the south of Berbera, and they are also found on the plateau to the south of the Golis range. They do not live on the mountain ranges, but frequent the low stony hills in the desert.

They go in small herds. The largest I saw consisted of five." (Inverarity, in Bryden, 1899, p. 71.)

"They are common to the eastward of Berbera, behind Siyaro, in among the sand dunes and rocky hills, and also south of Bulhar in similar localities, especially around the Issitugan Valley. South of the Golis Range they inhabit the low stony hills around Halo, Haloka Yer, and near Segig; they are also found on Negegr Plateau." They are "usually seen in herds of four or five individuals and not uncommonly singly." (Drake-Brockman, 1910, p. 103.)

Akeley (1914) gives an account of hunting Wild Asses about 30 miles from Berbera. One reason for their scarcity is indicated in his statement (p. 117) that "one English 'sportsman' boasted of having killed twenty-eight."

De Beaux (1928a, p. 6) records seven specimens from Italian Danakil. He also remarks (p. 13) that the present subspecies is separated from *africanus* by the Ethiopian plateau, which approaches the Red Sea at the Gulf of Zula [Annesley Bay].

Thesiger, who traversed Abyssinian and Italian Danakil in 1933, found Wild Asses quite common north and south of the lower Hawash (Neumann, 1935, p. 153).

Antonius (1938, p. 561) writes:

Because many hides from Berbera, as well as from Danakil, although typical in all other points, show a more or less developed shoulder cross, there can be no doubt that neither the existence of it nor its absence is thoroughly typical [of *somaliensis*]. . . .

It is, alas! to be feared that the Abyssinian war has its consequences for the African wild asses: warring soldiers, and especially askaris, are never the best protectors of vanishing game! Whether the "*Asinus somaliensis*" exists also in Southern Abyssinia or not is not positively known. A well-informed Austrian, who had been living in Abyssinia for many years, told me that he had seen wild asses in the Bale country on the upper Juba. I suggest for geographical reasons that the animals are not true wild asses, but either Zebras or domestic donkeys of a feral breed, similar to the beautiful asses of the Turkana people on the western shore of Lake Rudolf, at first seen by von Hoehnel and Count Teleky, and since recorded by modern visitors to that country.

Lydekker (1916, vol. 5, p. 39) records a specimen from as far south as "Shebeli Valley, Somaliland."

Atlas Wild Ass; Algerian Wild Ass

ASINUS ATLANTICUS (Thomas)

Equus asinus atlanticus P. Thomas, Mém. Soc. Géol. France, ser. 3, vol. 3, no. 2, p. 45, 1884. (Recent Quaternary deposits, Oued Seguen, near Constantine, Algeria.)

SYNONYM: *Equus asinus atlanticus* Werth (1930).

FIGS.: Thomas, *op. cit.*, pl. 2, figs. 7, 7a; Werth, 1930, p. 348, fig. 3; Jennison, 1937, pl. facing p. 145.

Apparently a Wild Ass inhabited Algeria up to at least about A. D. 300, but subsequently became extinct. It was probably distinct from any form now living.

P. Thomas (1884, p. 45) based the name *Equus asinus atlanticus* upon a mandible with teeth, found in late Quaternary deposits near Constantine, Algeria. In these he found characters apparently intermediate between those of Pliocene *Hipparion* and those of the present-day Domestic Asses of Algeria.

The name *atlanticus* may be applied at least provisionally to the Algerian Wild Ass of Roman times. Werth (1930, p. 350, map) indicates the presumable former distribution as including Morocco and Tunisia as well as Algeria.

"In a Roman villa at Bona, in Algeria, was found a large and well-preserved picture, dating from about A. D. 300, of an African hunt. Its main effect is a representation of a drive of carnivora. . . . The use of the lasso is illustrated in the same picture, where a Numidian, riding bareback and stirrupless, is throwing one at a wild ass." (Jennison, 1937, pp. 145-146.)

Antonius (1938, pp. 559-560) says:

The true asses of African origin—the wild stock from which our domestic donkey descends—belong to the many mammalia which became totally extinct in our days. There were in Roman times at least three local races, one of which became extinct before it was ever seen by a modern zoologist. It was the "*Asinus atlanticus* Thomas," well known from the rock picture of Enfouss, Algeria, published erroneously as "Quagga" by Frobenius. An excellent Roman mosaic at Hippo Regius, the modern Bone, also shows that donkey. It possessed a well-developed shoulder stripe, strongly marked limbs, and the ears perhaps a little shorter than its East African cousins. The geographic distribution of these Atlantic asses seems not to have exceeded the ranges of the Atlas mountains. The time of their extinction is unknown.

Mongolian Wild Ass; Chigetai; Dziggetai; Kulan; Kulon

ASINUS HEMIONUS HEMIONUS (Pallas)

Equus hemionus Pallas, Nov. Comm. Acad. Sci. Imper. Petropolitanae, vol. 19, p. 394, pl. 7, 1775. ("Ad Lacum Tarei Davuriae" = Tarei Nor, on the Siberian-Mongolian boundary, about lat. 50° N., long. 115° E.)

SYNONYMS: *Equus onager castaneus* Lydekker (1904); *Equus (Asinus) hemionus bedfordi* Matschie (1911); *Equus (Asinus) hemionus luteus* Matschie (1911). (Cf. Harper, 1940, pp. 197-198.)

FIGS.: Pallas, *op. cit.*, pl. 7, and 1781, pl. 1; Lydekker, 1904b, pl. 27 (*bedfordi*); Lydekker, 1904c, pl. 18 (*castaneus*); Lydekker, 1912, pl. 15, fig. 2 (*castaneus*); Lydekker, 1916, p. 13, fig. 6 (*castaneus*); Carruthers, 1913, pls. facing pp. 602, 606; R. C. Andrews, 1924, pp. 152-156, figs., and 1926, pl. facing p. 129.

During recent years, in all its vast range, the Mongolian Wild Ass seems to have been reported as plentiful in only one region—that about Orok Nor and Zagan Nor in central Mongolia (about long.

100°-102° E.). It has apparently disappeared from eastern Mongolia (including adjacent parts of Siberia and Manchuria). Wild Asses throughout the world, with the apparent exception of the Tibetan Kiang, are a vanishing type.

The following is derived from Pallas's early description (1781, pp. 16-17), supplemented by Radde's description (1862, pp. 293-294) of what were virtually topotypical specimens from the vicinity of Dalai Nor: The general color of the summer pelage is reddish yellow, with a slight grayish tinge; in winter the color is more reddish than yellow, and the hair is longer. Snout whitish; rest of head more and more yellowish; mane brownish; lower side of the neck of the general body color; upper rump ochraceous; limbs and ventral surface paler than sides; posterior side of forelegs, inner side of hind legs, lower rump, and posterior border of the thighs whitish; a brownish-black median dorsal stripe from the mane to the bushy part of the tail, broadest on the hindquarters; bristly hairs above the hoofs blackish. Height at shoulder, about 3 feet 10 inches; length of ears, about 7 inches; length of tail without hairy tuft, about 1 foot 4 inches.

The former range apparently covered the greater part of Outer Mongolia (except the present Tannu-Tuva), small areas in Siberia and Manchuria adjacent to the northeastern corner of Mongolia, at least the western part of Inner Mongolia, and the northern part of Chinese Turkestan (chiefly north of the Tian Shan).

According to Pallas (1781, pp. 5-8), the Argun steppes are the only place where these animals are still met with in Siberia. From the rest of Dauria, where they once ranged, they have retreated into the Mongolian deserts, on account of settlements. They still swarm about Tarei Nor. Formerly they were seen on the Argun steppes in great herds, but now only as solitary individuals or in scattered troops. On the Mongolian Gobi they occur in numerous herds. This is a game animal for the Mongols and Steppe Tungus, who eat the flesh and make boots of the hide.

Radde writes (1862, p. 293) that in the fall and winter of 1856 a strong northward migration extended to the region between Tarei Nor and Dalai Nor, and that several animals were taken north of Dalai Nor (in northwestern Manchuria). In a rare journal (*Beiträge Kenntniss Russ. Reiches*, vol. 23, pp. 431-433) Radde gives additional information on life history, hunting, and economic uses.

A dearth of recent records of Wild Asses in eastern Mongolia bodes ill for their survival in that region. They are evidently gone from the adjacent parts of Siberia and Manchuria. Arthur de C. Sowerby (*in litt.*, March 14, 1938) believes they have ceased to exist in all these areas.

In 1887, in the region about the southern base of the eastern Altai,

at about longitude 96°-100° E., Younghusband (1888, p. 495) saw "considerable numbers of wild asses."

In the central Gobi, in 1922-25, R. C. Andrews (1924, pp. 152-154; 1926, pp. 132-145, 299-302, 317-318) found considerable numbers of Wild Asses in the vicinity of Orok Nor and Zagan Nor (about long. 100°-102° E.) "During the first two years of our work in the Gobi, we never saw wild asses in herds of more than fifteen or twenty, but we did not arrive in their country until after the breeding-season. In 1925 the herds numbered thousands. Evidently they collect at favorable localities just before the young are born . . . The young are dropped about the beginning of July, and the asses seek a flat plain, undoubtedly for protection from wolves." (P. 302.)

"I have been asked by many people if it would be possible to catch wild asses when they are young and use them for breeding purposes. I do not believe that this would be practicable, due to the extraordinary wildness of the animals. Certainly, it would be difficult to tame an adult wild ass." (R. C. Andrews, 1924, p. 154.)

In 1926 the Kulan was very common at the northern base of Iche-Bogdo, in the valley of the lakes west of Orok Nor, and in the desert area to the northwest as far as the Baidarik River (Formozow, 1931, p. 77).

In 1911 Carruthers (1913, p. 532) found that the western shore of Bar Kul, in southern Dzungaria, was the haunt of droves of Wild Asses. His companion, J. H. Miller, supplies much additional information (in Carruthers, 1913, pp. 582, 588-589, 603-608). In the hills west of Bar Kul, towards the end of April, "a few wild-asses, straight from their winter quarters on the lowlands to the north, were busy making up for their scanty winter fare" (p. 588). In the vicinity of Shi-Kho, at the northern base of the Tian Shan, a domesticated Kulon was examined; it was perfectly docile, but could not be broken to the saddle. A large wild herd was seen in the same area. (P. 603.) In Guchen a Kirghiz reported Kulon very numerous in the sand-dune area to the north, and Miller himself found fair numbers there (p. 604). Two specimens were secured near the Dzungarian Gate north of Ebi Nor, where a spring was much frequented by Kulon (p. 605).

"My specimens are undoubtedly *Equus hemionus typicus* . . . Its extreme eastern distribution is at present imperfectly known; Sir Francis Younghusband, in his journey across the Northern Gobi, mentions seeing kulon in the Gobi at the extreme eastern end of the Altai. They are found north of the Altai Range on the plains, round the large lakes in the Kobdo region; we met with them near Barkul, and in several other places throughout Southern Dzungaria. . . . The natives hunt them occasionally for their skins and meat,

which they consider more palatable than the best mutton." (J. H. Miller, in Carruthers, 1913, pp. 607-608.)

"The wild ass, or kulon, is unlikely to be seen unless a special attempt is made. . . . The kulon is a rare animal, excessively wild and lives in very difficult country. Featureless plains, bitterly cold in winter, waterless and sunbaked in summer, are its habitat. The kulon ranges . . . through Dzungaria to the edge of the Gobi. We have seen them at the lowest elevation in the heart of the continent, and at 7,000 to 8,000 feet above the sea, in localities not very far distant from each other." (Carruthers, 1915, p. 154.)

In 1926 a journey made by Lattimore (1929, pp. 228-321) through the southwestern Gobi filled in some blank spaces in the known distribution of this species. West of Edsin Gol, at the Wild Horse Well (about lat. 42° N., long. 99° E.): "They say that on this fringe of the Khara Gobi there are wild horses . . . and wild asses" (p. 228). Near the "House of the False Lama" (about lat. 42° 30' N., long. 98° E.): "To this whole series of springs there come at night antelope, wild asses, and, they say, wild camels" (p. 243). In the vicinity of Ming Shui (about lat. 43° N., long. 96° E.): "To our camp that day there came riding a Mongol, who had followed us for two marches to sell the hinder half of a wild ass that he had shot in the Mongol way from a pit near the drinking place" (p. 251). West of Ming Shui, near the eastern outposts of the Karlik Tagh: "Here the camel herders in the dawn reported a herd of wild asses. It was the only sight of them that I ever had Their skins make first-class clothing, with much more wear than the antelope skin. I have heard that there is a Turki proverb that wild asses are so hard to kill that even when you get the skin of one safely spread out on your sleeping platform it wiggles. The meat is something like beef, but a sublime beef. It is very dry, with a coarse grain and a strange aromatic sweetness. Chinese and Mongols put it above any other game, and it undoubtedly ranks with the noblest vension." (P. 252.) At Wu-t'ung Wo-tze, about 100 miles northeast of Kucheng, in the Dzungarian Gobi: "It . . . was formerly a well-known wild-ass ground; but the wild ass in this region has been almost killed off by the Qazaqs. Both Mongols and Qazaqs will put themselves to more trouble to bag wild ass than almost any other game." (P. 321.)

Farther southwest than the territory covered by Lattimore, along the route from Hami to Bulundsir River, Wild Asses were reported in 1898 in a number of places by Fütterer (1901, pp. 179, 180, 184, 188). A specimen obtained northwest of the last-mentioned locality became the type of *Equus hemionus luteus* Matschie. In 1934 Sven Hedin (1940, pp. 195, 197, 200) found tracks in the Ghashun Gobi about 75 miles west of Fütterer's route. This area

seems to constitute the southwestern limit (as far as known at present) of the range of the Mongolian Wild Ass.

Enemies.—Among predatory animals, the Wolf seems to be the only enemy of any importance, and doubtless it has never affected the Wild Asses at all seriously. Apparently it cannot successfully attack any except the young Asses within a few weeks of their birth. Older animals are able to outrun the Wolf on the open plains.

Increasing use and precision of firearms in the hands of the Asiatics have undoubtedly contributed chiefly to the decline of the Wild Asses.

Transcaspian Wild Ass; Transcaspian Kulan; Wild Ass of Russian Turkestan. Transkaspischer Kulan (Ger.)

ASINUS HEMIONUS FINSCI (Matschie)

Equus (Asinus) hemionus finschi Matschie, in Futterer, *Durch Asien*, vol. 3, pt. 5, *Zoologie (Nachtrag)*, p. 24, 1911. ("Nordöstlich vom Saisanor" (Zaisan Nor, in former Province of Semipalatinsk, Russian Turkestan).) (Cf. Harper, 1940, p. 198.)

FIGS.: Radde, *Sammlungen Kaukas. Mus.*, vol. 1, *Zoologie*, pl. facing p. 60, 1899; Brehm's *Tierleben (IV)*, 12, p. 670, tab. Unpaarhufer V, fig. 2, 1915; Schwarz, 1929, p. 92, fig. 5.

This Wild Ass is now very scarce in Russian Turkestan, having evidently disappeared from the greater part of the country. It was long ago exterminated in southern Russia.

Matschie describes the type (from the vicinity of Zaisan Nor) as reddish salmon, with a slight tinge of gray; the lips are white; the whitish of the under parts extends well up on the flanks; the dark vertebral stripe continues on to the base of the tail. Schwarz adds (1929, p. 91) that the maximum width of the vertebral stripe is 42 mm. Radde and Walter (1889, p. 1059) describe a full-grown male from the Askabad region as lacking a shoulder stripe; its height at the shoulder was 1,110 mm.; tail (including tuft), 590 mm.

"It is clear [from Strabo's account] that the wild ass (onager) existed all across southern Russia in the fifth century B. C., for it was hunted both by the Sarmatian tribes who lived on the east side of the Don (Tanais) and by the Scythians who occupied the region to the west of that river. It is even possible that the wild ass dwelt in the Danube valley almost down to the beginning of the historical period. It seems certain that neither Sarmatian nor Scythian ever domesticated the wild ass, a circumstance probably due to the fact that they had a more docile and serviceable animal in the wild horses of the same region." (Ridgeway, 1905, pp. 51-52.)

"In former days kulan and onagers appear to have ranged much further westward than is the case at the present day. It is stated, for instance, by the Russian naturalist Rytshkov that in the eighteenth century kulan abounded on the eastern side of the Volga,

and from time to time troops swam that river and made their appearance in the Waldinsel Steppe." (Lydekker, 1912, p. 185.)

Pallas gives the following account in 1780 (pp. 261, 273). Kulans are still very numerous in the deserts of Tatory, and come annually to spread over the mountainous deserts east and north of the Aral Sea, where they pass the summer and assemble in autumn by hundreds and even thousands for their return toward India, for a winter asylum. They scarcely pass beyond lat. 48° N. The skins are sought by the residents of Bokhara for preparation in the manner of shagreen.

Hablizl states (1783, p. 93) that the Wild Ass is rarely found in Astrabad and Mazanderan, Persia. (The animal of this Caspian region was probably the Turkestan form rather than the Persian.)

In 1840 (p. 56) Eversmann records several recent specimens from the steppes between the Caspian and the Aral Seas.

Ladyjensky (1841, pp. 361-362) speaks of sending to Moscow a Wild Ass captured when young in the vicinity of Aktava in the Kirghiz Steppe, in the extreme southern part of the old district of Omsk. In this region, he adds, the Wild Asses are found in numerous troops, which are composed sometimes of more than a thousand head and raise a thick cloud of dust in moving across the steppe. The Kirghiz have not yet found the means of taking the young ones alive.

Severtzoff writes (1876, p. 387) that *Equus hemionus* "is rather rare in Turkestan, and to be found only about the Karatau mountains and near the rivers Aris, Keless, Chirchik, and the delta of the Sir-Darja, and even there only during the winter."

In 1881 (p. 22) Poliakof refers to the Kulan as having been numerous not long since in the environs of Lake Balkash. "In my last excursion to Balkash, during several days passed in its solitudes I did not observe a kulan, and only saw the tracks of one imprinted on the saline soil."

According to Radde and Walter (1889, p. 1058), it still inhabited at that time the entire Turkoman Steppes in considerable numbers, but had retreated from the Transcaspian railway and the new military posts farther into the undisturbed deserts. At the beginning of the construction large herds were often observed near the railway in the vicinity of Kazanjik and Dushakh, but later disappeared. It was considered more numerous in the steppes north of the Atrek River and also along the Afghanistan boundary in the hilly desert between the Tejend and the Murghab. Here Walter saw many in 1887. While the European hunter rarely had success, the Saryk Turkoman managed to approach within gun range of the animals by taking cover behind a carefully maneuvered camel. The flesh was

much prized by the Turkomans, and in winter was commonly sold at the bazaar in Yolatan.

Matschie (1911, p. 23), besides recording the type of *finschi* from northeast of Zaisan Nor, mentions another specimen from the Maiterek Steppe north of this lake.

J. H. Miller (in Carruthers, 1913, p. 608) states that the animals "extend throughout Northern Russian Turkestan, being exceedingly numerous in the neighbourhood of Lake Balkash." It is doubtful, however, if this statement was appropriate as late as 1913.

Schwarz (1929, p. 91) mentions a specimen from the vicinity of Merv that formerly lived in the Berlin Zoölogical Garden. He gives the range of this form as extending from the northern border of the Persian Plateau through West Turkestan and the Kirghiz Steppe to the western slope of the Altai.

Nazároff (1932, p. 54) refers to the species as extinct in the Tashkent region.

According to W. G. Heptner (*in litt.*, December, 1936), the Kulan is now a rare animal with a small distribution in the U. S. S. R. At the beginning of the nineteenth century it occupied the plains of Turkestan and almost all the steppes of Kazakstan. It is now met with in Turkmenia (principally west of the Murghab), and persists in small numbers in the desert steppes near Lake Balkash. Hunting is absolutely forbidden, and reserves are being organized.

"Today there are only a few scattered troops, in yearly diminished numbers, near the Oasis of Merw and the Afghanistan frontier—the last remnants of the immense herds which roamed the steppes of Asiatic Russia 100 years ago" (Antonius, 1938, p. 559).

North Persian Wild Ass; Persian Onager; Ghor-khar

ASINUS HEMIONUS ONAGER (Boddaert)

[*Equus*] *Onager* Boddaert, *Elenchus Animalium*, p. 160, (1784) 1785. (Based upon the "Onager" of Pallas, *Neue Nord. Beyträge*, vol. 2, p. 22, pl. 2, 1781; type locality erroneously stated as "in desertis Argunis"; corrected by Harper (1940, p. 199) to "mountains about Kasbin," northwestern Persia.)

FIGS.: Pallas, 1780, pls. 11-12; Pallas, 1781, pl. 2; Pallas, *Zoographia Rosso-Asiatica*, pl. to vol. 1, p. 264, 1834-42; Hamilton Smith, 1841, pl. 18; Lydekker, 1904, pl. 19; Kennion, 1911, pl. facing p. 121; Brehm's *Tierleben* (IV), 12, p. 674, tab. Unpaarhufer V, fig. 3, 1915; Antonius, 1939, figs. 2-3.

The present numerical status of the North Persian Wild Ass, like that of various other mammals of that country, is a matter on which up-to-date information is difficult to acquire. It is probably quite scarce; at least it very seldom affords a glimpse of itself to the scientific traveler. The Wild Ass of Afghanistan is provisionally referred to the present subspecies.

Both Pallas (1781, pp. 34-37) and Hablizl (1783, pp. 89-92) furnished descriptions of the original two specimens (male and female) from Kasbin. Since Hablizl alone was acquainted with the male in life, his description of that sex may be considered the more dependable, and is here utilized. In the male the top and sides of the head are half-reddish, the lower side and the muzzle white; outer surface of ears reddish yellow at base and tip, white in the middle; sides of neck and of body and fore part of haunch reddish yellow (isabelline); mane light brown, composed of hairs 3-4 inches long; a light-brown vertebral stripe, up to $2\frac{1}{2}$ to 3 inches wide, extending from the mane to end of the tail; a similar but smaller stripe crossing this at right angles on the shoulders; lower neck, lower shoulder, breast, belly, buttocks, vertical area in front of thigh, dorsal area bordering the vertebral stripe, and legs white; tail like a cow's, with a tuft of long, light-brown and white hairs. Height at shoulder, 50 inches; ear, $11\frac{1}{2}$ inches; tail (including tuft), 25 inches. The female is similar, but smaller, and lacks the shoulder stripe. Height at shoulder, 44 inches; ear, $8\frac{3}{4}$ inches; tail, 20 inches.

The three skins from Yezd, Persia, listed by Lydekker (1916, vol. 5, pp. 14-15), are very white on the sides and belly and have no shoulder stripe (J. C. Phillips, *in litt.*, June, 1938). Whether these specimens are all females, or whether some males lack the shoulder stripe, is difficult to say. Goodwin (1940, p. 17) describes the summer pelage as either avellaneous or light pinkish cinnamon, with a faint shoulder stripe; and the winter pelage as sayal brown, without a shoulder stripe.

Persia.—The Persian range of this Wild Ass is here considered restricted to a portion of the Persian Plateau, extending north to the Elburz Mountains, east to Afghanistan, south to about the latitude of Seistan, Kerman, and Shiraz, and west (at least formerly) to the mountain ranges extending along the line Kasbin-Ispahan-Shiraz.¹

Since Omar Kháyýám was a resident of Naishápúr in Khorassán, it was doubtless the present subspecies that he had in mind in the following verse:

They say the Lion and the Lizard keep
The Courts where Jamshyd gloried and drank deep:
And Bahráám, that great Hunter—the Wild Ass
Stamps o'er his head, but cannot break his Sleep.

¹ There is considerable uncertainty, however, as to the boundary between the ranges of this and the Indian subspecies. For example, Lydekker (1904, p. 589, pl. 17) refers to the latter a male in the London Zoo that was said (probably erroneously) to have come from the desert near Meshed, in north-eastern Persia; it lacked the shoulder stripe generally considered diagnostic of *onager*. There seem to be extremely few records of specimens with shoulder stripes and from a definite locality.

According to Pallas (1780, pp. 259-273), Onagers are found in the mountains about Kasbin at all times of the year. The Persians seek to take them alive in pitfalls, driving them toward these spots. The young ones captured alive are sold for a considerable price for the studs of the nobles. From the mating of these tame Onagers there is derived the fine race of riding asses in Persia and Arabia. They are clearly distinguished from the sorry race of ordinary asses that are used for carrying burdens. The bile is esteemed among the Persians as a remedy for obscure vision and for cataract.

Hablizl writes (1783, pp. 93-94) that the Wild Ass is frequently seen in herds in the valleys of the mountains about Kasbin. Yet it is reckoned among the rarest animals in all Persia, being known to most of the inhabitants only by name. It is captured only to be presented to some Khan, who has it kept as a mere rarity. In a few months it becomes completely tame, more especially if it has been caught while young.

"In the eastern provinces of Persia . . . their venison is highly prized, and the chase of them, from the time of Rustum to the present, has always been held the pastime of heroes and princes" (Hamilton Smith, 1841, pp. 309-310).

Blanford writes (1876, p. 85): "In Persia they appear . . . to be common in some places, generally on the borders of desert plains, rare or unknown elsewhere; but they occur scattered over all the more level parts of the country, except in the North-western and Caspian provinces. I saw none during my journey, though I often came across their tracks."

To this St. John adds (in Blanford, 1876, pp. 85-86): "All of twenty or more specimens that I have seen from Western Persia were undoubtedly *E. onager* The Persian wild ass is not, I believe, found west of the main road from Tehrán to Shiráz, except possibly in that arm of the salt desert which extends north of Kom . . . towards Saveh. It is most plentiful in the vicinity of the patches of salt desert, 'Kafah' or 'Kavir,' which are so marked a character of Eastern Persia. In the summer a herd occasionally wanders into the loftier desert valleys. I have several times seen them whilst travelling post along the plain that stretches from Khán-i-Khora, a short distance north of Dehbíd, in Fárs, to the Kulah Kázi or Urchín Hills, near Isfahán, a distance of nearly 150 miles, at an elevation of 5500 to 7000 feet above the sea. Persians say that they can not be caught by a single horseman when approached in the open; but if the sportsman can manage to conceal himself and his horse in the vicinity of a spring, and wait until the wild asses have quenched their thirst, they can readily be come up with when full of water, by a short spurt on a fast horse. At other times they are caught in relays of horsemen and greyhounds. The

flesh is said in books on Persia to be prized above all other venison; but Persians have told me that it should only be eaten under absolute necessity, being equally disagreeable to the conscience of a good Mussulman, and to the palate of a gourmand."

In his journey of 1906, Sven Hedin (1910, vol. 1, pp. 216, 218, 222, 228, 243-244, 396-397; vol. 2, p. 65) saw a few Wild Asses and noted tracks or received reports of numerous others on the western and southern borders of the Great Salt Desert ("Kevir") in north-eastern Persia. On the western border "the herdsmen . . . are accustomed to the presence of wild asses, and take no notice of them." On the southern border a native "had shot many wild asses, and was wont to sell their skins to the shoemakers of Tebbes. When, as now, there was much rain, the chase was not profitable, for the wild asses could find water anywhere; at other times they are dependent on springs, and then is the time for the huntsman to stalk his prey." Farther south, in Kuhistan, the animals were said to be very numerous in the desert between Tebbes and Bahabad, and a local hunter "had killed two hundred wild asses."

"Most of the remoter deserts of Eastern Persia are roamed over by wild asses. Unfortunately, . . . these animals have always been remorselessly persecuted for the sake of their meat and hides, usually by the ignoble plan of sitting up over water, with the consequence that they are now scarce." (Kennion, 1911, p. 119.)

"His [the Anatolian Onager's] near ally in Iran (*Equus hemionus onager* Zimm.), although still rambling over the salt deserts of his country in considerable numbers, is hard pressed by modern guns" (Antonius, 1938, p. 559).

The most recent account is by Legendre (1939, pp. 240-241):

"Goodwin had succeeded in shooting one, 50 miles from Teheran.

"At the village of Abbasabad [north of the Great Salt Desert] we received information that there were herds of wild ass to be found in the desert 80 miles away, near a salt spring." At this spring "there were tracks everywhere," but none of the animals could be located.

Two natives reported "that the wild asses had all migrated to the south two months before They assured us, however, that they were to be found in herds of ten to forty around the salt spring, from June until September."

The locality referred to by Legendre is evidently identified by Goodwin (1940, p. 17) as Siah Parde, whence he records three specimens.

Afghanistan.—Scarcely any information seems to be available concerning the Wild Ass in this country, save that secured by the

Afghan Delimitation Commission of 1884-85 (Aitchison, 1889, pp. 61-62):

[On November 30, 1884, herds were seen on the march between Tut-i-chi and Aftao, north of the Paropamisus Range.] They occupied the country in the vicinity of Gulran, as they were known to have attacked and injured some Mules and Donkeys that had been turned loose to graze. . . .

In my march from Gal-i-cha [south of the Paropamisus Range] to the base of the Kambao Pass, on the 29th of April, 1885, I had to cross the northern end of a great plain called "Gulam-i-maidan," or the plain of the Wild Ass. . . . My guide took me to a slight elevation, and from it pointed out to me where I was to look for the animals: for some time I could see nothing; at last, whilst using my glasses, I noticed clouds of dust, like the line of smoke left in the track of steamers. . . . These several lines of dust-cloud were caused by herds of Asses, galloping in various directions over the great plain. One herd came well within a mile's distance; from its extent, I am even now of the opinion which I then held, that the herd consisted of at least 1000 animals. I counted sixteen of these lines of dust-cloud at one time on the horizon. My guide said that at this period of the year the Wild Asses are always united in great herds on that plain, owing to the mothers having their foals at foot, but that in a few weeks the great herds would break up, and the animals would spread themselves all over the country in parties of ten to twelve. This is the season at which the young are caught, by riding them down; usually, the mother will not leave, viciously attacking men and horses upon their coming near her foal. It is a very rare circumstance to get a foal unless by shooting it. . . .

Between Karez-dasht and Sher-baksh [lat. 33°-34° N.], to the south-east of the Do Shakh range, we were informed was a locality for the Wild Ass, also the country between Kushk-rud and Zagin, still further south, but I did not hear of any having been seen by members of the Mission.

It is undoubtedly too much to hope that Wild Asses abound in such numbers today, as they did half a century ago, in north-western Afghanistan.

Indian Wild Ass; Baluchi Wild Ass; Ghor-khar. *Âne de l'Inde* (Fr.). *Indischer Wildesel* (Ger.).

ASINUS HEMIONUS KHUR (Lesson)

Equus khur Lesson, Manuel Mammalogie, p. 347, 1827. (Based upon "der wilde Esel" of Oken's Isis, 1823, Band 2, Heft 7, p. 764, 1823, inhabiting "die wüste Strecke Landes, welche Cattuwar von Cuth trennt (bey den Eingebornen Run genannt).") Thus the Little Rann of Cutch, western India, is the type locality.)

SYNONYMS: *Equus indicus* George (1869); *Equus hemionus* var. *indicus* W. L. Sclater (1891).

FIGS.: Cuvier, Règne Animal, disciples' ed., Mamm., atlas, pl. 83, fig. 1, 1836-49; J. E. Gray, Gleanings from Knowsley Menagerie, pl. 53, 1850; Lydekker, 1904, pl. 17 (ssp.?); N. Y. Zool. Soc. Bull., vol. 24, no. 1, p. 12, fig., 1921; Schwarz, 1929, figs. 1-4; Jour. Bombay Nat. Hist. Soc., vol. 37, no. 1, suppl., pl. 29, 1934.

The range limits of this subspecies toward the north and west are uncertain. The Wild Ass of southeastern Persia will be provisionally

considered the same form as that of Baluchistan and western India. The animal has evidently disappeared over a great part of this range. It survives in small numbers in the Rann of Cutch, India, and probably in some of the desert tracts of southeastern Persia.

The general color (in summer) is sandy; muzzle, buttocks, breast, lower parts, and inside of limbs white¹; ears sandy externally, white internally, with a blackish tip and outer border; mane and tail tuft blackish brown; a chocolate-brown vertebral stripe extending from mane to tail, bordered from the withers backward by a light area; front of all four limbs very light, with a slight yellowish tinge; a narrow blackish ring above the hoofs. The winter pelage is longer, and grayish. Height of male at shoulder, about 47 inches. (Chiefly from Jerdon, 1874, pp. 236-237, and Schwarz, 1929, pp. 87-88.) An adult female from the Punjab-Sind frontier measured: height, 46 inches; tail (including hair), 26 inches; ear from crown, 9 inches (Blanford, 1891, p. 470).

The absence of a shoulder stripe in the male, the presence of a blackish ring above the hoofs, and apparently the less pure white of the lower parts, may serve to distinguish the Indian from the North Persian subspecies (*onager*).

The place of this animal in ancient history is sketched by Ridgeway (1905, pp. 47-48). According to Herodotus (VII, 86), "some of the Indians in the army of Xerxes drove chariots drawn by 'wild asses.'

"From this it is clear that the peoples of western Hindustan, who did not possess horses, had made the wild ass obedient to the yoke.

"In Carmania . . . , a region bounded by the Indian Ocean and Persian Gulf on the south, and by Persia on the west, down to the time of Strabo, 'asses on account of the scarcity of horses' were 'generally made use of in war. They sacrifice an ass to Ares, who is the only god worshipped by them, for they are a warlike people.'"

According to an anonymous writer in Oken's *Isis* (Band 2, Heft 7, p. 764, 1823), herds numbering up to 60 or 70 were observed in the Rann of Cutch. The animals are said by the natives to be very shy and hard to capture. In November and December they come deeper into the land, in herds of hundreds, and cause great damage in the cultivated fields. Therefore they are caught in pitfalls. The flesh is considered good by many people of the lower classes, who lie in wait for them when they come to drink.

The breeding of captive animals from Hindustan was successfully carried out in Paris from 1842 to 1849. Of nine foals produced during this period, six survived in 1849. The animal was also said

¹ A specimen recorded by Lydekker (1916, vol. 5, p. 13) from the Sham Plains, Baluchistan, is not so pure white on the lighter parts as three specimens of *A. h. onager* from Yezd, Persia (J. C. Phillips, *in litt.*, June, 1938).

to be used occasionally in its native land for agricultural work. (I. Geoffroy, 1849, p. 35.)

“The *ghorkhur* is found sparingly in Cutch, Guzrat, Jeysalmeer and Bikaner, not being found further south, it is said, than Deesa, or east of 75° east longitude. It also occurs in Sindh, and more abundantly west of the Indus river, in Beluchistan It appears that the Bikaner herd consists at most of about 150 individuals” A writer in the *Indian Sporting Review* is quoted on the

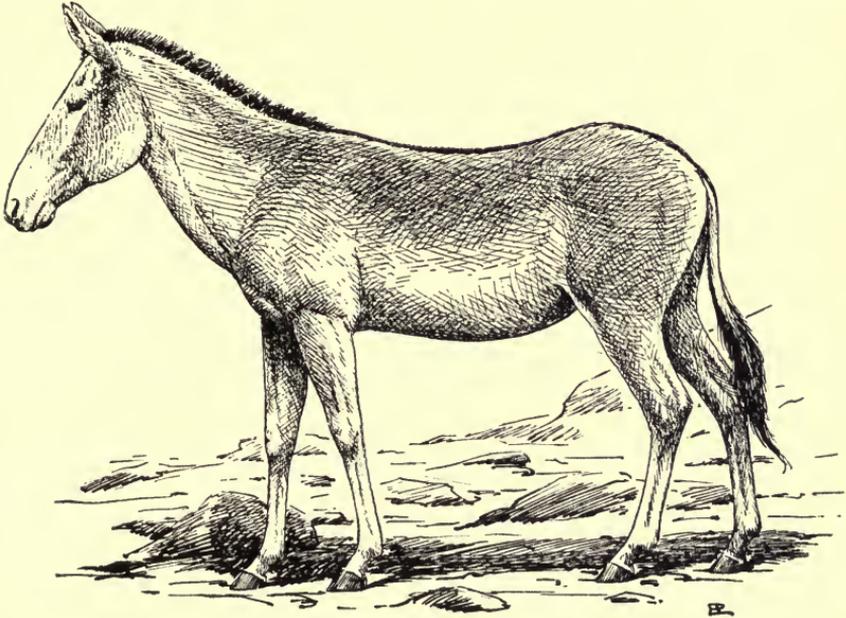


FIG. 38.—Indian Wild Ass (*Asinus hemionus khur*)

animal's occurrence in the desert country west of the Indus, above Mithunkote: “The foaling season is in June, July, and August, when the Beluchis ride down and catch numbers of foals, finding a ready sale in the cantonments for them, as they are taken down on speculation to Hindustan. They also shoot great numbers of full-grown ones for food, the ground in places in the desert being very favourable for stalking.” The same method of capturing foals is practiced in Bikaner. (Jerdon, 1874, p. 238.)

“Wild asses are renowned for speed, but in the Rann of Cutch adults have been run down by men on horseback and speared. I believe, however, the animals run down were mares in foal.” (Blanford, 1891, p. 471.)

“I told his Highness of Bikaner in London last autumn that I wished to intercede with him ‘on behalf of an oppressed minority

resident in his dominions'; the official books allege that Bikaner has 'a herd of about 100 wild asses.' He assured me the books were wrong; he himself had never seen one, but very occasionally one strayed into his borders from Bhawalpur. They still exist in Kutch, or did until yesterday. These too are in an isolated area where they cannot be replenished from outside." (Edward Thompson, in London Times, August 19, 1932?)

"Within recent years, it has become confined to the Rann of Kutch The depletion in numbers is attributed to the fact that it has for long been hunted by certain tribes for food; and it is significant that it now only exists in appreciable numbers in an inaccessible locality like the Rann, where it is rigorously protected by His Highness' Government. The killing . . . is illegal throughout His Highness' territory; and such killing as at present takes place is due entirely to hunters from British India and from the States on the Indian side of the Rann, who occasionally make raids upon the animal, either to secure a rare trophy or to kill it for food. This Government contemplates addressing a request to the British authorities that the killing of the animal should be made an offence elsewhere, on the analogy of the rules already in force in Kutch. But the wild Asses found within Kutch jurisdiction, and not straying outside it, are perfectly secure." (Dewan's Office, Kutch, *in litt.*, February, 1937).

The present range in India is the eastern parts of the Rann of Cutch, in very reduced numbers. The Wild Ass has been recommended by the All-India Conference for the Protection of Wild Life as one of the species which should be specially protected. The testes are believed to possess aphrodisiac properties. (Bombay Natural History Society, *in litt.*, December, 1936).

Blanford says (1876, p. 85): "Wild asses are locally distributed in [Persian] Balúchistán, and I only heard of their being abundant near Bampúr. None are said to be found in the deserts north of Jálk and Kalagán [in northwestern Baluchistan], though Ferrier speaks of them as common farther north in Sistán." Detailed reports from Baluchistan of more recent date do not seem to be available.

Lydekker (1904, p. 589, pl. 17) records a male specimen in the London Zoo, apparently referable to this subspecies, and "stated to have been captured as a foal in the desert near Meshed," north-eastern Persia. The alleged provenance, however, may be regarded as distinctly questionable. Schwarz (1929, p. 91) refers this specimen to *onager*, despite the impure white of the lower parts and the lack of a shoulder stripe.

Schwarz (1929, pp. 85-89, figs. 1-4) describes and figures a specimen in the Berlin Zoölogical Garden, evidently belonging to

the Indian subspecies and said to have come from the desert north-east of Kerman, Persia. He regards this locality as the present western limit for the subspecies, although he makes *Asinus hamar* Hamilton Smith (from the northern part of the Province of Fars) a synonym of *A. h. khur*. I prefer to consider *hamar* indeterminable at the present time.

Syrian Wild Ass. Hémippe de Syrie (Fr.). Syrischer Halbesel (Ger.)

ASINUS HEMIONUS HEMIPPUS (L. Geoffroy)

Equus hemippus L. Geoffroy-Saint-Hilaire, C. R. Acad. Sci. [Paris], vol. 41, p. 1214, (1855) 1856. (Based upon two live captives, said to have come "du désert de Syrie, entre Palmyre et Bagdad" (*op. cit.*, p. 1219, footnote).)

Figs.: Milne-Edwards, Nouv. Archives Mus. Hist. Nat. Paris, vol. 5, Bulletin, pl. 4, 1869 (cotype); Antonius, 1928, figs. 1-5, and 1939, fig. 1.

The question of the Wild Asses of the Syria-Palestine-Arabia-Iraq region is a very troublesome one, especially on account of the meagerness of material and information. It is further complicated by the fact that a number of authors recognize two distinct species in this region, although in no other part of the world are as many as two different forms of Wild Asses definitely known to occur together. The Wild Ass of this region must be on the verge of extinction, if not already extinct.

Since Geoffroy's cotypes (1856, p. 1217) were both subadult females, we shall turn to Antonius (1928, pp. 21-22) for a description of both sexes of *hemippus*. This is the smallest form of Recent Equidae. The general color of the male is "avellaneous" (Ridgway), becoming a sort of mouse gray with age; the color is lightest on the head, darkest on the haunches; a light area in front of hips; buttocks, belly, and inner side of legs dirty grayish white; outer side of legs, lower side of neck, and outer surface of ears "tilleul buff"; tips of ears originally dark brown, later almost white; mane rather long, "natal brown"; vertebral stripe, of the same color, extending from the mane to the tail tuft, and bordered by a lighter area; area above the nostrils grayish white; nostrils very large and nasal region swollen. Height at shoulder, 1 meter.

The general color of the female is between avellaneous and fawn color; buttocks and lower parts pure white; outer side of legs and ears "pinkish buff"; tips of latter scarcely darker. Height at shoulder, 1 meter.

Tristram (1884), Aharoni (1930), and Bodenheimer (1935) fail to assign any adequate diagnostic characters to the two kinds of Wild Asses that they recognize; they also place both of them in the

Syrian Desert and neighboring regions. Thus the two forms must be specifically distinct, if distinct at all. The names applied are *onager* and *hemippus*, which are currently considered subspecies of a single species. It is almost unquestionable that the name *Asinus hemionus onager* (Boddaert), typified by the Wild Ass of northwestern Persia, cannot be applied to a form of the Syrian Desert. If there was a Wild Ass in this region distinct from *hemippus*, some other name than *onager* must be found for it.

In view of the extension of various African types of mammals past the Isthmus of Suez into Syria and Arabia, it is perhaps not beyond the bounds of possibility that, if there was a second form of Wild Ass in the Syrian Desert, it was some form of the African Wild Ass (*Asinus asinus*). A character this species has in common with the Persian Onager is a shoulder stripe. The type of *asinus*, according to Lydekker (1916, p. 37), is the domesticated ass of Asia; but he also remarks (1912, p. 217) that we have no evidence that its wild progenitor ever existed to the eastward of the Red Sea. A different view is expressed by Tristram and by Ridgeway, who are quoted below. It is perhaps now too late to secure conclusive light on the subject. The following account will include both alleged forms.

Tristram says (1884, pp. 2-3) concerning "*Asinus onager*": "This Wild Ass, the origin of the Domestic Ass, was formerly well known in Arabia, and is not extinct there, though very rare. I have seen this species in a state of nature frequently in the Sahara, and have handled captured though not tamed individuals. It no doubt, as the Arabs assure me, occasionally enters the Hauran [at the north of the Syrian Desert]. Their language, as well as the Hebrew, recognises two species of Wild Ass."

Ridgeway (1905, pp. 52-53) writes in similar vein: "There is strong evidence that the Arabs had domesticated some kind of *E. hemionus* from a very early time, for we shall find later on that the Arab tribes possessed asses from the dawn of history, and Strabo when describing the littoral of the Red Sea after Eratosthenes and Artemidorus, speaks of a region south of Nabataea well wooded and well watered, abounding with all kinds of cattle, wild asses (*hemionoi*), wild camels, deer, and gazelles As there were thus both wild asses and wild camels in Arabia down to the Christian era, there can be little doubt that the domestic asses and camels of the Arab tribes were derived from the wild species of that region."

Tristram also gives (1884, p. 3) the following account of "*Asinus hemippus*": "This, rather smaller than the true Onager, and confined to Syria, Mesopotamia and North Arabia, very rarely enters the north of Palestine from the Syrian desert, but is still common in Mesopotamia. It does not extend into India, but in summer herds

of this animal frequently visit the Armenian mountains. It is the Wild Ass of Scripture and of the Ninevite sculptures."

"The fluctuations of the Beduin troops during the World War in general and of the Wahabi tribes in late years have quite wiped out the limits of both species of Wild Asses (*Asinus hemippus* and *A. onager*) reaching Trans-Jordania, and have pushed back these extraordinarily shy, freedom-loving animals into the center of the desert. They now occur so sporadically that many Beduin clans have not seen them at all during late years." (Aharoni, 1930, p. 330; translation.)

"In earlier days Wild Asses were fairly common in the Syrian Desert, and they entered Transjordan freely. They have since become rare and are probably on the verge of extinction in the Syrian desert. Two forms occurred there which correspond to the two Wild Asses of the Bible, i. e. the Syrian Wild Ass (*Equus hemippus*) and the Onager (*E. onager*)." (Bodenheimer, 1935, p. 116.)

"That the onager was regularly captured and domesticated in Assyria in ancient times is clearly established by one (Fig. 23) of the bas-reliefs discovered by Sir A. H. Layard at Kouyunjik (Nineveh). The relief, which is one of a series of slabs recording scenes in the life and hunting expeditions of Assur-Bani-Pal (B. C. 668-626), represents two of the king's attendants lassoing a wild ass. The other asses are seen running away." (Ridgeway, 1905, p. 48.)

Xenophon (Anabasis, book 1, ch. 5) mentions seeing large numbers of Wild Asses, in company with Ostriches, in the vicinity of the Euphrates in 401 B. C.

Porter (1821, pp. 460-461) gives the following brief account of the animal in Mesopotamia: "I was informed by the mehmandar, who had been in the desert, . . . that the wild ass of Irak Arabi [in the lower Tigris-Euphrates Basin] differs in nothing from the one I had just seen [in the Province of Fars, Persia]. He had observed them often, for a short time, in the possession of the Arabs, who told him the creature was perfectly untameable."

In the 1840's Layard (1850, pp. 265-266) observed a large herd of Wild Asses in the Sinjar region west of Mosul. He adds that those mentioned by Xenophon must have been seen in these very plains. "The Arabs sometimes catch the foals during the spring, and bring them up with milk in their tents. . . . They are of a light fawn color—almost pink. The Arabs still eat their flesh."

"Wild ass . . . range over the plain between the Tigris and the Euphrates, but do not, as generally stated, extend into the Syrian Desert. The only locality which I know of as being a sure place to come in contact with these very elusive beasts is the Jebel Sinjar,

between Deir on the Euphrates and Mosul on the Tigris." (Carruthers, 1915, p. 22.)

A later account by Carruthers (1935, pp. 147-149) is as follows:

The Syrian Wild Ass . . . had a wide range over the Syrian Hammad in the 16th and 17th centuries. John Eldred saw wild asses between Hit and Aleppo in 1584, Cartwright in 1603 beheld "every day great droves of wild beasts, as wild asses all white," this was not far from Ana on the Euphrates. Teixeira a few years later saw many herds in the region of Ur in the Chaldees, while Della Valle described a captive "wild ass or little onager" which he saw in the piazza before the Pasha's house in Basra in 1625 . . .

It would appear that the Wild Ass disappeared from the Syrian Desert during the 18th century, and was exterminated in Northern Arabia during the 19th. Burckhardt reported that they were still numerous in the Shararat country in the first decade of last century. Its last refuge appears to have been in the lava country to the south-east of Jabal Druz. Musil says [1927 or 1931] "I have heard that as late as a hundred years ago there were Wild Asses roaming near the depression of Sirhan, where they had an abundance of water and, in the volcanic district, good pasture and still better hiding places. It is said that the last Wild Ass was shot at the wells of Al Gharr, [34 miles] south-east of the lake of Azrak. Old Hmar told stories of his grandfather's hunts for Wild Asses near the depression of Sirhan; but since firearms have come to be used by the Bedouins, Wild Asses have become less and less numerous. They are still to be found in the Jezire, between the middle Euphrates and Tigris, whence the Sleyb often bring their Asses for breeding purposes." Guarmani confirms this custom of crossing the domestic asses with the wild ones, and also the fact of the extermination of the latter south of the Euphrates. He says "When winter comes, many of the Saleib cross the Euphrates to hunt the Wild Ass in Mesopotamia, there being no more of these now (1865) in the Hammad. They take a certain number of them alive to breed with their own." . . .

It is almost certain that they have now been exterminated in their last refuge, north of the Euphrates, the Jabal Sinjar, none having been seen since 1927. Whether or not there are a few left in South Arabia, or in the Oman hinterland, seems doubtful.

The British Museum has a specimen from Mesopotamia, presented by Layard before 1852, and a Syrian specimen, received from the Zoological Society of London in 1867. No modern zoölogist seems to have met with this subspecies in the field, and wild-killed animals are evidently among the rarest of all museum specimens.

Antonius (1928, pp. 19-20) records a male that had been received in 1911 from the "desert north of Aleppo," Syria, and was still living in the Schönbrunn Zoo in 1928; also three preserved specimens that had lived at Schönbrunn in the latter part of the past century.

"The little Hemippus . . . of Mesopotamia and Syria, domesticated by the ancient Sumers before the introduction of the horse, . . . became perhaps totally extinct in recent years. It could not resist the power of the modern guns in the hands of the Anazeh and Shammar nomads, and its speed, great as it may have been, was not sufficient always to escape from the velocity of the modern motor

car which more and more is replacing the Old Testament Camel-Caravan." (Antonius, 1938, p. 559).

In a later paper (1939) Antonius makes out a strong case for the domestication of the Syrian Wild Ass by the Sumerians in the third millennium B. C.

Shooting of gazelles and other game from motor cars is now said to go on throughout the Syrian and Arabian Deserts (J. C. Phillips, *in litt.*, June, 1938). Perhaps this modern "sport" was instituted before the last Syrian Wild Asses had been killed, and it may have been the final factor in their disappearance.

The Onager of Anatolia

ASINUS HEMIONUS subsp.

Of this animal there evidently remains nothing but a tradition. It was presumably a subspecies of *Asinus hemionus*; but whether it was the North Persian *onager*, the Syrian *hemippus*, or some undescribed form, we shall probably never know. It must have inhabited the rolling downs that Carruthers describes (1915, p. 10) as the habitat of the Anatolian Wild Sheep (*Ovis ophion anatolica*).

Pliny (Hist. Nat., VIII, 44) reported "Onagers" in ancient Phrygia and Lycaonia, corresponding more or less to the modern Anatolia.

"In early days the wild ass was well known in Paphlagonia [a country on the south of the Black Sea], for Homer, when speaking of the Eneti who came from thence to aid Priam and the Trojans, describes their land as 'the home of wild mules.' There can be little doubt that the wild mule of Paphlagonia was some form of *Equus hemionus*, probably the same variety as that called 'mule' (*hemionus*) in Aristotle's time." (Ridgeway, 1905, pp. 50-51.)

"The Onager of Anatolia, so well known to Pliny and other ancient authors, was exterminated before modern times" (Antonius, 1938, p. 559).

Family TAPIRIDAE: Tapirs

This family is represented by two genera (*Tapirus* and *Tapirella*) in Central and South America and by one genus (*Acrocodia*) in southeastern Asia and Sumatra. Of the seven New World forms, ranging from Mexico to Argentina, one, *Tapirus roulinii*, is dealt with in Dr. Allen's volume. An account of the single Old World species follows here.

Malay Tapir

ACROCODIA INDICA (Desmarest)

Tapirus indicus "Cuvier" Desmarest, Nouv. Dict. Hist. Nat., vol. 32, p. 458, 1819. (Malay Peninsula.)

Figs.: Geoffroy and Cuvier, Hist. Nat. Mammif., pl. 303, 1825; Gervais, Hist. Nat. Mammif., pt. 2, pl. 51, 1855; Royal Nat. Hist., vol. 2, p. 458, fig., 1894; Proc. Zool. Soc. London 1908, p. 786, fig.; Kerr, 1927, pl. 7; Jour. Bombay Nat. Hist. Soc., vol. 37, no. 1, suppl., pl. 34, 1934; Pocock, 1937, p. 710, fig.

It is generally agreed that this interesting animal of the Malay Peninsula and Archipelago deserves and requires protection, though its numbers may not yet be reduced to the danger point.

The general form is heavy; limbs short and stout; tail short; ears oval; eyes small; nose and upper lip produced into a short proboscis; front feet four-toed; hind feet three-toed; head, limbs, and front part of body brownish black; body behind the shoulders, including rump and upper part of thighs, and ear tips grayish white. Height at shoulder, 36 to 42 inches. Young brownish black, spotted and streaked with brownish yellow and white. (Blanford, 1891, pp. 478-479.)

Malay Peninsula and adjacent region.—Blanford (1891, p. 479) reported the Tapir's northern limit at about lat. 15° N. in Tenasserim, but Arthur S. Vernay extended the range about 3° farther north, on the Burmo-Siamese frontier (Jour. Nat. Hist. Soc. Siam, vol. 6, p. 318, 1924).

Its status in Burma is discussed by Peacock (1933, pp. 201-202):

Tapirs are found only in the Tenasserim forests in southernmost Burma. They are found only in very dense evergreen forests, but are much more common than their retiring habits would lead one to believe. I found tapirs to be very common indeed along the Big Tenasserim River and in the Victoria Point Range in the Mergui Forest Division. Tapirs are generally found in pairs or solitary. . . .

The tapir appears to be singularly blessed in that neither man nor the carnivora appear to be particularly keen on hunting it. . . .

There can be no pleasure or object in shooting a gentle, shy animal that does not bear even an insignificant trophy. I have heard of tapir being shot only on two occasions.

Tapirs are wholly protected animals under existing game laws.

"The distribution of the Tapir in Siam is very imperfectly known, but it seems to occur in Peninsular and South-western Siam. Said to be fairly common in Patani, and recorded from Hat Sanuk and Hue Sai near the Siam-Tenasserim frontier." (Gyldenstolpe, 1919, p. 170.)

Gairdner (1915, p. 141) reports finding tracks of the Tapir in the Petchaburi Valley, Siam, and adds: "They are never, I believe, intentionally shot by jungle folk, who look upon these rather

defenceless creatures as peculiar. They allege that the Creator, having devised all other beasts to his entire satisfaction, had left over numerous remnants of clay. Taking these in his hands, he rolled them all up together . . . Hence the tapir."

According to Giles (1936, pp. 167-168), "They are also found in the forests of Tavoy and Mergui in Burma and in the Malay States . . . The flesh of this animal is not much esteemed as food nor is the animal sought after for commercial purposes. The reason for this animal having survived may be found in these two main factors. The chief enemy of the tapir is the tiger."

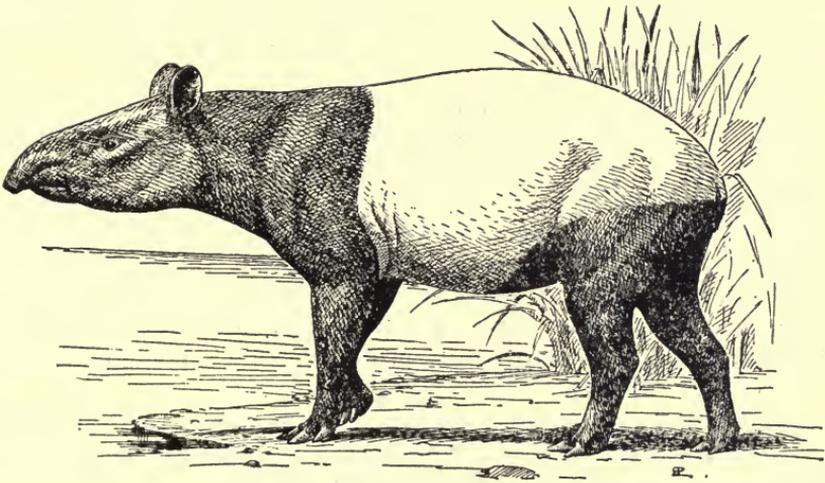


FIG. 39.—Malay Tapir (*Acrocodia indica*)

In 1933 total protection was recommended by the Siam Society.

In Cambodia Tapirs have almost completely disappeared at the present time (Résident Supérieur of Cambodia, *in litt.*, November 20, 1936).

In southeastern Indo-China the species was still fairly common 15 years ago, but it is becoming rarer and rarer. It was believed to have practically disappeared, when last year a report came from a trustworthy source that two had been killed by native trappers in the Hongquan district of eastern Cochin China. The species is absolutely protected under the law. (André Kieffer, *in litt.*, November 21, 1936.)

In the Malay Peninsula, according to Ridley (1895, pp. 161-162), "This animal is still tolerably abundant in the further jungles of the interior, and though rarer than the rhinoceros, is oftener to be seen in captivity. . . . When taken young it becomes very tame and

amusing. As the jungles are cleared the tapir becomes rarer and rarer."

S. S. Flower (1900, pp. 368-369) gives records for Province Wellesley, Kedah, Malacca, Pahang, and Perak, and adds: "H. H. the Rajah Mudah of Kedah told me (June 1898) that the Tapir is not uncommon in the swamps of Kedah, within a day's journey of Alor Star. Mr. F. H. Malcolm Staples told me (Sept. 1897) that the Tapir is still sometimes met with about Batu Pahat, Johore."

It is "still not uncommon in the Malay Peninsula and Sumatra, but much persecuted by menagerie keepers. No zoo anywhere in the world is considered complete without a pair of Malayan tapirs and for every animal that survives in an exhibition, several die in Singapore, or in transit." It needs protection. (F. N. Chasen, *in litt.*, March 31 and May 5, 1937.)

Sumatra.—"Concerning the possibilities of the survival of the Indian Tapir opinions are at variance. Some speak of 'relentless hunting' by Natives, while others claim that the tapir needs no protection by law, since it has no market value, the meat is not eaten, and the animal is, moreover, very shy. In addition, owing to Native superstition it is little molested. . . . They are yet quite numerous near the headwaters of the Koaloe and Bila Rivers; as well as farther south near the kotta Siak Sri Indrapoera and the Mandau River; as well as near the salt springs of Ampoe Gadang, Djambi and N. West Palembang.

"Few will question the necessity of enforcing rigidly and thoroughly the Decree on Game Protection with regard to this animal." (Heynsius-Viruly and Van Heurn, 1936, p. 50.)

"I know of one authentic case near the borders of our plantation [at Dolok Merangir, east-central Sumatra] in which a group of native clerks were hunting at night. They saw a pair of eyes and shot—to find that they had a large tapir; one of a pair known to be in that region. It seems that rhinoceros and other large animals are killed by the same methods and by planned attacks by the natives without any serious consequences." (Walter N. Bangham, *in litt.*, 1933.)

According to Dammerman (in Skottsberg, 1934, p. 422), the species is threatened with extinction.

Kuiper (1926, pp. 425-426) records three black individuals from the Palembang region, southeastern Sumatra. He considers that these represent "more than an individual aberration," and gives them the name *Tapirus indicus* var. *brevetianus*.

"The Malay tapir is strictly protected by Dutch law in Sumatra; not even scientific institutions being allowed to collect it. . . .

"Carl Berthold, the well-known animal dealer of Medan, has noted

that tapirs in the wilds suffer from an eye disease and are often blind." (Ulmer, in Miller, 1942, p. 161.)

Various authors, including De Beaufort (1926, p. 61), extend the Malay Tapir's range to Borneo, while others consider it confined to Sumatra within the Malay Archipelago.

"It is not yet certain that the tapir has been met with in Borneo, although there are persistent reports that an animal of its size and appearance exists in the interior of the country. It would be wise to suspend our judgment for the present and content ourselves with the fact that so far it has only made its appearance on the North Bornean postage stamps!" (Mjöberg, 1930, p. 22.)

Family RHINOCEROTIDAE: Rhinoceroses

Two genera (*Ceratotherium* and *Diceros*), of two forms each, occur in southern and eastern Africa, and from the Sudan westward to Nigeria. Two additional genera (*Rhinoceros* and *Dicerorhinus*), consisting of four or five forms, range from India and Indo-China through the Malay Peninsula to Sumatra and Borneo. Unfortunately, a work of the present scope requires a discussion of every living form of rhinoceros.

Great Indian Rhinoceros; Great One-horned Rhinoceros. *Rhinoceros unicorne* (Fr.)

RHINOCEROS UNICORNIS Linnaeus

[*Rhinoceros*] *unicornis* Linnaeus, Syst. Nat., ed. 10, vol. 1, p. 56, 1758. ("Habitat in Africa, India" (Linnaeus); "probably the sub-Himalayan Tarai of Assam" (Lydekker, 1916, vol. 5, p. 48).)

Figs.: Geoffroy and Cuvier, 1824, vol. 2, pls. 306, 307; Gervais, Hist. Nat. Mammif., pt. 2, pl. facing p. 164, 1855; P. L. Selater, 1876, pl. 95; Royal Nat. Hist., vol. 2, pl. facing p. 464, 1894; Lydekker, 1900, pl. 1, fig. 2; Van der Byl, 1915, pl. 32; Faunthorpe, 1924, pp. 174, 181, figs.; New York Zool. Soc. Bull., vol. 27, p. 72, fig., 1924; Jour. Bombay Nat. Hist. Soc., vol. 37, no. 1, suppl., pl. 31, 1934; Pocock, 1937, p. 709, fig.

With a former range extending from the North-West Frontier Province of India eastward perhaps as far as French Indo-China, this species has more recently become restricted largely or wholly to the Nepal Terai, northern Bengal, and Assam. Its numbers also have greatly diminished.

This is the largest of the Asiatic rhinoceroses, reaching a height of 6 feet 4 inches at the shoulder and a total length of 14 feet 1 inch, with a horn of 24 inches; fold of skin in front of shoulder not continued across back of neck; other folds behind shoulder, in front of and across thigh, and around the neck; sides of body and upper limbs studded with large rounded tubercles; skin naked except for a fringe of hairs on the margin of the ears and some bristly hairs on

the tail; general color uniformly blackish gray, with more or less pink on the margins of the folds (Lydekker, 1900, pp. 21-22).

India.—"In the history of Timur-bec, it is described how in 1398 on the frontier of Kashmir, Timur hunted and killed many rhinoceroses. In the memoirs of Baber it is described how in about 1519 he hunted the rhinoceros in bush country near the Indus. And in the book of Sidi Ali dated 1554 it is stated that rhinos were seen near the Kotal Pass, west of Peshawar.

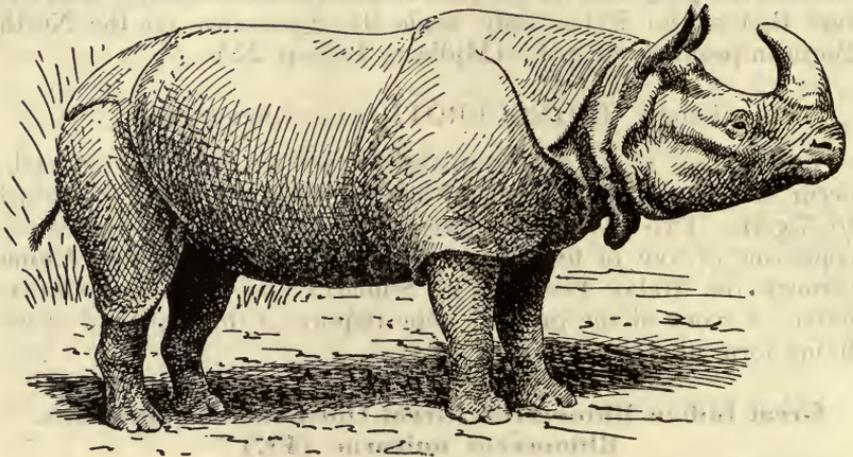


FIG. 40.—Great Indian Rhinoceros (*Rhinoceros unicornis*)

"These references are of interest, for they show that in old times the rhinoceros was plentiful and further, ranged over a great portion of India, whereas it is now approaching extinction." (Hobley, 1931, p. 19.)

"Not improbably . . . the rhinoceroses found till about the year 1850 in the grass-jungles of the Rajmehal Hills, in Bengal, belonged to the present species. Now, however, this huge animal has retreated almost, if not entirely, to the eastward of the Tista valley, on the borders of Kuch Behar; its main strongholds being the great grass-jungles of that province and of Assam." (Lydekker, 1900, p. 23.)

Shebbeare (1935, pp. 1229-1231) gives the following account:

Though this rhinoceros is becoming alarmingly rare everywhere, Nepal and Assam are better off than Bengal, where its habitat is restricted to a few places in the Duars and Cooch Behar State. Here the last main stronghold of the species is a tract of high grass savannah along the Torsa river, stretching from the foothills of Bhutan, through the Duars into Cooch Behar. It is a narrow strip, not more than 40 miles from the north to the south and, at its widest, four miles from east to west—perhaps 50 or 60 square miles. Outside this tract the few scattered colonies can perhaps muster a

dozen individuals in all, but unfortunately these outliers have no spare coverts into which they can expand. . . .

Contrary to what one hears of African rhino, ours is seldom aggressive, nor does he cause havoc to agricultural crops like the elephant.

For the last 25 years in Bengal and Assam rhino have been closed to sportsmen, but this has not saved them from poachers, who shoot them to obtain their horns. From time immemorial these have been highly prized for superstitious reasons. A cup made of the horn of a rhinoceros is still believed to render poison innocuous, a point of some importance to tyrannical rulers, and, when powdered, it is held in the East, especially in China, to be the most potent aphrodisiac. It is believed that most of the horns that are smuggled out of these jungles eventually find their way to China, but however this may be their present value in the Calcutta market is about half their weight in gold. A single horn retrieved from the poachers recently fetched 150 pounds, and still higher prices have been known. That an animal by nature condemned to carry such a price on his nose should tempt poachers is not to be wondered at, but the remoteness of their strongholds, and their armour, too thick to be penetrated by "gas-pipe" guns, was their protection, and up to about six years ago there were probably some 200 animals living in the small tract I have described.

Then poaching began. The first poachers came from Assam, where they had plied the same trade, and brought with them muzzle-loading guns heavy enough to kill a rhino. They were joined by local men of the same tribe (Mechs) and formed themselves into gangs. Their plan was to build a light bamboo staging about 8 ft. above the ground at strategic points, usually where two well-worn rhino tracks met, and lie up when the moon was nearly full. Sooner or later a victim was bound to pass and received a heavy bullet at a range of a few feet They seldom took more than the horn; to try to dispose of the meat, which, by the way, is excellent eating, would have aroused suspicion For nearly three years this went on without any suspicion being aroused.

After the poaching was detected, it required six months or more of effort by the Forest Department and the Government of Bengal to stop the poaching. A bill was passed, making the killing of rhino, except in defense of life, an offense.

"Our attempts have so far been successful. Since Christmas, 1931, so far as we know, only one rhino has been killed, and the perpetrators are now in gaol."

The Government of Bihar (*in litt.*, December, 1936) sends the following information: "The Great One-horned Rhinoceros was formerly fairly common in the jungles of North Bihar bordering on Nepal, especially . . . near the Kosi river, and individuals were found until 50 or 60 years ago. The jungles in this area have practically disappeared and the animal is unknown except as an occasional stray visitor from Nepal into the jungles in the North West corner of the Champaran district."

The Senior Conservator of Forests, Bengal, writes (*in litt.*, September, 1937):

"Former range: Jalpaiguri Forests (common) and Riparian Forests of the Buxa Division (no information as to number).

"Present range: 4 or 5 in the Jalpaiguri Forests, 56 in the Riparian Forests bordering the Torsa and Malangi Rivers and wet forests of Kanbari.

"Causes of depletion: in Jalpaiguri Forests: probably shooting and poaching and possibly disease. In the Buxa Division the species showed up to 1932 tendency to extinction due to heavy poaching. Since 1933 they are increasing in number. The horn is worth 8 to 10 times its weight in silver. The hide is also valuable. . . . A Game Sanctuary to the extent of 26 sq. miles is being maintained."

In years gone by, in this general region, the animals were sufficiently numerous or destructive to have called for the establishment of a bounty. "They sometimes will travel long distances to reach rice and corn fields, and do immense mischief, so much so that *there is a Government reward of twenty rupees* to anyone shooting a rhinoceros" (Baldwin, 1876, p. 144).

Nepal.—This species is "decreasing rapidly in Nepal. In the Morang District of the Nepal Tarai this rhinoceros was plentiful not many years ago, but now not a single specimen is, I believe, to be found within two hundred miles." Several specimens were collected in the Gandak Valley in 1923. (Faunthorpe, 1924, pp. 179-188.)

Further information is as follows (Anonymous, 1934, p. 89):

Along the numerous rivers which flow through the jungles of the Nepal Terai the rhino has particular places for dropping its excreta. Mounds so accumulate in places. In approaching these spots a rhinoceros walks backwards and falls an easy victim to poachers. . . .

The food consists chiefly of grass. In Nepal during the rains Rhinoceros frequently enter cultivation. . . .

In Nepal the flesh and the blood of the Rhinoceros is considered highly acceptable to the *Manes*. High caste Hindus and most Gurkhas offer libation of the animal's blood after entering its disembowelled body. On ordinary *Sradh* days the libation of water and milk is poured from a cup carved from its horn. The urine is considered antiseptic and is hung in a vessel at the principal door as a charm against ghosts, evil spirits and diseases. These beliefs connected with the Rhinoceros are prevalent in varying form in Burma, Siam and China. They set a great value upon the animal and provide the main reason for its persecution. In Nepal, the Indian Rhinoceros is found only in the country to the east of the Gandak river known as Chitawan where strict preservation by the Nepal Government has saved it from extinction.

Twenty to thirty years ago, according to the Bombay Natural History Society (*in litt.*, December, 1936), it "was still common in the Sikhim Terai and in Nepal as far west as Rohilkund."

Arthur S. Vernay writes (*in litt.*, March 11, 1936) on economic conditions:

"I think . . . that there is one mistake he [Shebbeare] has made, that is in regard to the crops being destroyed by the rhinoceros. This is one of the chief complaints which the Nepalese have in the Nepal

Terai. One sees all over the place high bamboo shelters which are built in their cultivations, and these during certain seasons of the year are occupied at night by Nepalese in order to have bells, gongs, and so on, to frighten the rhinoceros away during their night feeding in the cultivations. . . .

"One of the methods of poaching which is being used from time to time is building deep pits into which the rhinoceros falls."

Lt.-Col. F. M. Bailey, of the British Legation, Nepal, writes (*in litt.*, March 16, 1936): "Yesterday I had a talk with His Highness the Maharaja about the numbers of Indian rhinoceros in Nepal. He told me that it was estimated that in 1910 there were about 1,100, in 1930 the number had dwindled to about 100. Very strict measures were taken to preserve them and he told me that he now estimates there must be some 200 and there is every sign that they are on the increase."

Assam.—"This rhinoceros is very plentiful along the Terai and in the Durrung, Nawgong and Goalpara districts in Assam" (Pollok, 1879, p. 95).

"Mr. Shebbeare has taken great pains in an attempt to estimate the approximate number of *R. unicornis* still surviving in Assam (North Bengal). They first occur about 51 miles south-east of Darjeeling and there are sporadic occurrences along the foothills for about 330 miles due east as far as Sibsagar. In this long strip of country he estimates that not more than 220 specimens survive to-day." (Hobley, 1932, pp. 20-21.)

Milroy (1934, pp. 99-101) contributes the following information:

The two Game Sanctuaries [Monas and Kazirunga] . . . were originally selected for the Great One-horned Rhinoceros . . . , and a very fine stock of these animals was raised as the result of the protection afforded. . . .

The rhinoceros, our most important animal from the natural history point of view, is a difficult species to preserve even though its destruction is forbidden by law The demand for rhinoceros' horns has always been considerable in India, but of recent years China has also been in the market, consequent on the practical extermination of *R. sondaicus* in Lower Burma, Tenasserim, etc., with the result that a horn is now worth just about half its weight in gold. The prospect of a lucrative business led to an organization being formed for passing on rhinoceros' horns and elephant tusks to Calcutta, and the disturbed political conditions provided the virile Boro tribes (Meches and Kacharies) living near the Monas with the opportunity to take up poaching on a large scale.

The operations of the financiers in the background were checked for the time being; the advent of the Assam Rifles restored order; additional game-watchers were engaged, and an Assistant Conservator was placed in charge of the Sanctuary

Apart from the two Sanctuaries mentioned previously, the rhino have one remaining refuge, namely the Balipara Political Area. Here some very valuable protection has been afforded to this animal in one area by a planter who is an enthusiastic game preserver.

The Chief Secretary of the Assam Government writes (*in litt.*, June, 1937): "Former range: probably occurred all along the Brahmaputra between Kalangmukh and the present Kaziranga game sanctuary and in a sporadic condition in Sibsagar. Present range: about a dozen in the Laokhowa reserve in Nowgong, about 100 in the Kaziranga sanctuary and adjoining U. S. F. in Sibsagar. Causes of depletion: opening up of the jungle and shooting by poachers Complete protection under the game laws."

Burma.—The records for this country are not at all satisfactory. Pollok (1879, pp. 95-96) states that rhinoceroses of three kinds are abundant in Burma, the large single-horned species occurring "in the Yonzaleen and Arrakan range, and perhaps the Yomahs." On the other hand, Jerdon (1874, p. 233) had no information as to its extending south of the region adjoining the Himalayas, and Peacock (1933) does not mention it in his book on the game animals of Burma.

Siam.—Its occurrence in this country is doubtful (Hobley, 1931, p. 21, and 1932, p. 20). Flower (1900, p. 366) has no definite record, and Gyldenstolpe (1919) does not include it in his list of the mammals of Siam.

French Indo-China.—The older works do not include this country in the range of the species, and the recent reports probably require verification. De la Chevassérie (1936?, pp. 340-341) quotes Millet to the effect that *unicornis* extends as far as Tonkin, and he adds (translated):

It may still be found between the Rivers Da R'Man and Krong Knô, lower branch of the Srépok. Also between the River Song-Quao and the road from Phantiet to Djiring, region of Catot. Also in the massif extending along the right bank of the Song-Phan, from the Nui-Visong to Nui-Bê. Also, according to native report, on the left bank of the Da Nhim above the post of Dran (Lang-Bian) and about two days' journey from the center; the place is called Lieng-Du. Likewise in the region of Tutra (Lang-Bian) near the mountains Mu K'Bay and Cay Ko Mao, in the forest of Mour-Neuill.

While there remain a certain number of *unicornis* in Indo-China, the individuals of the other two species could probably be counted on the fingers, if any survive at all.

The Chief of Veterinary Service, Cochin China, writes (*in litt.*, December, 1936) that it no longer exists in Cochin China.

According to the Résident Supérieur de Cambodge (*in litt.*, November, 1936), different authors indicate that *unicornis* is one of three species found in Indo-China. It is rather possible that one or even two of these species have now disappeared from Cambodia.

**Javan Rhinoceros; Smaller One-horned Rhinoceros.
Rhinocéros de la Sonde (Fr.)**

RHINOCEROS SONDAICUS Desmarest

Rhinoceros sondaicus Desmarest, Mammalogie, pt. 2, p. 399, 1822. ("Sumatra.")
FIGS.: Temminck, Natuurl. Geschiedenis Nederl. overz. bezittingen, Zool., Mammalia, pl. 33, 1839-44; Proc. Zool. Soc. London 1874, pl. 28; Trans. Zool. Soc. London, vol. 9, pl. 96, 1876; Blanford, 1891, p. 475, fig. 155; Lydekker, 1900, pl. 1, fig. 3; Kloss, 1927, pl. 5; Dammerman, 1929, p. 25, fig. 6; Barbour and Allen, 1932, pl. 11; Jour. Bombay Nat. Hist. Soc., vol. 37, no. 1, suppl., pl. 32, 1934; Ward, 1935, p. 338, upper fig.; Loch, 1937, pls. 3, 4.

This is one of the rarest and most famous of the large mammals now facing extinction. The last survivors linger in a few localities in southeastern Asia and the Malay Archipelago.

It is somewhat smaller than *R. unicornis*; color dusky gray throughout; fold of skin in front of the shoulder, like that behind the shoulder and that in front of the thighs, continuous across the back; skin divided by cracks into small, polygonal, scalelike disks; ears with a short hairy fringe; tail hairy below and at tip; single horn of the male reaching a length of a little more than 10 inches; horn generally absent in the female. Height of male at shoulder, 5 feet 10 inches; of female, 5 feet 6 inches. (Blanford, 1891, p. 475; Lydekker, 1900, pp. 25-26.)

The range formerly extended from Bengal, Assam, Burma, Siam, and Indo-China through the Malay Peninsula to Sumatra and Java (cf. Loch, 1937, map facing p. 130).

India and Burma.—In the past the species was distributed in the Sundarbans and other parts of eastern Bengal, and through Assam and Burma. It is mentioned as having been once abundant in the forests along the larger rivers of Tenasserim. At present it is practically exterminated from India proper. A few may survive in the North Lushai Hills and in Manipur. It is doubtful if more than half a dozen animals survive in Burma. It is completely protected by law in Burma. Every part of the animal, including the blood and the entrails, is in demand. (Bombay Natural History Society, *in litt.*, December, 1936.)

Shebbeare writes (1935) of its former occurrence along the Torsa River, Bengal: "The Lesser Indian rhinoceros (*R. sondaicus*) inhabited these jungles until at least as recently as 30 years ago, when one was shot by a forest officer." This was "one of the last, if not the last, of its race in this locality."

"There have been rumors of the former existence of *R. sondaicus* in the forests of Orissa and about the delta of the Mahanadi River, in the Bay of Bengal. This has been discredited by some authorities

and as specimens have not been seen by Europeans, we have now no means of ascertaining the truth.

"In the Sunderbans delta . . . the last tracks of the animal were seen . . . about 1887 so that by 1890 it had probably died out." (Loch, 1937, p. 132.)

In Bengal the former range included the Jalpaiguri and Chittagong Forests. Extinction was due to poaching. (Senior Conservator of Forests, Bengal, *in litt.*, September, 1937).

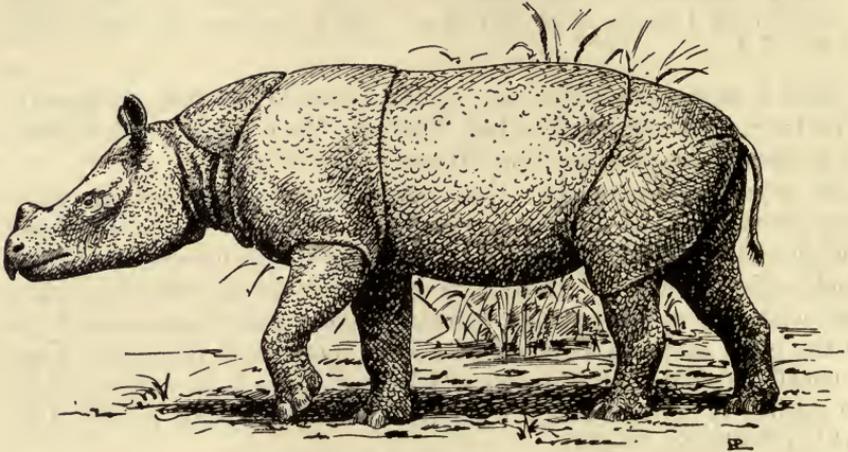


FIG. 41.—Javan Rhinoceros (*Rhinoceros sondaicus*)

Its status in Assam is discussed by Milroy (1934, p. 102): "It is on record that Messrs. Rowland Ward identified the head and shield from a rhino shot by a Forest Officer in the Bengal Doors as belonging to this species, and it would be strange if it did not also occur in the contiguous Goalpara Reserves and Monas Sanctuary. Pairs of smaller, less truculent, and definitely less armoured rhino can be put up in the Sanctuary and these, if not cases of *R. unicornis* pairing while still far from mature, must be specimens of *R. sondaicus*."

Loch (1937, p. 132) quotes Pollock (1900) as follows:

"It is fairly plentiful on the left bank [of the Brahmaputra] South of Goalparah, where I have killed it.

"I may here mention about them in Assam . . . that I shot there forty-four to my own gun, and probably saw some sixty others slain, and lost wounded fully as many as I killed."

On this Loch comments (p. 133): "The latter paragraph, no doubt, refers to all species of rhino. Colonel F. T. Pollock spent seven years, in the '60s, in Assam, and was an accurate observer and keen shikari. If one European can, in seven years, account for so

many little wonder that the Javan-rhinoceros is now extinct in the country."

Peacock (1933, pp. 77-79) says:

In Burma, there is no authentic record of its shooting, except in one instance, viz. a specimen shot . . . some years ago . . . in the Mergui District in southernmost Burma. . . .

The Javan rhinoceros has been shot illicitly on numerous occasions by professional hunters and poachers: in fact, it has now been poached almost out of existence. . . .

It is open to question whether the Javan rhinoceros ever existed outside of the Thaton, Salween and Mergui Forest Divisions in Lower Burma. The only definite records of its existence come from these three Divisions.

The best-known grounds used to be the forests of the Victoria Point Subdivision in the Mergui District. Although, as Divisional Officer in charge of the Mergui Forest Division, I spent four months in touring through that Division, I could find no evidence of its existence outside of the Victoria Point Subdivision. . . .

The forests of the Victoria Point Subdivision undoubtedly held, at one time, a very fair number of Javan rhinoceros, but these have long since been poached out of existence for the sake of the valuable horn and blood which realize an even greater price than that of the Sumatran rhinoceros. . . .

It is extremely doubtful whether there are now more than half a dozen specimens of *R. sondaicus* in existence in Burma, and it is unlikely that they will survive.

This is the most threatened mammal in Burma. It "is now, so far as known, confined to the Kahilu Game Sanctuary in the Thaton Forest Division of Lower Burma. This Sanctuary was formed with the chief object of affording shelter to these rhino which are believed to number six specimens. No death has been reported since 1931 and there are grounds for believing that these rhino will be saved from extinction. Hunting prohibited. In the past ruthlessly persecuted for the sake of the blood which is claimed to have medicinal properties." (Game Warden, Burma, *in litt.*, November, 1936.)

"In a letter received from the Forest Department, Shwebb, it stated that four specimens of the Javan rhinoceros probably occur in the Kahilu Game Sanctuary. This is located in the Thaton and Salween Districts, in Lower Burma. In the Shwe-U-Daung Game Sanctuary in Upper Burma, it is hoped that a few may exist but it is unlikely." (Loch, 1937, p. 133.)

Siam.—Flower (1900, pp. 366-367) records a specimen brought to the Siamese Museum in 1897, apparently from the Laos Country. He also remarks on the eagerness of the volunteer skimmers (mostly Siamese women) to secure the blood, flesh, and bones.

In his notes on *R. sondaicus* and *R. sumatrensis* in Siam, Gyldenstolpe (1919, p. 170) confuses the technical and the common names of the two species, so that it is difficult to allocate the notes to the right species. Both animals, however, were evidently rare at that time.

In 1931 total protection was recommended by the Siam Society.

"Of its occurrence in the Siamese part of the Malay Peninsula we have practically no evidence" (Kloss, 1927, p. 207).

Loch (1937, pp. 133-134) quotes William W. Fegan (1933) as follows:

I may state that both the one-horned and two-horned rhinoceros (*R. sondaicus* and *R. sumatrensis*) are to be found in Siam but, owing to the hunting by the hill tribes both are now extremely rare

As to the one-horned, I have been thirty-three years in this part of the world and have travelled over the major part of Siam and I have never yet met a man, native or European, who has shot one. Some twenty years ago two Europeans, surveyors, in the hilly district near the Three Pagodas, on the Siam-Burma frontier, tried to bag one but failed. It was later on trapped in a pitfall by the neighbouring tribesmen and I saw the horn and strips of the skin which were brought to a place called Kanburi.

In more recent times I have heard of two of the animals having been seen in Eastern [=western] Siam, near the Meklong, but know nothing more about them. A Siamese official who had spent some years in this district told me that he had heard of the existence of seven or eight and he knew personally of two of them having been killed. The question of how many of the animals remain alive to-day in Siam is rather a mystery About the year 1886 a one-horn was captured and brought alive to Bangkok from a place near Krabin, to the west of the capital.

Loch adds that a few years ago A. S. Vernay could get no information as to the animal's presence in central and northwestern Siam.

French Indo-China.—Information on the status of the two species of rhinoceros occurring in this country (*Rhinoceros sondaicus* and *Dicerorhinus sumatrensis*) is so imperfect that in some cases it is virtually impossible to segregate the records of one species from those of the other. The following notes probably refer in part to both species.

Rhinoceroses have certainly become very rare in Indo-China, if indeed a single one is left. In South Annam Defosse succeeded, about 1903 or 1904, in killing five. About 1896 M. Oderra killed 25 Rhinos; M. de Monestrol certifies to this. (De la Chevassérié, 1936?, p. 340.)

In Cambodia the disappearance of rhinos is almost complete at present. They were formerly recorded as very rare in the Massifs de l'Elephant and des Cardamomes, and on the banks of the Mekong. A specimen was killed about 1930 in the Province of Kompong-Cham. Some may still exist, but in very sparse numbers, in the region of Sré-Umbell (Kampôt) and in the Province of Stung-Treng. The number must be very small (probably less than a dozen). It is impossible to determine the exact species. Various authors have recorded *sondaicus*, *sumatrensis*, and *unicornis* from Indo-China. It is quite possible that one or two of these species have

completely disappeared from Cambodia. (Résident Supérieur of Cambodia, *in litt.*, November 20, 1936.)

Twenty years ago *sondaicus* and *sumatrensis* were abundant in the whole Mekong Valley, and they were hunted not far from Saigon, in the marshy plains covered with spiny bamboo. Since then the two types have completely disappeared. The last specimen killed (*sondaicus*) was secured by a European hunter in upper Cambodia two years ago. The animals may be considered practically annihilated. (André Kieffer, *in litt.*, November 21, 1936.)

P. Vitry (*in litt.*, December 20, 1936) sends the following information concerning *sondaicus* and *sumatrensis* in Laos. Before 1890 they were still quite numerous on the western buttresses of the Annam mountain chain. The maximum frequency was in the south and more particularly on the Boloven Plateau and the slopes extending west to the Mekong on the boundary of Cambodia. During the last 30 years I have only once seen tracks. The last specimen killed in southern Laos, so far as I know, was in 1911 in the Boloven Plateau region. I am sure that a very few still exist: in the Sonla-Samnena region, probably also in certain regions of the Boloven Massif, practically uninhabited and not visited by the natives, and in the mountain buttresses separating the upper Sélanong and Sékong from Kontum. There has most certainly been an intensive destruction by native hunters on both banks of the Mekong; they even drive the animals down to the sea (particularly in the Phanrang, Camranh, and Phanthiêt districts in southern Annam). The purchase price for a complete rhino ranges from about 1,000 piasters in 1910 to about 2,000 piasters at the present time. Everything is utilized by the Chinese pharmacies—not only the horns, but also the meat, the hide, the blood, the vital organs, and especially the urine! In my opinion no protective measures can be taken.

Loch (1937, pp. 142-144) has assembled more definite information concerning this species in Indo-China. He quotes E. M. de Villa as follows: "The one-horned rhinoceros . . . is still to be found in several parts of Indo-China, being fairly well represented on both sides of the great Annamite Range, and both north and south of it. . . . It is known and hunted on the Dar Lac Plateau at an elevation of about 3,000 feet, and last year some natives invited me to hunt a party of about four rhinos near Cua Rao, about 100 feet above sea level. Rhinoceros and elephants . . . are met with between Kratie and Sung Treng, south of Saravane (in Cambodia—to the east of the Mekong) and in many places in Laos."

Loch (1937, p. 143) writes:

M. Antoine Lagreze, the Résident at Vinh in Northern Annam, . . . has written . . . that several specimens still exist in the dense forests separating the provinces of Vinh and Thanh-Hoa, in northern Annam. Also in the

forests between the province of Luang-Prabang and the Vème military territory. The writer states that during 1924 he located a band of rhinos in the province of Sam-Nua where formerly they abounded. . . . Fifty years ago these animals were numerous in the Annamite Chain and in the forests of Nord-Annam and Haut-Laos. They have been destroyed by Meos, a mountain people who have immigrated from China in recent times. . . . The value of the horns was so great that they figured in the tribute sent by the King of Luang-Prabang every year to the Emperor of China and the Emperor of Annam. At the present time in the royal marriages of Luang-Prabang a rhino horn frequently figures in the dowry of the young princess. . . .

Professeur Bourret, . . . writing from Hanoi is certain . . . of *sondaicus* as far north as Tonkin where it has recently been killed in the province of Son La. . . .

Bourret maintains that *sondaicus* . . . has been killed in La Nha, also at Bien-Hoá at Cap St. Jacques not far from Saigon, in the south of Cambodia. Also in the region of Xieng-Khouang in Tran Ninh, North-east Laos He estimates that perhaps 30 of the one-horned rhinos have been killed in Indo-China by European hunters since 1900. About 1900, two skulls were sent home from Bien-Hoá to the Paris Museum,—these appear to be the only specimens of *sondaicus* from Indo-China in any Museum.

"M. J. Loupy, Commissaire du Gouvernement at Luangprabang in Laos, from enquiries from native authorities, thinks that no rhino has been met with during the last five years in the Kingdom of Luangprabang" (Loch, 1937, p. 144).

Malay States.—According to Ridley (1895, p. 161), the common rhinoceros of the Malay Peninsula "appears to be *R. sondaicus*. It frequents the hill-jungles, ascending to 4,000 feet altitude As the jungle gets cleared, it wanders often into the low, open country, apparently losing its way. It is a quiet, inoffensive beast."

"In 1921 it was known that two animals of this rare species were round about Changkat Jong not far away from Chikkus, and one of them was shot by a planter" (Times of Malaya and Planters' and Miners' Gazette, Ipoh, February 1, 1932).

"In Perak, lower Malay Peninsula, . . . two individuals have been killed in the last thirty years, the mounted heads of which are now in the Selangor Museum" (Barbour and Allen, 1932, p. 146). "Both these animals seem to have been extremely savage and given to unprovoked attacks. The Pinjih beast had been the terror of its valley from long before the British Occupation (1874)." (Kloss, 1927, p. 208.)

Comyn-Platt (1937b, p. 48) writes:

Undoubtedly the rhinoceros is having the most serious time, and I fail to see how his existence can be much further prolonged. After all trade will always defeat sentiment in the long run, and as the Chinese are convinced that rhinoceros horn is a most valuable aphrodisiac and will pay as much as three or four hundred dollars to get it, can one be surprised if this animal is being hunted to extinction? And this is happening in other countries besides Malaya.

Whether or no commercialism is the reason for the practical disappearance of *Rhinoceros sondaicus* I am not prepared to say. But the fact remains that it is rarely, if ever, seen nowadays. It is believed that two or three are still to be found in the swampy lands of South Perak. There is no certainty, however, about this.

Loch writes (1937, p. 135) on its status in Malaya:

Few specimens of the Javan rhinoceros are left in Malaya at the present time. In the state of Perak, at least three are believed to exist in the Erong and Chawang areas, to the west of Trolak. At least one is to be found in the Lekir district, on the other side of the Perak River near Sitiawan. After the shooting of a *sondaicus* in 1928 at Ujong Pematang, a search was made at the instance of the Game Warden in the area between the Selangor and Bernam Rivers. The results were unsatisfactory, but it is believed that the tracks of two were found. These half-dozen are all that are known to exist in the Malay Peninsula. There may be others; it is sad to think there may not be so many. . . .

We do not know if the Javan rhinoceros was ever numerous in the Malay Peninsula previous to the British occupation of the Straits Settlements. Early Portuguese and Dutch writers refer to the "badaks" to be found inland, and there must have been a continuous trade in rhinoceros horns between the Malays and merchants from China.

Loch also enumerates (pp. 135-140) the known records from Malaya, as follows: Province Wellesley, 1816; Pahang, an unverified sight record in 1891 (the only record from the east side of the Malay Peninsula); Temoh, Perak, 1890's; Batu Gajah, in Kinta, two in 1897; Sungai Palawan, Lower Perak, 1898; Pinji Valley, in Kinta, 1899; Dindings and Bruas district of Perak, four between 1905 and 1921; Telok Anson, 1924 and 1932; Ujong Permatang, Selangor, 1928.

"Whether or not the species still exists in the Malay Peninsula is a moot point. My own view is that this species should not be killed under any circumstance, scientific, or otherwise." (F. N. Chasen, *in litt.*, May 5, 1937.)

Sumatra.—Hazewinkel (1933, p. 1019) records the killing of seven specimens in Sumatra, and adds: "The Chinese gladly pay quite a lot of money for the hide of the one-horned rhino (up to fl. 1500), and, in particular, the chula, or horn, will fetch fancy prices, even up to 4000 guilders (nearly £500). The two-horned *Rhinoceros Sumatrensis* is, on the contrary, far less valuable: will fetch, in fact, only about one-tenth of the above-mentioned prices. Hide, horn, bloods, and other parts of the body, pulverized or as an extract, provide the most essential ingredients for very potent and renowned medicines. According to the Chinese and the natives, those medicines should be able to give back lost strength, youth, and vitality, and cure various diseases. The horns are sometimes modelled into goblets. Water or some other liquid, when left in such

a vessel for some days, should then become a veritable panacea against all ailments and diseases, even tuberculosis and the plague!"

Heynsius-Viruly and Van Heurn (1936, pp. 40-47) give the following account:

On the eastern coast of Sumatra both species of rhinos were known by the natives for ages past. [Reports by Marsden (1811), Raffles (1822), and Hagen (1890) are quoted.] In 1885 Neumann wrote: "... Formerly the export of this article [horn] was rather important, but at present it has largely ceased, first because the rhino has become scarce and secondly because the natives no longer indulge much in hunting." . . .

The district in Atjeh, now set apart as a large game reserve, is criss-crossed by many . . . rhinoceros paths [apparently made by both species]. . . .

In 1925 Mr. Hazewinkel had the good fortune to shoot a *sondaicus* in South Sumatra. Later he shot six more and two *sumatrensis*. [He tells] how they became aggressive through contact with man (and bullets), how they kill cattle

Presumably the magic power [of the horn] manifests itself in three ways:

1. A poisonous snake bite may be healed by placing a small piece of the horn on it.

2. A poisonous drink may be detected by putting it in a tumbler made of rhinoceros horn. If it contains poison, the liquid will foam.

3. It works as an aphrodisiac when taken in powder form or mixed with water.

Belief in the first and second of these superstitions is to be found all the way from Arabia to China and Japan. Bombay is one of the most important markets for rhinoceros horn. . . . Even Indo-Europeans sometimes believe in it. . . . The general opinion is that the effect is nil or based upon suggestion. . . .

Little is known as yet of the action as an aphrodisiac mentioned above. . . .

Reports received from Sumatra [as to the occurrence of rhinoceros] . . . are not at all optimistic. The last *sondaicus* seen in South Palembang is said to have been shot in 1928. In the Lampong Districts the same distinction, reported by Hagen from the East Coast, is made between the "Badak karbo" and the "scaly badak," the latter seemingly being *sondaicus*. . . .

Reports from all other parts of Sumatra where rhinoceros are said to occur, always mention that they are found very sporadically only. On the whole, rhinoceros still occur in the plateaus and mountain swamps of Atjeh, especially in the Gajo and Alas districts, in the extensive forests in the hinterland of Langkat, at the salt springs on Sumatra's East Coast, at Indragiri (between Talook and the P. R. I.), in Riouw, Djambi as well as N. W. Palembang (Benarat). On the western coast they are still found in the Barisan Mountains, though in small numbers. In the early 19th century, rhinos were quite numerous in the vicinity of the Peak of Korintjih, but they are practically extinct there since 1915, mainly owing to intensive hunting by means of pit traps. They are threatened with rapid extermination in Bangko, where the controller BB. reports that "they may perhaps hold their own for some ten years more."

De Voogd [1933] . . . remarks with some sarcasm that since or due perhaps to the hunting expeditions of Hazewinkel about 1925, the rhinos have decreased at a terrific rate.

Java.—Lydekker makes the remarkable statement (1900, p. 27)

that "in Java tame individuals are frequently to be seen wandering about the villages of the natives."

"In Java the Rhinoceros is now reduced to a single herd, which is confined to the Bantam district, at the extreme west of the Island. The herd is said to consist of about fifty individuals, which are very strictly preserved." (Harmer, 1922, p. 16.)

According to Dammerman (1929, pp. 7-8), "the Javanese species . . . has decreased so considerably that its number for Java has been estimated at hardly more than a few dozens. . . . From Java hardly any export has taken place publicly as here the rhinoceros has been protected since 1909, but all the same, many a specimen has been killed illegally."

Heynsius-Viruly and Van Heurn (1936, pp. 40-46) give the following account:

In Java . . . it has been exterminated, except for a few specimens. . . .

Much has been written about the fierceness of the rhinoceros. . . . They seem to have an especial dislike for naturalists. In 1827, G. von Raalten, anatomist of the "Natural History Committee of the Netherlands Indies," was attacked and seriously wounded by a rhinoceros [*sondaicus*] at Krawang, Java. . . .

Meanwhile the rhinoceros disappeared long ago from Krawang. In their original habitat in Java, which was restricted to the western and central districts, steady hunting during the past century has made them so scarce that their complete extermination is seriously feared. This is all the more immediate since one can expect, at the most, one young every five or six years. . . .

In Java, according to reports, *sondaicus* will soon be a thing of the past, if it does not prove possible to sufficiently guard the few remaining specimens in Southwest Bantam and in the Nature Monument Oedjoengkoelon. Although poachers are now punished more severely than before, three corpses of rhinoceros were found in the Nature Monument in 1932. The presence of a single rhinoceros in the district Karangnoengal was reported; also a few specimens in the Garoet Mountains as well as near Pameungpeuk and to the west of Lake Kinder.

Borneo.—This species "has been supposed to inhabit . . . Borneo as well, but statements to that effect need confirmation, and are very likely to be wrong" (Harmer, 1922, p. 16).

"The evidence for its occurrence in Borneo is far from good, being based in part on native report (see Sclater, 1869)" (Barbour and Allen, 1932, p. 145).

Heynsius-Viruly and Van Heurn (1936, p. 47) evidently consider reports of *sondaicus* from Borneo due to confusion with *sumatrensis*.

"E. Banks, Curator of the Sarawak Museum . . . does not believe that *sondaicus* really exists in Borneo" (Loch, 1937, p. 145).

Specimens.—Barbour and Allen (1932, pp. 147-149) list the known museum specimens, and Loch (1937, p. 147) does likewise, making a total of 18 mounted skins, 6 mounted heads, 20 skeletons, and 40 skulls.

Loch also gives (p. 146) an estimate of 66 specimens living at present, including 4 in Burma, 6 in the Malay States, 6 in Sumatra, 24 in Java, 8 in Siam, and 18 in Indo-China.

Sumatran Rhinoceros. *Rhinoceros de Sumatra* (Fr.)

DICERORHINUS SUMATRENSIS SUMATRENSIS (G. Fischer)

[*Rhinoceros*] *sumatrensis* G. Fischer, Zoognosia, vol. 3, p. 301, 1814. (Based upon "the double horned rhinoceros of Sumatra" of Bell, Philos. Trans. Royal Soc. London 1793, pt. 1, p. 3, pls. 2-4, 1793; "about ten miles from Fort Marlborough," Sumatra.)

Figs.: Bell, 1793, pl. 2; Temminck, Natuurl. Geschiedenis Nederl. overz. bezittingen, Zool., Mammalia, pl. 34, 1839-44; Gervais, Hist. Nat. Mammif., pt. 2, pl. 31, 1855; Elliot, 1907, p. 105, fig. 25; Mjöberg, 1930, pl. 2.

This typical subspecies of the two-horned Sumatran Rhinoceros, occurring in Sumatra and Borneo, has very seriously declined in numbers.

It is said to be distinguished from the form of the Malay Peninsula by skull differences and also by its grayish instead of blackish color (J. E. Gray, 1873, pp. 358-359). According to Bell's original description (1809, pp. 283-284), the general color is brownish ash; belly between the legs and folds of skin dirty flesh-colored; ears small and pointed, edged with short black hair; upper lip pointed and prehensile; whole skin rough and covered very thinly with short black hair; tail covered with long hair; a fold of skin behind the shoulder, and others on the lower side of the neck. Height of male at shoulder, 4 feet 4 inches; length from tip of nose to end of tail, 8 feet 5 inches; anterior horn, about 9 inches; posterior horn, 4 inches.

Sumatra.—Heynsius-Viruly and Van Heurn (1936, pp. 40-41) refer to early records by Bell (1793), Marsden (1811), Raffles (1822), and Neumann (1885).

In 1906 W. L. Abbott (in Lyon, 1908, p. 623) found rhinoceroses (species not determined) common on the mainland in Eastern Sumatra opposite Pulo Rupert. The following remarks of Dammerman (1929, pp. 7-9) apply to two species:

The rhinoceroses need protection urgently. The Javanese species (*Rhinoceros sondaicus*) has decreased so considerably that its number for Java has been estimated at hardly more than a few dozens, and also the Sumatra kind (*Rh. sumatrensis*) is strongly on the decline. These animals, besides being a victim to big-game hunting, are taken by the natives for the sake of their horns These horns are highly valued by the Chinese, at some hundred guilders a piece, and are used for a secret medicine. . . . The exported horns go mostly to Singapore, only a small quantity goes directly to China. . . . In the islands outside Java the rhinoceroses remained pretty much unprotected up to the present. The principal port for export of this product is Tandjoengselor in East Borneo. . . . We see by the given prices, which vary between 200 and 400 guilders a kilogram, what large sums the Chinese will spend for these horns. We do not possess exact figures about the weight of rhinoceros horns, but it is improbable that the weight of the two horns of the Sumatra

species should exceed one kilogram. So we may suppose that during the last ten years an average of forty rhinoceroses yearly were sacrificed to the superstition of the Chinese, for, of course, there can be no question of any curative action of the horn. With the new regulations both species of rhinoceroses will be protected and also the export of their horns will be forbidden, so we hope to be in time to save these remarkable animals from total destruction.

According to the statistics given by Dammerman (1929, pp. 90-91), 49 kilos of rhinoceros horns were exported from the Netherlands Indies in 1919, 70 in 1920, 38 in 1921, 68 in 1922, 39 in 1923, 24 in 1924, 16 in 1925, 22 in 1926, and 26 in 1927. These figures indicate unmistakably an increasing scarcity of the animals.

J. Gourin (*in litt.*, August 7, 1933) speaks of *sumatrensis* as pretty rare. Formerly "we had them near Boeloe Telang, and I believe there is still a couple living on Lepan."

Heynsius-Viruly and Van Heurn (1936, pp. 43-44) give the following information:

Otto's hunting descriptions [1903] are of particular interest to the Netherlands Committee because they relate to that part of Langkat lying along the Upper Lepan River, a district set apart long ago as a forest reserve and which connects, along the boundary of Langkat and Atlas, with the recently proclaimed game reserve. All rhinoceros shot by Otto belonged to the two-horned species. . . . There is . . . much chance that both species will be found in the newly established game reserve. . . .

The Netherlands Committee for International Nature Protection formerly described how the Natives [in northern Sumatra] hunt rhinoceros by means of a spear-trap.

Mjöberg writes (1930, p. 18): "In Sumatra, so it is said, the Battas creep up so close to the rhinoceros as to be able to cut the sinews of its back legs with a sharp knife."

"Rhinoceroses are close to extinction in northern Sumatra, although a few are supposed to remain in remote parts of the Wilhelmina Range. A 'pawong' or native chieftain told us that the animals once were very numerous on the plateau at Blangbeke. . . . The pawong and his men hunted the rhinos here twenty years ago, using both guns and dead-falls over the rhino trails. . . . The pawong personally had captured 24 rhinos with these spike traps. . . . The pawong used to obtain 250 rupees (guilders) for a catty (1.36 lbs.) of powdered horn." (Ulmer, in Miller, 1942, pp. 161-162.)

Borneo.—"The Rhinoceros . . . is still extant, but it seems to be confined to the mountainous regions in the far interior of the island, and I do not suppose that more than half a dozen specimens have been sent to European museums" (Shelford, 1916, p. 42).

To the foregoing statement, H. N. Ridley adds in a footnote that *sumatrensis* is common in British North Borneo, and that he passed four in one trip.

Mjöberg (1930, pp. 17-19) gives the following account for Borneo:

He lives in the most inaccessible tracts, which are free, as a rule, from all human visitors. . . .

Near the upper springs of the River Boh, in Central Borneo, we one day . . . came upon no less than four specimens. [Three of these fled but one attacked the procession of bearers. The meeting with a party of four was very exceptional.]

The nomad tribes that wander through the central districts of Borneo are very keen rhinoceros-hunters. The Punans follow his trail without a sound and blow poisoned darts at his more vulnerable points. They may follow one and the same animal for weeks without giving up the pursuit, until they have secured a suitable opportunity to use their blow-pipe. . . .

It is chiefly the horns that are highly prized for trading purposes. They are sold for several hundred shillings apiece to the Chinese from the districts round the coast, who use them for the preparation of a medicine in great request . . . as a cure for ailments of every description.

The fate of the rhinoceros family should soon be sealed in Borneo, for every year a very large number of them are killed simply for the sake of their horns. At the twelfth hour the Sarawak Government—acting on the author's initiative—has introduced certain restrictions on rhinoceros-hunting, but they are not strictly enough enforced. . . . It is of course true that the rhinoceros is also to be found in Dutch Borneo, but apparently not in such numbers as in highly favoured Sarawak. . . .

The hunting of the rhinoceros ought to be entirely forbidden for humanitarian reasons. It is a perfectly harmless creature, that does not do any mischief. . . . The rhinoceros stands badly in need of protection to enable it to survive in modern conditions.

Banks (1931, pp. 19-20) writes concerning the Bornean animal:

[It occurs] in the mountainous region in the Lawas interior, various places in the far interior of the Baram and Rejang Rivers, occasionally straying as far down as the Ulus of Mukah and Oya but is not found on the left bank of the Rejang or down into Saribas and Sarawak proper. . . .

Now there can at the moment be no fear of Rhinoceros becoming scarce for as many as 36 trophies were brought into Belaga in two years not so long ago and I have met men who have claimed to have shot over 30 in the course of their life time, but it must be evident that such a slow breeding animal cannot stand destruction for long at this rate

Reserves so successfully made in other countries are impossible to enforce here.

Heynsius-Viruly and Van Heurn (1936, pp. 47-48) contribute the following:

Reports from Borneo are hardly more favorable [than from Sumatra]. We are told that in West Koetai rhinoceros are quite scarce and confined to remote and inaccessible spots. The area it occupies is said to be large, but the numbers few and steadily decreasing, once more due to hunting.

In some subdivisions their survival is seriously threatened, while they are already extinct in Martapoera. They occur nowadays mainly north of the Mahakam River, where they extend high up into the mountains. . . .

R. sumatrensis is also reported from Boentok and Apau-Kajan; and is said to be fairly numerous in the highlands near the boundary of British North Borneo, outside inhabited districts, as well as at the headwaters of the Malinau and Toeboe.

The foregoing localities are shown on a map accompanying an article by J. L. P. Zondag [De Tropische Natuur, vol. 20, p. 221, 1931]. Although there are quite a few of these places, the small number of specimens gives food for thought. May the establishment of large reserves soon remove all danger of their extermination in Borneo also.

Comyn-Platt (1937, p. 54) writes of conditions in British North Borneo: "As to *R. sumatrensis*, I understand there are still a few left. I can well believe its approaching extinction, for . . . the Chinese will pay any price for the horn, which has a medicinal value. But realizing the great demand the Customs Authorities take every precaution to prevent the export. It is not easy."

"The Dyaks make or have made a very good thing out of hunting *sumatrensis* for sale to the Chinese" (Loch, 1937, p. 145).

Chittagong Rhinoceros; Hairy-eared Sumatran Rhinoceros

DICERORHINUS SUMATRENSIS LASIOTIS (Buckland)

Rhinoceros lasiotis "Sclater" Buckland, Land and Water, August 10, 1872. (Based upon a living female captured south of Chittagong, Bengal, at a distance from that point marched by elephants in about 16 hours (P. L. Sclater, 1872, p. 493).) (On the authorship of *lasiotis*, see Harper, 1940, p. 201.)

FIGS.: Nature, vol. 5, p. 427, 1872, and vol. 6, p. 519, fig. 2, 1872; P. L. Sclater, 1872, pl. 23, 1873, pp. 791-792, figs. 1-3, and 1876, pl. 98.

Malaccan Rhinoceros

DICERORHINUS SUMATRENSIS NIGER (J. E. Gray)

Ceratorhinus niger J. E. Gray, Ann. Mag. Nat. Hist., ser. 4, vol. 11, p. 357, 1873. ("Malacca.")

SYNONYM: *Ceratorhinus blythii* J. E. Gray (1873).

FIGS.: P. L. Sclater, 1873, p. 793, figs. 4, 5, and pl. 67; P. L. Sclater, 1876, pl. 97; Lydekker, 1900, pl. 1, fig. 4; Peacock, 1933, pl. 6 (no posterior horn visible); Jour. Bombay Nat. Hist. Soc., vol. 37, no. 1, suppl., pl. 33, 1934.

Since the ranges of the two mainland representatives of the Asiatic Two-horned Rhinoceros have not been satisfactorily delimited, it seems advisable to treat both in a single account. The Two-horned Rhinoceros has been greatly reduced in numbers but is not yet so near the vanishing point as the Smaller One-horned Rhinoceros (*sondaicus*).

The type of *lasiotis* was a female about 4 feet 4 inches high at the shoulder and about 8 feet from the snout to the root of the tail; anterior horn low and rounded, above the nostril; posterior horn conical, above the eye; ears fringed with drooping hair about 5 inches long; interior of ear conch nearly naked; upper lip pointed and prehensile; tail with numerous transverse folds, and with long hair on the anterior and posterior borders of its lower third; skin

ashy gray, covered with bristles about 1 inch long; bristles rufous on back, dark brown between shoulders, almost white on neck and head, black on lower half of trunk and on limbs; tubercles of the skin so small and flat that the skin is almost smooth (Anderson, 1872, pp. 129-131; P. L. Selater, 1873, p. 791). No adequate description of the male of *lasiotis* seems to be available. A male from 20 miles south of Comillah, in Tipperah, Bengal, presumably of this subspecies, had a front horn $8\frac{1}{2}$ inches long, while its second horn was a mere stud (Proc. Zool. Soc. London 1877, p. 269).

The type specimen of *niger* "is peculiar for having a very rough skin, the body being covered with thick black hair" (J. E. Gray, 1873, p. 357). An average male from Burma, presumably of this form, was 9 feet 5 inches from nose to tip of tail; tail, 1 foot 9 inches; light buff on body; face, tail, outsides of legs, and portions of flanks black; under parts of body, legs, and hips a light flesh color; hairy throughout, but less hairy on face and head; very hairy on legs and ears; a thick fringe of hairs along the flattened surface at the tip of the tail; heavy folds of skin behind the shoulder, in front of the thigh, and round the neck. The front horns of males average 7 or 8 inches, and those of females about 3 inches; the posterior horns of males average about 3 inches, and those of females are mere knobs. (Peacock, 1933, pp. 71-72.)

Specimens from Bengal and Assam may be provisionally regarded as *lasiotis*, and those from elsewhere on the Asiatic mainland (Burma, Siam, French Indo-China, and Malay States) as *niger*.

Bengal and Assam.—Specimens of the Two-horned Rhinoceros have been recorded from the valley of the Brahmaputra, 40-50 miles northeast of Dohbree, Assam, and from 20 miles south of Comillah, Tipperah, Bengal (Proc. Zool. Soc. London 1875, p. 566, and 1877, p. 269). By 1900 the animal was considered rare in Assam (Lydekker, 1900, p. 29).

"In the [Assam] reserves a great number of rhinos were destroyed last year, but with military police guards stationed in these localities this summer, it is hoped that there will not be so much poaching" (Hanson, 1931, p. 37).

Milroy writes (1934, p. 102) as follows concerning the animal in Assam:

Formerly common in the Lushai and Manipur Hills and occasionally found in North Cachar, but by now almost hunted to the vanishing point by Lushais and Kukis. The opening up by forest villagers of several big patches of marshy land in the Forest Reserves of South Cachar seriously reduced the number of suitable haunts available for this species. Most of the remaining patches, however, will have to be kept closed to cultivation in order to preserve feeding-grounds for the timber-dragging elephants, and some special steps have already been taken to try and look after the few rhino still left alive in this difficult country where little control can be exercised over

shikaries. The record flood of July, 1929, drove the rhino up into the hills and very few have been allowed by the Lushais to return.

"Whether this species continues to exist in India proper is a matter of speculation. It has probably been exterminated or is on the verge of extinction from this country. Probably does not survive in Assam." (Bombay Natural History Society, *in litt.*, December, 1936.)

Burma.—"While at Bhamô in Upper Burmah, I was informed by an intelligent native that two-horned Rhinoceroses are found in the Mogonny district, which is close to the confines of Assam, and as far north as the twenty-sixth degree of north latitude" (J. Anderson, 1872, p. 129).

Peacock (1933, pp. 72-73) gives the following account:

In the days before the advent of fire-arms the Sumatran rhinoceros must have been fairly common throughout Burma. Even now it is thinly distributed near the watersheds of most of the important hill-systems from Myitkyina in the north to Victoria Point in the extreme south of the Province. . . .

The Sumatran rhinoceros has been so heavily poached within the past twenty years that there are now vast stretches of suitable evergreen forest from which it has been completely exterminated. It may still be located in parts of Myitkyina, in the angle between the Chindwin and the Uyu Rivers, in the Arakan Hills as far south as Bassein, in parts of the Pegu *Yomas*, in parts of the Salween and Tenasserim drainages and in a few other remote hill tracts. . . .

The only area in which rhinoceros is now fairly common is the Shwe-udaung Game Sanctuary in the Mogok Subdivision of the Katha District. There are about ten rhinoceros in this sanctuary but, in default of adequate protection, I should not be surprised to hear that they had been decimated by some enterprising gang of poachers. The perpetuation of this species undoubtedly depends on the proper protection of this sanctuary which, hitherto, has been guarded only by the occasional visits of one or two forest subordinates and a peculiar superstition to the effect that the sanctuary is occupied by wood-spirits which are intolerant of poaching.

The blood and horn of the Sumatran rhinoceros have a very high medicinal value in the imagination of Chinamen, Burmans and tribesmen indigenous to Burma. One gathers that such parts of a rhinoceros have the properties of a very potent aphrodisiac. An average horn, about 8 inches in length, is worth about 1000 rupees, and the blood, when dried, is valued at its own weight in silver. Other parts of the rhinoceros have a lesser value but, in the extreme south of Burma, the inhabitants find a medicinal use even for the urine and dung. An animal, the parts of which are invested with such value, is bound to be mercilessly hunted, and this has been the fate of the Sumatran rhinoceros in Burma.

Siam.—"I may state that both the one-horned and two-horned rhinoceros (*R. sondaicus* and *R. sumatrensis*) are to be found in Siam but, owing to the hunting by the hill tribes both are now extremely rare, so much so that some five years ago the killing of them was prohibited by the government. Their extermination was

mainly due to the Chinese for their horns for medicinal purposes, the said horns being probably worth their weight in gold to-day. There has for many years been a special customs duty on them." (William W. Fegan, in Loch, 1937, pp. 133-134.)

(See also the account of *R. sondaicus* in Siam.)

French Indo-China.—(See the account of *R. sondaicus* in this country.)

Barthélemy (1930, pp. 131, 139) refers to this species as a rare animal in Indo-China, living in rocky, densely thicketed, mountainous places; he records one killed by Laos hunters in 1904 at Camranh, south of Nhatrang, Annam.

Undoubtedly the present species has existed, and probably still exists, in Indo-China, since M. H. Maitre and M. Fernand Millet himself have seen several skulls armed with two horns. Its occurrence in Cambodia and on the Darlac is noted. (De la Chevasnérie, 1936?, p. 340.)

Malay States.—"There are several known of in Perak (this was in Jan. 1932) also Selangor and Hubback told me himself that they were in Pahang" (Arthur S. Vernay, *in litt.*, March 1, 1933).

"Personally, I am inclined to believe the last species of rhinoceros to exist will be the Sumatrensis as this animal lives in the most remote and inaccessible places, in hills that are practically impossible to man, and quite impossible to elephants, whereas the Unicornis is quite easy to obtain and kill, and the Sondaicus, almost gone, also lives in fairly accessible country" (Arthur S. Vernay, *in litt.*, October 27, 1933).

In the Malay Peninsula "the two-horned animal (*R. sumatrensis*) is more common [than *sondaicus*] but I did not see any. In recent years one of these was shot by the Sultan of Johore . . . H. H. The Sultan is very jealous as regards the protection of animals in his own jungles, and great credit is due him for instituting game laws in his State, even before development of the country had begun." (Burgess, 1935, p. 251.)

This rhinoceros "needs rigid protection everywhere. In the mountainous parts of the Malay Peninsula it is, probably, still not uncommon." (F. N. Chasen, *in litt.*, May 5, 1937.)

Black or Hook-lipped Rhinoceros

DICEROS BICORNIS BICORNIS (Linnaeus)

Rhinoceros bicornis Linnaeus, Syst. Naturae, ed. 10, vol. 1, p. 56, 1758. ("India," but fixed by Thomas as Cape of Good Hope.)

Somali Black Rhinoceros

DICEROS BICORNIS SOMALIENSIS (Potocki)

Rhinoceros bicornis somaliensis Potocki, Sport in Somaliland, p. 82, 1900.

FIGS.: Dugmore, A. R., Camera Adventures in the African Wilds, figs. opp. p. 16, 1910; Ward, 1935, figs. opp. pp. 343, 345, 347; Maxwell, M., 3 pls., 1930.

The African Black Rhinoceros is readily distinguished by its rather narrow muzzle, with a hooked rather than squared upper lip. The two horns are placed one behind the other on the nose, the posterior one usually the smaller, though in some cases the reverse is true (giving rise to the belief that this condition represented a second species, the keitloa). Skin thick and dark brown in color. Hoofs three on each foot. Head and body about 10 feet long; tail, 28 inches. The record front horn, measured on the outside curve, is given by Rowland Ward as 53.5 inches (a female). The average is much less, perhaps about 20 inches.

The Black Rhinoceros avoids wet forest country but prefers rather dry thorn bush and plains with streams here and there where it may drink. Its range therefore included formerly the Cape region in the south, from southwestern Angola across the Cape Province to eastern Africa, and north, avoiding the Congo Basin and its rain forests, to Somaliland and southwestern Ethiopia, thence westward along a strip between the Sahara and the Congo and Nigerian forests to the region of Lake Chad and the French Cameroons. Over this vast area are localities where rhinos are absent, as along the coast of Kenya and Tanganyika Territory, or between the Chobe and the Zambesi, where according to Selous the natives say there were none even in days before white occupation. Formerly common locally, the Black Rhino has become much reduced of late years. In the northeast of this general range, east of the Tana River and Lake Rudolf in Kenya Colony, the animal is supposed to be slightly smaller and is generally regarded as a distinct race, *somaliensis*, but the extent of these differences needs more particular definition, and the two may here be considered together.

Sclater (1900) and Shortridge (1934) have given a good summary of its history in South Africa. It seems to have first become known to Europeans about 1653 at the time of the first settlement of the Cape. "It is frequently mentioned in van Riebeck's diary, and apparently at that time, was common enough on the slopes of Table Mountain and on the Cape Flats; a further incident corroborating this is, that the coach in which Simon van der Stel, the Governor, was proceeding northwards, on a journey to Namaqualand in 1685, was upset in the neighbourhood of Piquetberg, by the charge of a rhinoceros, and the Governor himself had a narrow escape. Tachard

who spent some few weeks at the Cape at the same time (1685), and Kolben who wrote about fifty years later" give descriptions of it. In those days widespread over the whole of South Africa, it was still common along the south coast of the Colony in 1700. The last one in the Cape region was said to have been killed in 1853, on the Coega River, close to Port Elizabeth, while in the Orange Free State the last one killed is said to have been in 1842, a decade earlier, in the Kroonstad district. In the 1840's rhinos were still rather common in Bechuanaland, "but now they are extinct both there and probably also in Rhodesia." (W. L. Selater, 1900.) In 1900, according to Selater, their last haunts south of the Zambesi were "Zululand, the Lydenburg district (where a few are preserved), the Beira-Zambesi country and perhaps Ovampoland."

Kirby (in Bryden, 1899, pp. 38-40) wrote at the end of the last century that "a few years ago rhino were far more widely distributed throughout central South Africa than at present. There are probably not a dozen left in even the remotest corners of the northeastern Transvaal, where once they abounded; two or three in the Matamiri bush, and a few in the Libombo range near Oliphant's River represent all. In the rough broken country south of the Zambesi and east of the Falls, in parts of . . . Portuguese East Africa they are still fairly numerous, and there are a few in Matabeleland, Mashonaland, and Amatongaland." This statement is apparently more or less near the truth at the present day, nearly forty years later. At all events, in the annual report as to conditions in what is now Kruger National Park, the Game Ranger states in 1925 as follows: "A few of the species exist in the neighbourhood of the Shingwedi River. I was long under the impression that no survivors now existed south of the Olifants River; but during the past year, I personally came on fresh tracks of a single animal in the Sabi Bush, and it is therefore fairly certain that the dense covert in the neighbourhood of the Matumiru Spruit, still holds several of the species. The rhinoceros is a type fast disappearing from even the best game countries of Africa today, and in view of its slow breeding nature, exceptional efforts should be made to preserve it from extinction. Fortunately it has no natural enemies." The most recent report available, 1934, gives as an estimate of the numbers in eastern South Africa, "a few" in the Umfolosi Reserve, approximately 85 in the Hluhluwe Reserve, and a few in the Mkuzi Reserve, Natal. The number in Kruger Park in 1932 was believed to be "under half a dozen." In western South-West Africa a small remnant still exists. In the Kaokoveld, according to Shortridge (1934), between the lower Ugab River and the Cunene there may be still between 40 and 80 rhinoceros, but "in 1923 Manning estimated that, at most, there were 50 in the entire territory," so that a slight increase may be

indicated. Steinhardt estimated about one to every 12 km. along the south bank of the Cunene, across which in southwestern Angola they are more plentiful. Shortridge states that they are very rare in Ovamboland, with none in the Namutoni Game Reserve. There are still a few in the central Caprivi, but none in the eastern. In Portuguese East Africa there are apparently a number of these animals, and it is believed that from time to time they come over the border into the sanctuary of Kruger National Park. In Northern Rhodesia they appear to be restricted to the southern and eastern parts, where, however, according to David Ross (in letter, 1936) they are "being thinned out to the danger line." In Nyasaland they are "very scarce in most districts, though still to be found in several of the more remote parts of the country, such as in the Dowa and Kotakota districts. They are protected and but one may be obtained on a visitor's full license or on a special license." (Wood, in Maydon, 1932, p. 315.)

Proceeding northeastward from these localities, the Black Rhinoceros seems to have its present center of abundance in Tanganyika and especially in Kenya Colony. Up to 1920, at least, it was considered "abundant in the northern districts, becomes scarcer in Tabora, Kilimatinde and Handeni, and is present in small numbers only in Mahenge, Malinyi, Mamanyere and Tunduru, apparently becoming abundant south of the railway only at Ifakara" (Jour. Soc. Preservation Fauna Empire, pt. 2, p. 47, 1922). In Kenya Colony, C. W. Hobley writes (in August, 1936) that in the past 20 years the rhino population has greatly decreased and is at present probably only 20 percent of what it then was. "If, however, the permanency of the great reserves is assured, the perpetuation of the species is certain." From the report of the Kenya Game Department for 1926, it appears that along the edge of the forest, these rhinos became so numerous that at the request of the local inhabitants the department undertook to reduce the number of the animals in the Nyeri district "where they had for some time been a source of danger and annoyance." Twenty-eight were thus killed. A later report (in *East Africa*, June 8, 1933) tells that "Mr. J. A. Hunter, the Kenya white hunter, recently shot eleven rhino near Nyeri in three days." Such measures will inevitably reduce the animals considerably but they may be needed in areas under settlement. This condition of affairs was foreseen by the Swedish naturalist Lönnberg, who wrote in 1912: "In settled districts and such with a lively traffic, rhinoceroses may be a troublesome nuisance, especially if they are numerous. But there are vast stretches of land in British East Africa, as well dry steppe as arid thornbush country, which can never produce any kind of crops, and where at most nomadic tribes may be able to feed their flocks. There the rhinoceroses can do no

harm, and there, at least, they may be allowed to remain in reasonable number."

Passing again to the westward, we find these animals few in Uganda. Here their areas are very limited in extent, and within these areas they "do not diminish in number, there is no trade in their horns, and they are little used for food. It is probable that . . . not more than ten are killed in a year." (Coryndon, 1921, p. 28.)

North of Uganda, rhinos are found as far as Mongalla, and the north end of Lake Rudolf, and thence westward to the Ubangi-Shari district and the French Cameroons, avoiding the rain-forest areas of the Congo Basin. In the Ubangi-Shari district they have been protected partly since 1916 and totally since 1933. L. Blancou (in response to query in 1937) states that there are several groups, totalling about fifty individuals in the Parc National and the adjoining game reserve, where they are strictly guarded. From official sources (Ministry of Colonies, Paris, 1936, and Inspection of Waters and Forests, Yaounde, 1937) it is learned that they are found mainly in the north of the territory, in the region north of Maroua, where estimates place the numbers at most as 120, probably less. Their disappearance is laid to European and native hunting—by the latter for the sale of the horns. At the present time they are absolutely protected by regulations.

This species reaches its westward limit in the Lake Chad region and eastern Nigeria. Here in the Yola Province north of the Benue River, a few survivors "may still be encountered, though possibly only a dozen specimens exist in the country; their bones, however, are numerous in the Benue basin and on the Song plateau, while the ingrained fear which the native has of 'Kilifou' shows that the species was plentiful not very long ago" (Oakley, 1931, p. 34). To much the same effect adds Haywood (1932, p. 32) that "around the junction of the Provinces Bornu, Adamawa, and Bauchi, it seems unlikely that more than 50 at most survive. . . . Rhino are so scarce that they should certainly not be allowed to be killed under any circumstances."

The Black Rhino to the northeast of the Tana River and Lake Rudolf is believed to represent a smaller and slightly different race, *somaliensis*, although its distinctive characters do not seem very well defined. It ranges at present, or did, not so many years ago, into the Blue Nile Valley near the borders of Ethiopia, and into the Rift Valley region of southern Ethiopia, as well as eastward into British Somaliland. It is probably now much reduced in numbers owing to constant hunting by the natives. In 1912, while the late Dr. John C. Phillips and I were on the upper Blue Nile, we were told that the animal was then rare. Tracks were occasionally reported by native hunters, but of solitary adults, with no evidence of the

spoor of young accompanying them. They believed that the few remaining animals in the region were so scattered that they were not breeding. In 1899 they were "fairly common on the southern side of the Haud [in Somaliland] . . . and again south of the Webbi Sheybelli" (Stracker, in Bryden, 1899). Drake-Brockman, in 1910, wrote that it was no longer to be found south of Burao, but was still present in the Haud and Nogel Valley, toward the Ethiopian border, and was said to be plentiful in Ogaden. On account of persecution he predicted that "a few more years will see its disappearance from all save the most remote regions." In 1932, Swayne (in Maydon, 1932, p. 235) regarded it as "almost extinct" in British Somaliland, though probably still found in Ogaden. It formerly "penetrated north to Toyo Plains in Ogo."

Unlike the somewhat more peaceably inclined White Rhinoceros, the Black Rhino is rather truculent and at times dangerous, of poor eyesight, but keen of scent and hearing. On being approached, it is quite as likely to come charging down upon the source of the disturbing sound or smell as to dash away out of sight. At close quarters, it is as agile as a polo pony and may follow up its charge and make matters disagreeable. For this reason it becomes a source of danger if, as in the case mentioned in the Nyeri district, its numbers become too great in settled or agricultural localities. Otherwise, it is a harmless animal, browsing contentedly on twigs and sheltering by day in dense thickets of thorn scrub. As the surviving member of its genus, *Diceros*, and one of the end forms of an evolutionary line of ancient development, it possesses peculiar interest and deserves protection, but this can best be given in special reserves. The chief menace to which it is exposed is from hunting by natives, which cannot always be stopped in thinly populated districts. The Somalis value its hides especially for making their small round shields, in which they take much pride, as after a time these become whitish. Some of the native tribes will eat the flesh. But the chief reason for its pursuit by natives and white poachers is for its horns, which are sold to the Chinese to be ground up for medicine in the potency of which they have great faith. To this cause is laid the great reduction in its numbers in the French Cameroons, Somaliland, and Ethiopia, and its continued pursuit elsewhere. C. W. Hopley writes (1936): "There is little demand for rhino horn in Europe but in China high prices are still paid for supposed medicinal uses, and this is the danger, for although legal export is forbidden, smuggling still continues and is difficult to check." This for Kenya Colony. Lavauden (1933) says: in "French Africa it is seriously threatened, thanks to the ridiculous trade in rhino horn." In the French Cameroons there is apparently a good deal of such illicit hunting by the natives, and this is not easily

stopped. In Kenya Colony "the poaching and smuggling of rhinoceros horn has become a serious problem for the Game Department." One lot of 187 horns was recently (about 1930) seized. Presumably the Wakamba kill the animals with poisoned arrows in the Ukamba Reserve. Most of the horn is smuggled into Italian Somaliland, whence it can be freely exported (*East African Standard*, March 7, 1930). There has also been a great illegal trade in rhino horns going on through Zanzibar, but steps have been taken to stop it. According to Caldwell (1924, pp. 51, 53), the Somalis, penetrating Kenya Colony from the north, make use of the native hunters to obtain this horn as well as elephant ivory, which they then smuggle out through Italian Somaliland. "The only real cure is to get Italy to cooperate, and to conform to the Ivory Convention to which she was a signatory." In the Chad Territory it is said that the Arabs, under the pretext of hunting elephants with a regular permit, also kill many rhinos. A local sultan near Fort Archambault has his subjects hunt in his behalf, and this has resulted in the disappearance of the rhino from localities where it was particularly abundant a few years ago. During the period when rhino horn was valuable, the horns of at least 300 animals, weighing 900 kilograms, were sold there (Ramecourt, 1936). It is said that the Chinese prize the horn of the Asiatic rhinos more highly than that of the African species, but nevertheless, with the growing scarcity of the former, that of the latter seems to command high enough prices to make its smuggling worth while.

G. M. A.

Southern White Rhinoceros; Burchell's Rhinoceros; Square-mouthed Rhinoceros; Square-lipped Rhinoceros. Witre-noster (Boer). Rhinocéros blanc du Sud (Fr.)

CERATOTHERIUM SIMUM SIMUM (Burchell)

Rhinoceros simus Burchell, Bull. Sci. Soc. Philom. Paris, année 1817, p. 97, 1817. ("L'intérieur de l'Afrique Méridionale, . . . vers le vingt-sixième degré de latitude"; Burchell himself seems to give no further details, but Selous (in Bryden, 1899, p. 52) indicates as type locality "the Batlaapeen country, not far from the present native town . . . of Kuruman [British Bechuanaland].")

FIGS.: Burchell, *op. cit.*, pl. facing p. 100; A. Smith, 1849, pl. 19; Harris, 1840, pl. 19; Schreber, Säugthiere, Supplementband 4, pl. 317K, 1844; Proc. Zool. Soc. London 1886, pl. 16, fig. 1; Coryndon, 1894, pl. 18; Bryden, 1899, pl. 1, figs. 2, 6; Lydekker, 1908, pl. 1, figs. 2, 6, and pp. 36, 45, figs. 13-14; Selous, 1914, pl. 2, right-hand fig.; Vaughan-Kirby, 1920, pl. 27; New York Zool. Soc. Bull., vol. 27, p. 146, fig., 1924; Jour. Soc. Preservation Fauna Empire, n. s., pt. 9, frontisp., 1929; Ward, 1935, p. 344, left-hand fig.

Formerly enjoying an enormous range in South Africa, from Namaqualand to Zululand, and from the Orange River to the Zam-

besi, this rhinoceros is now extinct except in or about two reserves in Natal and possibly in one or two remote areas of Southern Rhodesia.

Largest of all land mammals after the elephants; hairless except for a fringe along the edge of the ear and for the tail bristles; color a slaty gray-black; upper lip straight all round with no trace of a proboscis; ears longer than in the Black Rhinoceros, springing from a closed cylinder about 3 inches long; anterior horn usually longer and slenderer than in the other species; posterior horn usually short, straight, conical. Height of male at shoulder up to 6 feet 6 inches; female rather smaller. Record length of horn, 62.5 inches. (W. L. Sclater, 1900, vol. 1, pp. 300-301.)

The former range corresponds somewhat to the more northerly portions of the Kalahari Arid District and the Southeast Veldt District of Bowen (1933, pp. 256, 259, 260). The distribution is indicated on maps by Heller (1913, pl. 10), by Roosevelt and Heller (1914, vol. 2, p. 671), and by Lavauden (1933, pl. facing p. 25).

Angola.—This animal occurred formerly on both sides of the Okavango, and possibly a few individuals remain on the Kwando. Yet there is no unquestionable record in this region. (Wilhelm, 1933, pp. 55-56.)

“According to Zukowsky, as ascertained by Mattenklodt in 1906, White Rhino are ‘very rare’ at Lujana (S. E. Angola) in the Tschbombe Bush.

“According to Schulz and Hammer (The New Africa, London, 1877), they were plentiful in that region in the 1870’s.” (Shortridge, 1934, vol. 1, p. 425.)

In his recent list of Angolan mammals Monard (1935) does not include this species.

South-West Africa.—Of this rhino in South-West Africa, Shortridge (1934, vol. 1, pp. 425, 427) writes:

Beyond any reasonable doubt the White Rhinoceros has been extinct in South-West Africa for the last 50 years or more; since then no actual occurrence has been recorded. . . .

The fact that the Nama Hottentots and local Bushmen had distinguishing names for Black and White Rhinoceros indicates that both species formerly existed in Namaqualand, Gobabis and Grootfontein Districts, and elsewhere in the more level parts of South-West Africa. . . .

Zukowsky records horns of White Rhino from the sands of the Omaruru and lower Ugab Rivers [Atlantic drainage], and from near Usikos. . . .

As early as 1801, Barrow recorded the “supposed” occurrence of this species in Namaqualand.

Bechuanaland Protectorate and British Bechuanaland.—“When Mr. Burchell . . . visited Latakoo [=Litakun], he found it common in that district, and we have been told by the aborigines that it was not unfrequently found even further to the southward. Of late, however, it has almost ceased to exist even in the situations where its

discoverer met it, which is accounted for by the danger to which it is exposed being now much increased from the general introduction of firearms among the Bechuanas." (A. Smith, 1849, text to pl. 19.) Campbell (1822) records this species in Bechuanaland, and Livingstone (1857) and Baines (1864) note it near Lake Ngami (W. L. Sclater, 1900, vol. 1, p. 299). Selous (1881, pp. 725-726) writes:

Twenty years ago this animal seems to have been very plentiful in the western half of Southern Africa; now, unless it is still to be found between the Okavango and Cunene rivers, it must be almost extinct in that portion of the country. And this is not to be wondered at when one reads the accounts in Andersson's and Chapman's books of their shooting as many as eight of these animals in one night as they were drinking at a small water-hole; for it must be remembered that these isolated water-holes, at the end of the dry season, represented all the water to be found over an enormous extent of country, and that therefore all the Rhinoceroses that in happier times were distributed over many hundreds of square miles were in times of drought dependent upon perhaps a single pool for their supply of water. In 1877, during several months' hunting in the country to the south of Linyanti, on the river Chobe, I only saw the spoor of two Square-mouthed Rhinoceroses, though in 1874 I had found them fairly plentiful in the same district; whilst in 1879, during eight months spent in hunting on and between the Botletlie, Mababe, Machabe, Sunta, and Upper Chobe rivers, I never even saw the spoor of one of these animals, and all the bushmen that I met with said they were finished.

Elsewhere (in Bryden, 1899, pp. 53-54) Selous says:

Between 1840 and 1850 all travellers who have left records of their journeys report having found the white rhinoceros very abundant all over the country, wherever there was water, to the north and west of the Limpopo between Secheli's country and Lake Ngami. . . .

C. J. Andersson also found these animals very numerous during his travels between 1850 and 1854 in the country lying to the west and north-west of Lake Ngami, and speaks of killing nearly sixty rhinoceroses of both species during one season. . . . Yet, notwithstanding the great, and in many instances it is to be feared unnecessary, slaughter of white rhinoceroses which has taken place at the hands of Europeans, South Africa is such a vast country, that in many districts these animals might still have been numerous had it not been for the rapid spread of firearms amongst the native tribes, who have carried the war against these easily-killed beasts into their remotest retreats.

One of these animals reported along the Mababi River in 1884 was "the last rhinoceros that I ever heard of in any part of Western South Africa" (Selous, in Bryden, 1899, p. 55).

Southern Rhodesia.—Of this rhino in Southern Rhodesia, Selous (in Bryden, 1899, pp. 54-58) writes:

At the date of my first visit to South Africa, in 1871, . . . these animals were still numerous in the uninhabited districts of Matabeleland [and] Mashunaland. [In 1872 many were met with northwest of Buluwayo.] Between the Gwelo and Umniati Rivers, I saw white rhinoceroses almost daily, and sometimes as many as six or eight in one day. In 1873 I . . . found

these animals plentiful to the south of the mountainous tract of country which extends eastwards from the Victoria Falls to the junction of the Gwai and Tehangani Rivers. . . .

In the country to the north-east of Matabeleland, between the Sebakwe and the Manyami Rivers, white rhinoceroses were still fairly numerous in 1878, . . . and their numbers only commenced to be seriously reduced after 1880. About that time rhinoceros horns . . . increased very much in value, and . . . the traders in Matabeleland employed natives to shoot rhinoceroses for the sake of their horns . . . and their hides, which were utilized as waggon whips and sjamboks.

One trader alone supplied 400 Matabele native hunters with guns and ammunition, and between 1880 and 1884 his large store always contained great piles of rhinoceros horns, often the spoils of 100 of these animals at one time, although they were constantly being sold to other traders and carried south to Kimberley on their way to England. What caused this sudden demand for short rhinoceros horns from 1880 to 1885 I do not know. But this freak of fashion in knife handles, combs, or what not sounded the death-knell to the white and black rhinoceros alike in all the country that came within reach of the Matabele native hunters. [From 1892 to 1895 several of the few remaining animals between Salisbury and the Zambesi were killed. Perhaps a dozen survived by 1899.]

“Possibly a few may still linger, in the neighbourhood of the Angwa River in Northern Mashonaland” (Selous, 1914, p. 15).

“I have very definite information that about 7 of these animals still exist on the Portuguese-Nuenetsi Border; they have not been seen by Europeans, but well-trained native shikaris have reported them on several occasions” (J. F. Fleming, 1931, in Shortridge, 1934, vol. 1, p. 426).

“It is rumoured that a few still exist in that locality [between the Umniati and Hunyani Rivers], but . . . only native information is available Many white people visiting the area and even those stationed in it declare that there are white Rhino present today but no concrete proof . . . can be obtained. It is also rumoured that a few white Rhino exist on the Portuguese Rhodesia border near Nuanetsi Ranch The areas in which the animals may still exist are both inaccessible and in the case of the Umniati area . . . there is a danger of sleeping sickness; these conditions serve to protect all fauna and the white Rhino as well should it still exist. Legally considered as ‘Royal Game.’” (Game Warden, Wankie Game Reserve, *in litt.*, March, 1937.)

Transvaal.—Harris (1839, pp. 160, 174, 221) found numbers of this species along the Marico and Crocodile Rivers. On one occasion, in a distance of half a mile, “we counted no less than twenty-two of the white species of rhinoceros.”

“In 1871 . . . these animals were still numerous in . . . certain portions of the Eastern and South-Eastern Transvaal. . . .

“The flesh of the white rhinoceros was always considered by both

Dutch and English hunters to be superior to that of any other game animal in South Africa, and in this verdict I entirely agree." (Selous, in Bryden, 1899, pp. 52-54, 64.) Elsewhere (1914, pp. 14-15) Selous writes:

The emigrant Boers first encountered the white rhinoceros just north of the Vaal River on the open grassy downs, where the towns of Klerksdorp and Potchefstroom now stand, and I have had the actual spots pointed out to me by old Boer "voortrekkers". . . . In those days these huge pachyderms were practically without enemies, for, with the exception of the small number which fell into native pitfalls, very few could have been killed, and before the advent of the European hunter with his death-dealing fire-arms, the species must have increased almost to the limit of its food supply. Within fifty years, however, of the time when Cornwallis Harris had met with the white rhinoceros in almost incredible numbers, . . . thousands upon thousands of these huge creatures were killed by white hunters, and natives armed with the white man's weapons, and the species had become practically extinct.

Natal.—"In 1894 . . . a few of these animals were discovered to be still surviving in a corner of Zululand, and it is said that six of them were shot there during that year" (Selous, in Bryden, 1899, p. 58).

"There are still said to be a few surviving in Zululand, where they are very strictly preserved, and where, perhaps, they may have a chance of increasing if proper precautions are observed" (W. L. Selater, 1900, vol. 1, p. 302).

Vaughan-Kirby (1920) gives the following information:

In Zululand, at the present day, the white rhinoceros is to be found only in the Mfolozi Game Reserve . . . and in a narrow strip of country along the south bank [of the White Mfolozi River].

From time to time evidence has been adduced which indicates that there may be a few of these animals, probably not exceeding five or six in number, in the dense bush at the north end of False Bay. (P. 225.)

They are frequently accompanied by the "Tick-birds" (*Buphagus erythro-rhynchus*) and sometimes by the Buff-backed and the Little Egrets (*Bubulcus ibis* and *Herodias garzetta*). The former scramble about all over the huge animals, exactly as they do upon cattle, and as they are particularly wide-awake birds it is very difficult to approach their host when they are present, as they invariably . . . sound a warning of which even this dull-witted pachyderm never fails to avail itself. The egrets sedately follow up the rhinoceroses as they move, and may frequently be seen taking ticks from under the animal's belly. (P. 240.)

"There are only some twenty of this southern sub-species now remaining in the world. They are . . . confined in . . . the Umvolosi Reserve. They have been and still are in the greatest peril of extinction at the hands of the neighbouring settlers, some of whom resent their presence because to it and that of the other wild animals they ascribe the continued existence of the tsetse fly in the locality. Three of these white rhinos were illegally killed in 1928, and in the 'game drive' of 1921 five are said to have been shot." (Jour. Soc. Preservation Fauna Empire, pt. 9, 1929.)

In and near the Umfolosi Reserve "the animals have bred well during the year and there are now just over 200.

"The White Rhino have apparently come to stay in the Hluhluwe Reserve. A recent census shows that at least eleven adults and two calves are at present resident there." (Ann. Rept. for 1933 of H. B. Potter, Game Conservator, Zululand.)

"There are about 200 of these animals now, and it is estimated that they are increasing at the rate of about 30 each year. . . . At least 40 were in the area lying between the Umfolosi and Hluhluwe Reserves, which area we hope to add to the Reserves. The remaining 60 of the wanderers were on the Crown lands to the west of the Umfolosi Reserve adjoining the Mahlabatini Native Reserve, which cannot be used as a Game Reserve." (Charter, 1934, p. 2.)

"There were terrific droughts from 1931 to 1933 in this portion of Zululand. According to some reports most of the rhinoceroses wandered about aimlessly and a few died and were killed." (Herbert Lang, *in litt.*, January 23, 1935.)

The present range is limited to the area surrounding and including the Umfolosi and Hluhluwe Game Reserves. The number is estimated at between 250 and 300. Depletion took place before the Natal game laws were enforced in Zululand in 1906. The horn can be used to make handles for walking sticks and also for other ornaments. (Administrator's Office, Natal, *in litt.*, December, 1936.)

"This rhinoceros for the time being may be regarded as in a fairly firm position" (Dollman, 1937, pp. 73-74).

Both subspecies of the White Rhinoceros are accorded full protection under Schedule A of the London Convention of 1933.

Northern White Rhinoceros; Nile White Rhinoceros. *Rhinocéros blanc du Soudan* (Fr.)

CERATOTHERIUM SIMUM COTTONI (Lydekker)

Rhinoceros simus cottoni Lydekker, Field, vol. 111, no. 2878, p. 319, 1908.

("The Lado district of Equatorial Central Africa"; type locality said by Heller (1913, p. 29) to be "some distance north of the station of Kiro, almost precisely on the northern boundary of the Lado Enclave.")

FIGS.: Trouessart, 1909, pls. 29-31; Roosevelt, 1910, pls. facing pp. 400, 414, 420, 422, 428; Heller, 1913, pls. 1, 6-9, 31 (figs. 2-5); Roosevelt and Heller, 1914, vol. 2, pl. facing p. 664; Selous, 1914, pl. 2, left-hand fig.; Lydekker, 1916, vol. 5, p. 57, fig. 20; Lang, 1920, pp. 65-92, figs., and 1923, pl. 16; Brocklehurst, 1931, frontisp. and pls. facing pp. 107, 108, and 110; Lavauden, 1934, pl. 15; Ward, 1935, pp. 342, 346, figs.; Am. Mus. Nat. Hist. Sci. Guide 118, ed. 2, p. 106, fig., 1943.

About 15 years ago the Northern White Rhinoceros was much persecuted, and fears were expressed concerning its survival. Its status in the northeast of the Belgian Congo is still unsatisfactory,

but of late it has been well protected in the Anglo-Egyptian Sudan and Uganda, and its future there seems assured. A small number survive in the Ubangi-Shari Territory of French Equatorial Africa along the Sudan frontier.

"The Nile race resembles very closely, in external appearance and size, the southern race It differs, however, by the possession of a flatter dorsal outline to the skull . . . and by the smaller size of the teeth. The measurements of skulls of the two races show them to

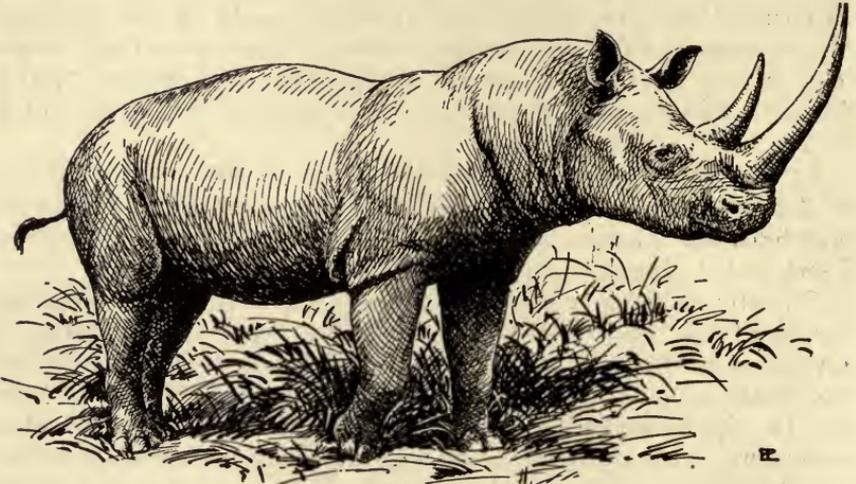


FIG. 42.—Northern White Rhinoceros (*Ceratotherium simum cottoni*).
After Lang.

be of practically the same bodily size. . . . Height at shoulders, 5 feet 8 inches." (Roosevelt and Heller, 1914, vol. 2, pp. 662, 670). Record length of front horn, 45 $\frac{3}{4}$ inches (Ward, 1935, p. 347).

"The range . . . was believed to be restricted to the Lado country and the immediate neighborhood of the Nile. Contrary to all surmises its range has steadily increased. These white rhinoceroses are now positively known to extend from a little north of Lake Albert to three hundred miles down the Nile to a point near Shambe. From there it stretches four hundred and fifty miles westward to the Dar Fertit section, and two hundred miles south to Rafai [on the Bomu River at about long. 24° E.]. The southern limit extends about five hundred miles across the northeastern Uele district to the territory northwest of Lake Albert. This habitat thus forms an oblong area of about 100,000 square miles, all situated west of the Nile." (Lang, 1920, p. 76.) This range corresponds more or less to the eastern portion of the Ubangi-Uele Savanna District of Chapin (1932, p. 90) or the Ubangi Savanna District of Bowen (1933, pp. 256, 258).

Distributional maps are provided by Heller (1913, pl. 11), Roosevelt and Heller (1914, vol. 2, p. 671), Lang (1920, p. 77, and 1923, p. 156), and Lavauden (1933, pl. facing p. 24, and 1934, p. 431, fig. 45).

Anglo-Egyptian Sudan.—"By his account published in 1869 von Heuglin was actually the first who recorded the presence of the West Nile race of square-lipped rhinoceros" (Lang, 1923, p. 158).

According to Heller (1913, p. 34), "the first real evidence of its occurrence to the north of the Zambesi River was the skull procured in 1900 by Major Gibbons in the Lado Enclave." He seriously questions "the earlier reports . . . by Speke, Grant, Von Höhnel, Gregory, and others. . . . There is little doubt but that all their records referred to the black rhino." He continues (pp. 36-38):

The square-nosed rhinoceros is found at the present time in a wild state only in the Lado Enclave and the Bahr-el-Ghazal province of equatorial Africa. . . .

In the Lado Enclave they are confined to the immediate vicinity of the western bank. . . . Very little is yet known of their distribution westward. The farthest point inland where they were met by Colonel Roosevelt was . . . approximately 12 miles west of Rhino Camp. [This part of the former Lado Enclave is now included in Uganda.] In this vicinity nine were seen by Colonel Roosevelt in one day's journey A few days later Kermit Roosevelt encountered 10 in the same general neighborhood. . . . The known distribution of the white rhinoceros covers the two widely separated localities of Lado Station and Rhino Camp, which are some 120 miles apart, and the more distant Dar Fertit country. . . .

There is little doubt but that the species is quite local in distribution, and to this circumstance its long escape from discovery is to be attributed.

"During Mr. A. L. Butler's direction of the Game Department of the Sudan Government the white rhinoceros was placed on the 'Protected List'—that is, the killing of it was absolutely prohibited. But since his retirement in 1914 the poor remnant of rhinos that still survive along the west bank of the Upper Nile have been replaced on the 'Game List,' in respect of a paltry premium of £5. Unless that wicked action is reversed it spells the death warrant of the few white rhinos that remain on the Nile." (Chapman, 1922, p. 44.)

"The case of the white rhino . . . is a pretty hopeless one. He obviously belongs to another world, and his extinction in this is fairly certain in the near future. In the British Sudan very few individuals remain. Those along the west bank of the Nile can, I should fancy, not exceed half-a-dozen pairs.

"A little farther westward, along the Nile-Congo Divide, from about Yei in Western Mongala, to a point some distance northwest of Tembura in the Bahr-el-Ghazal, they are more numerous, especially in that section of the divide between Meridi and Yambio. In that district in 1916 I came upon them many times in my rambles." (Christy, 1923, p. 63.)

Brocklehurst (1931, p. 109) writes:

It is still comparatively plentiful in certain parts of Uganda and the Sudan, west of the Nile, and owing to their strict preservation they are certainly on the increase. In one year, in Mongalla Province alone, I have seen no less than eight cows accompanied by calves. The natives seldom kill them now as it is not easy to kill so rare a beast without the fact being known sooner or later by the District Commissioner, who inflicts a heavy punishment on anyone infringing the law.

Owing to the fact that the cow carries the longest horn, they were more sought after by hunters, which would account for their rapid decrease and almost entire extermination. . . .

Unlike the Black Rhinoceros they are extremely inoffensive, depending entirely on scent and almost invariably seek safety in flight.

French Equatorial Africa.—The occurrence of the White Rhinoceros in this country has only recently been verified. When Lang states (1924, p. 177) that "no square-lipped rhinoceros is known from the Ubangi-Shari region," he contradicts his previous testimony (1920, p. 76) and is in obvious error.

"Two horns [presumably of the White Rhinoceros], now in the British Museum, were brought from the neighbourhood of Lake Tchad by Messrs. Denham and Clapperton in the first quarter of the last century" (Lydekker, 1908, p. 37).

In 1927 G. Babault recorded seeing at Khartoum a lot of more than 150 White Rhinoceros horns, which had come from the general region of Abécher in eastern Chad Territory and had been collected in the course of a year. The animal still exists (unfortunately in small numbers) to the southeast of Abécher, in the regions of Goz-Beïda and Mongororo. There are also records from eastward of Mangueigne (near the Aouk River) and from the eastern part of Ubangi-Shari (near Yalinga). A recent decree protects the animal absolutely in French Equatorial Africa. (Lavauden, 1933, p. 24.)

It is certain that seven or eight years ago this animal was found between Birao (northeastern Ubangi-Shari) and Lake Mamoum, and at the junction of the Aouk River with the Bahrs Ouandja and Gunda. At present there are probably no White Rhinoceroses within the limits of Chad Territory. Possibly, however, there are a few survivors in the east of the Ubangi, between Birao and Zemio. (Malbrant, 1936, p. 26.)

Formerly there were some hundreds along the Sudan frontier, about the headwaters of the tributaries on the right bank of the Mbomu and on the left bank of the Aouk. There are now a few individuals in the same region. Depletion is due to the trade in horns. The animal has been totally protected since 1916. There ought to be a few individuals in the Parc National du Goz Sassulkou and in the game reserves of Ouanda-Djale and Zemango. (L. Blancou, *in litt.*, December, 1936.)

Belgian Congo.—From Lang's excellent and comprehensive account (1920) the following excerpts are taken:

The habitat of these white rhinoceroses lies in the northeastern savannah of the Belgian Congo, and beyond it to the Nile (p. 69).

[They evidently suffered from the rinderpest that] swept across Africa from the northeast in the early nineties . . . Only in the last ten years have the white rhinoceroses and other game become sufficiently numerous in that section to figure once more in the natives' larder. (P. 77.)

[In the territory of Maruka, the great chief of the Logo], the regular annual toll of white rhinoceroses killed by natives for meat exceeded forty (p. 78). [Twenty-nine had fallen to the spear of a single Azande hunter (p. 80).]

With the exception of man they have no enemies but lions and leopards, which prowl about seeking their young. Near the crossing in a papyrus swamp we came upon the remains of a calf that had been overpowered by two leopards, and later feasted upon by hyenas. (Pp. 87-88.)

Reproduction is . . . unexpectedly rapid . . . Often troops of five included, besides the adults, a calf, a three-quarter grown and another still youthful member. (P. 88.)

Among the smaller pests that may inconvenience white rhinoceroses are various ticks . . . They chiefly infest the softer, wrinkled parts of the hide . . . Credited with removing these insects are the oxpeckers (*Buphagus africanus*). (P. 88.)

[A] minute, blood-sucking fly (*Lyperosia*) is a characteristic companion, constantly hovering in great swarms about their huge prey. . . The hides of rhinoceroses have thousands of little injuries whose exudations furnish ample nourishment for these insects.

More remarkable still is an oestrid fly (*Gyrostigma pavesii*), whose grub-like larvae often cover large portions of the stomach lining . . .

Intestinal parasites, especially round worms (nematodes) are numerous, and most noteworthy is a . . . tape worm (*Taenia*). (P. 89.)

What has indirectly contributed more than anything else to the gradual extermination of the white rhinoceros are the horns . . . They made the horn-bearer a danger, and the horns could be sold. Greek and Hindu traders were ready to buy them at the value of ivory which has proven so fatal to the elephant. Superstitions of peoples in far off Asia made a market for horns, at good prices. Greasy and sleek humanity . . . has been willing to guarantee health to those stolidly believing, so long as the mere powder and scrapings from rhino horns sufficed. The craze among native chiefs to own a horn staff of unsurpassed length helped decimate the white rhinoceroses in South Africa.

White man, too, has bid for these rarities, and not in vain. Polished and scraped into canes, gold-topped and diamond encrusted, these horns become valuable "curios." Amulets to keep away witchcraft were carved easily, and worn willingly. A cup turned out of rhinoceros horn was believed to splinter at the mere touch of obscure poison . . . Now statuettes and other bric-a-brac, fashioned by artists of many lands, still delight those eager for quaint trinkets.

The many-thonged slave-trader's lash cut out of rhinoceros hide now finds its counterpart in the dainty horse-whip of the more refined. The hide, raw or burnished, or given an amber-like appearance and polish, is often transformed into queer-looking tables, trays, and smaller objects. . . And finally, industry has found that disks cut from the hide and put on the lathe give a high polish and stand great wear. (Pp. 89-90.)

Fortunately the white rhinoceroses of the Congo-Nile race have little of the aggressiveness that makes the black form so dangerous a brute. Their realm lies far remote from civilization, and they leisurely roam over regions wherein the call of forward struggling civilization is still faint. They are protected by the natural indolence of natives, and the commercial poverty of nature. They have a fair chance to survive the native spear, but not modern gun and powder, and today the negro marvels at the small bullet that brings him so easy and big an exchange in meat.

Judging from observations made by others and ourselves, from 2000 to 3000 white rhinoceroses may still be alive in the entire northern range. Just how rapidly their numbers will decrease, depends upon the protection afforded them. . . . Perhaps complete restrictions to traffic in the horns of white rhinoceroses would be the most important step toward saving [them from extinction]. (Pp. 90-91.)

Christy (1923, pp. 64-65) writes of his experiences:

In 1916 on the Congo side of the Divide, especially in the district opposite the Meridi-Yambio section, I found the species individually was much more common than anywhere on the British side. . . . In a Greek store at Aba . . . I was shown a pile of at least a hundred rhino horns, worth from £1 to £3 apiece, I think the trader told me, but which he could not sell owing to the restrictions put upon their sale in, or transit through, the Sudan.

Westward of Aba, and more or less throughout the Haut Uele district north of the Uele river, I came upon the animals . . . almost daily. . . .

The small region in the Congo in which the animal is commonest is almost uninhabited, and it would not be difficult for the Congo Administration to enforce upon Chief Bwendi . . . a prohibition in favour of this interesting species, forbidding at the same time the sale of rhino horn throughout the Congo.

Lang writes again (1924, pp. 176-177):

There is little fear of the destruction of these rhinoceroses by natives armed with spears, as Christy supposes; the danger lies in gun and powder of which there is always an abundance, of either lawful or smuggled provenance. The few Azande hunters, justly famed among the tribes for dangerous exploits, are admired as much for killing a rhinoceros with a spear as an elephant or a buffalo These rhinoceroses are of course attacked when sleeping. . . .

There seems to be no effective means at present of stopping the wholesale slaughter of this northern form. Its meat is one of the important parts of the native diet, procurable at all times without much difficulty. Even though the principal chiefs were willing to enforce protection there would still be a great number of native poachers and such a law would never be adequately respected. To properly police these vast areas is practically impossible.

The situation would be helped in part by the more drastic enforcement as regards confiscations and fines for the transportation, sale and exportation of the horns and pieces of hide. Khartum is the great center at present for the exportation of horns to the Orient and for the manufacture therefrom of articles sought alike by sportsmen and curio collectors.

A recent decree provides that all Rhino horns in the Belgian Congo, however acquired, shall become the property of the State. Previously it had been lawful to kill an "attacking" Rhinoceros and to keep the horns of one so killed. (Schouteden, 1927, p. [30].)

A. J. Jobaert writes (*in litt.*, November 10, 1936): "Eleven years ago, competent naturalists estimated that there could not remain more than 40-60 Rhinoceroses in the Belgian Congo. In the last 15 years I do not believe that more than 20 of these animals have been killed by Europeans, in each case under special permit. But the increase in the value of the horns led to an intensive demand on the part of the traders, and apparently to an incessant hunting on the part of the natives. The animal is officially protected, but the possession, transport, sale, and even export of skins are not forbidden. The animal is now respected only by the conscientious European hunter, and is on the verge of extinction in the Belgian Congo. The only means of saving it, that I can see, is the establishment of its range as a game reserve, with adequate supervision."

Uganda.—"The existence of the square-lipped rhinoceros in the Nile Province of the Uganda Protectorate is now proved" (Johnston, 1902, p. 374). This statement, however, lacks substantiation, since there is no authentic record from east of the Nile, where the Nile Province of that period was located.

The 14 specimens secured by the Smithsonian African Expedition in 1910 came from the vicinity of Rhino Camp, on the west bank of the Nile, in the southern portion of the Lado Enclave of that time. This region is now included in Uganda.

In Uganda the range "does not extend more than probably forty miles along the left or west bank of the Nile above Nimule, and, say, fifteen miles inland. This range is remote from any European settled area, and is very sparsely inhabited by primitive natives, who possess very few firearms. . . . I believe that poaching is now almost non-existent." (Coryndon, 1921, p. 28.)

In his annual report for 1925, the Game Warden of Uganda writes:

Every endeavour has been made to put a stop to the illegal destruction of this animal by the natives and the result is distinctly gratifying.

During the year under review two white rhinoceros fell into a deep salt-lick in West Madia and were drowned. Also, a certain number of these animals probably fall victims to game-pits. . . .

The result of the first census leads to the belief that there are possibly no more than 150 of these grand animals left in Uganda at the present time.

The persecution of the white rhinoceros is as good an instance as any of the deplorable results which are likely to occur from killing game for profit, for I understand that prior to the demand for rhinoceros horn this species was scarcely molested.

Three years later a marked diminution was noticed. The total number in Uganda was then estimated at 130. (Ann. Rept. Uganda Game Dept., 1928.)

"Next to the gorilla this ranks as Uganda's most interesting mammal. Its habitat is restricted to the West Nile district where it is believed about 150 examples still remain.

"The range is unchanged, and there are no data to indicate whether present-day numbers reveal a marked reduction. It is possible that formerly 250 to 300 of these prehistoric monsters roamed this locality.

"Between ten and thirty years ago it is unquestionable that numerous white rhinoceros were slaughtered by the natives to meet the ever-increasing demands of the Far East for rhinoceros horns To a far lesser extent examples were sometimes hunted by the natives for meat.

"The white rhinoceros . . . enjoys complete protection and not even a Governor's permit is granted to collect specimens for scientific purposes. For nearly ten years this species has enjoyed absolute immunity from molestation, and the measures adopted for its protection have proved most effective." (Game Warden, Uganda, *in litt.*, December, 1936.)

Order ARTIODACTYLA: Even-toed Ungulates

Family HIPPOPOTAMIDAE: Hippopotamuses

This family consists of two genera (*Choeropsis* and *Hippopotamus*), with one species in each. The latter, however, is divided into five subspecies. The various forms are widely distributed over Africa south of the Sahara. All are treated in the following pages.

Northern Hippopotamus

HIPPOPOTAMUS AMPHIBIUS AMPHIBIUS Linnaeus

Hippopotamus amphibius Linnaeus, Syst. Naturae, ed. 10, vol. 1, p. 74, 1758. (Nile River, Egypt.)

Cape Hippopotamus

HIPPOPOTAMUS AMPHIBIUS CAPENSIS Desmoulins

Hippopotamus capensis Desmoulins, Dictionn. Classique Hist. Nat., vol. 8, p. 222, 1825. (Lower Berg River, western Cape of Good Hope.)

Angola Hippopotamus

HIPPOPOTAMUS AMPHIBIUS CONSTRICTUS Miller

Hippopotamus constrictus Miller, Smithsonian Misc. Coll., vol. 54, no. 7, p. 1, pls. 1-4, July 1924. (Angola.)

East African Hippopotamus

HIPPOPOTAMUS AMPHIBIUS KIBOKO Heller

Hippopotamus amphibius kiboko Heller, Smithsonian Misc. Coll., vol. 61, no. 22, p. 1, Jan. 26, 1914. (Lake Naivasha, Kenya Colony.)

Nigerian Hippopotamus

HIPPOPOTAMUS AMPHIBIUS TSCHADENSIS Schwarz

Hippopotamus amphibius tschadensis Schwarz, Ann. Mag. Nat. Hist., ser. 8, vol. 13, p. 31, Jan. 1914. (Katana, Bornu, northern Nigeria.)

FIGS.: Dugmore, A. R., 1910, 7 plates facing p. 96, pl. opp. p. 98; Shortridge, 1934, vol. 2, pl. opp. p. 643; Miller, G. S., Jr., *op. cit.*, pls. 1-4 (skull).

As a species the big Hippopotamus formerly ranged all over Africa except in the Sahara, keeping to the larger streams, down to the very mouth of the Nile. Five subspecies are currently recognized, based on small characters, particularly of the skull. Shortridge believes, however, that the race *constrictus* of Angola is inseparable from *capensis* of South Africa. In typical *Hippopotamus amphibius*, the least width of the nasal bones is said to be less than 1.25 inches, while the least width of the rostral constriction goes about 5.5 times or more in the greatest length of the skull. In the race *kiboko*, the nasal bones are wider, 1.5 inches or more, and the least width of the rostral constriction goes about five times in the skull length. In *tschadensis*, the face is short and broad, the orbits strongly projecting and laid forward, and the cheek-tooth series is shorter than in the typical race. In the race *constrictus*, which may prove identical with *capensis*, the rostral constriction is much greater than in typical *amphibius*, and goes more than six times in the length of the skull. How far these supposed differences will hold good is yet to be demonstrated. The precise limits of range of the different forms, and even their validity, are not as yet well ascertained; hence the species may be treated as a unit.

Of ponderous size, with a large, squarish head, small ears, eyes placed high, short stout limbs, and 4-toed feet, it is nearly hairless except for a few tufts on the lips, at the sides of the head and neck, at the tips of the ears, and the end of the tail. Skin thick, of a "dirty or greyish black above, lighter below." Incisors and lower canines large and tusklike. Length, 10 to 12 feet; tail, about 13 inches; height at shoulder, 4 feet 8 inches. Weight of one living in the London Zoological Gardens, 4 tons. Record length of lower canine tusk, not malformed, 48 inches on outer curve, but 35 inches is a large size.

The Hippo has been known from ancient times, but on account of its large size and its damage to crops near its aquatic habitat it is persistently hunted; its meat is in favor among native tribes in Africa, and its hide is used in making whips. Formerly there was much use of its tusks in the manufacture of false teeth, and they are still used to some extent as ivory. Otherwise the species is of relatively little economic value, but in regions of human settlement it may become somewhat of a nuisance, destroying crops or attacking canoes and boats with little or no provocation. It has been suggested

that in the latter case, it mistakes the boat for a crocodile and attacks to drive the supposed enemy from its young, or merely on principle.

While Hippos are still common in many parts of Africa, as in the upper Nile, parts of the Congo, the Great Lakes, and elsewhere, they have become reduced in the more settled areas or entirely exterminated. A brief review of the present status may therefore be given. S. S. Flower (1932) places the last recorded Hippopotamus in the Nile Delta at about 1815, when one appears to have been killed near Damietta. In the following year, one is mentioned by Burekhardt at Deran, 23 miles north of Aswan. Within recent years they are not regularly found below the junction of the White and the Blue Niles at Khartoum. Capt. Flower about 1908 saw the tracks of one at that point, but regarded the circumstance as very unusual even then. In 1912, the late Dr. John C. Phillips and I, in going up the Blue Nile, saw nothing of Hippos until well above Singa. Higher up they were still to be found in small numbers. They are said to be common in southern Abyssinia, in parts of Somaliland, and even in the Lorian Swamp, Kenya Colony, a region which may at times be much dried out, they seem common, seeking the deeper pools when the stream goes partly dry. They are common in the Great Lakes of East Africa, and according to the Annual Report of the Game Department of Uganda, 1933, "there is little realization of the almost incredible and, I believe, steadily increasing, numbers which frequent the shores of the Victoria Nyanza and its islands." Indeed, in the 1927 report, it "is classed as vermin in Lakes Victoria, Albert, Edward and George, and in the River Nile; and as there is a ready sale for its teeth a certain amount of trading takes place in this commodity, but so far this fact has resulted in no undue slaughter, and the hippopotamus is quite as plentiful, and in many places as great a nuisance, as ever."

In the Belgian Congo it was formerly abundant in all the rivers, lakes, and pools. According to Leplae (1925), "it is now [1925] shot or trapped by hundreds by meat-hunters, white and native. Its ivory brings a good price, and its skin is used for making whips. Its flesh is highly esteemed by the blacks, and even Europeans eat it upon occasion. Owing to the enormous slaughter in the Belgian Congo, some rivers are already entirely depopulated." Lavauden writes in 1933, however, that it is still widely spread in Central Africa, and that while it is not seriously threatened in French Equatorial Africa, the same cannot be said of French West Africa. A reserve on Lake Edward has permitted its survival there. In view of the fact that it provides natives with meat, its hunting should be limited and controlled. The extent to which Hippos are being destroyed to furnish meat to laborers in the Chad territory is indi-

cated by Ramecourt (1936), who states that in a recent year more than a thousand of these animals besides a multitude of other species were killed for food for workmen on the Brazzaville-Ocean railway.

Westward, the Hippo is found still in the larger rivers of Nigeria and the Gambia. About 1933, two reserves were created for them on the Benue Donga and Katsina Rivers and within 15 miles of Aboli (Observer, 1934, p. 53). In the Gambia, Haywood (1933) reports them as locally "numerous," while in Sierra Leone he estimates 150 on Rokel River, Little and Great Scarcies River, and Mungo River. Some damage to crops is done by them.

In South Africa particularly, with settlement and agriculture, the Hippo has everywhere receded before the onward course of white occupation. W. L. Sclater (1900) summarizes the status of the species in this area as follows:

In South Africa it was originally found everywhere along the coasts and rivers; Theal, in his history records from van Riebeck's diary that in 1652, hippopotamuses disported themselves in the swamp now occupied by Church Square, in the centre of Cape Town; even in the early part of the 18th century Kolben speaks of them as being not uncommon in the neighbourhood, but with the great expansion that took place in the middle of that century the hippopotamus retreated, and Paterson, Sparrman, and the other travellers had to go nearly as far as the Great Fish River before meeting these monsters; Burchell witnessed a . . . hunt close to where the Vaal and Orange Rivers meet, but Harris and Cumming, 1830-40, only came across them in the upper waters of the Limpopo and its tributaries.

A few individuals lingered for many years near the mouth of the Berg River almost 70 miles north of Cape Town; and the head of one killed in 1856, is still preserved in the South African Museum, and the last is said to have disappeared about 1874.

Nowadays, except for a few said to be still surviving in the lower reaches of the Orange River, the hippopotamus may be regarded as extinct in the Colony; in Natal there are a few strictly preserved in "Zeekoe lake" at the mouth of the Umgeni River a few miles north of Durban; north of this, especially in St. Lucia Bay, in the Komati and other rivers, in the eastern Transvaal and Portuguese territory up to the Zambesi, they are still found in reduced numbers in less frequented districts as also in the upper waters of that river, the Okovango and the Ngami swamps.

At the present time the Hippo is thus practically extinct south of the eastern Transvaal and Zululand (Natal). In the Zambesi region it is still fairly common, as well as in the Maputo and Inkomati Rivers of Portuguese Southeast Africa (Haagner, 1920, p. 147). A few may still be found at the mouth of the Orange River (Hobley). Under careful protection in Kruger Park, in the eastern Transvaal, Stevenson-Hamilton (1933) reports that they are now "very numerous" all along the Olifants River, and according to Hobley there were estimated to be about 200 here within the Park. "A good deal of damage was done by these animals to farmers' lands across the Crocodile River, and arrangements were made in some

cases to help landowners by putting up wire fences to keep them out. A very low fence suffices to stop a hippo, who will not step over even a low obstacle and does not seem to push through a wire fence." The protected herd in Natal also seems to be flourishing at present. Here, according to H. B. Potter, Game Conservator, there were in 1933 in the False Bay and St. Lucia Lake area, "about 100 hippopotami in the whole area, sixty of which have their home in St. Lucia Lake." In the following year Mr. Potter reported that in the latter area they were doing well, calves had been seen, and no deaths had been noted during the year, nor any accidents to visitors caused by them. Evidently here as in Kruger Park they form an attraction to visitors and should continue so for the future.

In South-West Africa, according to Shortridge (1934, vol. 2, p. 644) a few still survive in the lower Cunene, "probably because the narrowly reed-fringed banks of that river are unpopulated and seldom visited. . . . It is doubtful if more than a dozen hippo remain today between the Rua Cana Falls and the mouth of the Cunene." There are "very few" in the middle section of the Okavango, "perhaps half a dozen," but in the Caprivi district they seem to be "fairly plentiful." In the adjacent parts of Angola there are a good many, though according to Statham "disappearing more rapidly than any other game." Shortridge reports that in 1914-15, after a particularly dry period, when the Cunene almost ceased to flow, they were nearly exterminated by squatters in southern Angola. Yet they are still common in the upper Okavango and the Kwando as well as in the rivers between. The reduction in numbers in the general region is in part a result of the gradual drying out of the country in recent decades. According to Selous (in Bryden, 1899), at the end of the last century, "natives now living remember the time when hippopotami were plentiful in the Molopo River, where these animals could not exist at the present day; and Dr. Livingstone mentions that, according to native report, hippopotami used to live in the river flowing from the spring of Kuruman, which even in his time had become quite a small stream."

While adult Hippos seem to have no natural enemies other than man, it may be that crocodiles occasionally capture the young. There is some evidence, however, that they are subject to occasional epizootic disease. Of this, Hopley (1932, p. 21) writes of a report by the captain of a river steamer, that in 1904 or 1905 a serious epizootic occurred among Hippos on the Kasai and Sankuru Rivers in the Congo basin from which "vast numbers" died. Again, in the Annual Report of the Uganda Game Department for 1932, it is stated that sixty were counted dead "from a mysterious disease on a short stretch of shore of Lake Albert." However, the herds that were decimated quickly recovered.

From the foregoing it appears that the Hippo is likely to remain in numbers in the upper Nile, the Great Lakes, and parts of the Congo, and a certain number are well protected and thriving in parts of Tanganyika, the Transvaal (Kruger Park), and Natal (St. Lucia Lake reserve). Their numbers are being reduced in parts of the French Equatorial possessions, and on the borders of the range in the west; in South-West Africa they are being rather rapidly reduced in some sections, but remain common in others; but are likely to continue their retreat from the drier parts, with desiccation of the country. In South Africa, particularly, except for the herds in the reserves mentioned, the animal is gone. Given sufficient protection, however, there seems no reason to suppose that it may not continue to thrive in regions where it is now still common, and with proper management might in addition be a source of food for the native population and of interest to visitors.

G. M. A.

Pygmy Hippopotamus

CHOEROPSIS LIBERIENSIS (Morton)

Hippopotamus (Tetraprotodon) liberiensis Morton, Jour. Acad. Nat. Sci. Philadelphia, ser. 2, vol. 1, p. 232, 1849. (St. Paul's River, Liberia.)
Figs.: Morton, *op. cit.*, 1849, pls. 32-34; Proc. Zool. Soc. London 1923, p. 1096, fig.; Pocock, 1937, p. 643, fig.

The Pygmy Hippo has always been a little-known species. Even in the region where it exists, one may travel for days through the country and find nothing of it. In general much like a smaller replica of the large Hippo, it is a stoutly built animal about the size of a domestic pig. Büttikofer (1890), who spent several years in zoölogical work in Liberia, describes its color as shining grayish blue-black. It differs from the big Hippo further in the smaller proportions of the head, and in usually having only one pair instead of two pairs of lower incisors. The feet have the toes slightly more separate and spreading. Length, about 1.4 meters; height, 80 cm.

Although skulls much like that of this species are found in superficial deposits in Madagascar, and fragments of related type in the Mediterranean islands, indicating a former wider distribution, the living species is known only from a restricted area in the rivers and primeval forests, of the Ivory Coast, Liberia, and the adjacent parts of Sierra Leone. The statements of Haywood that it is found in the Niger Delta,¹ and of Lavauden of its occurrence in the Gabun

¹ More recently, however, confirmation of the animal's occurrence in Nigeria has been supplied by Dollman (1940), on the basis of two skulls sent to the British Museum from the Owerri and Warri Provinces. "It is possible," Dollman adds (p. 288), "that the range of this animal may be even still greater than is at present known and may extend into French Equatorial Africa."—F. H.

and Spanish Guinea, are undoubtedly based on faulty information; nor can any credence be given the report published by Letcher (1911) of its presence in Rhodesia.

Büttikofer states that, unlike its larger relative, it is not social but solitary, or at times is found in pairs. In his experience, each pair seemed to have its special area, so that although it may be well known in a district, it is nowhere common in its restricted range. It is found in the streams and wet forests and swamps and is less given to purely aquatic life than the large Hippo. It is

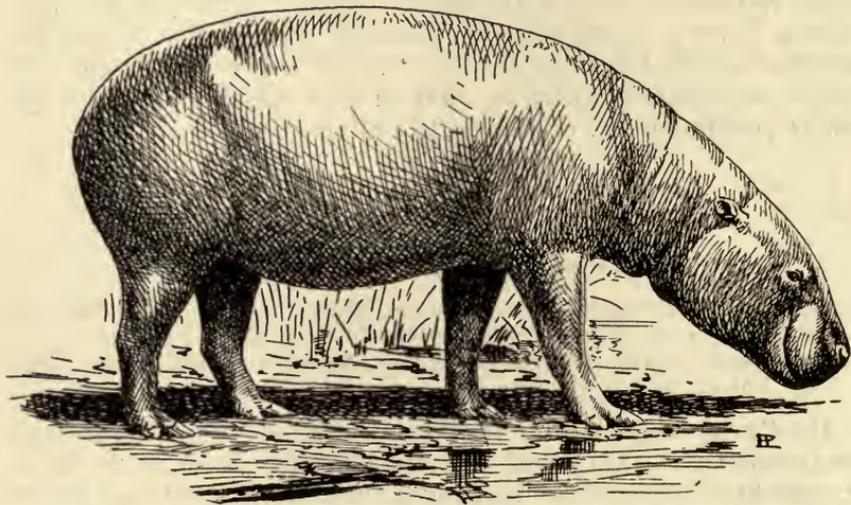


FIG. 43.—Pygmy Hippopotamus (*Choeropsis liberiensis*)

largely inactive by day, but by night wanders forth to seek by stream and forest the shoots, leaves, and fallen forest fruits on which it subsists. In swampy places its short legs sink deep so that its body leaves a trail. Büttikofer secured three specimens for the Leiden Museum, but apparently himself saw little of the animal. He speaks of the natives' relish for the flesh, which tastes like that of a wild pig. To the native Liberians it is known as "sea-cow" or "water-cow."

Apparently the first to attempt the capture of living specimens for exhibition was Hans Schomburgk, who in 1911-12 after much effort succeeded in capturing a pair by means of pitfalls. These were sold by Hagenbeck to the New York Zoological Society. Another was sent to the National Zoological Park at Washington in 1927, and there have been captive specimens in the London Zoological Gardens. Schomburgk (1912) has given an account of his search for this species and its capture. Other than for food it is of no

economic importance to the natives of the region where it occurs, but apparently it is so uncommon that no special effort is made for its capture. Specimens for exhibition in zoölogical gardens are in some demand, however. Because of its restricted range and apparent scarcity, this species is accorded complete protection by the London Conference of 1933.

G. M. A.

Family CAMELIDAE: Camels

This family consists of three living genera. In South America the Llamas (*Lama*) and the Vicuñas (*Vicugna*), each with two wild subspecies, range from Ecuador to Tierra del Fuego; all are treated in Dr. Allen's volume (1942). In the Old World there is a single genus (*Camelus*), with two species. One (*C. dromedarius*) is now known only as a domesticated species. The other (*C. bactrianus*) is represented by a domesticated subspecies and by a wild subspecies. Only the last comes within the scope of this report. It occurs in Chinese Turkestan and Mongolia.

Wild Bactrian Camel

CAMELUS BACTRIANUS FERUS Przewalski

Camelus bactrianus ferus Przewalski, Third Journey in Central Asia, p. 43, 1883 (in Russian). ("From Tarim, Lob-nor, and Hami to southern Dzungaria; from Guchen and Manas to northwestern Zaidam, Tibet." Type locality restricted by Harper (1940, p. 202) to "the border of the Kum-tagh, east of Lob-nor and north of the Altyn-tagh, Chinese Turkestan.")

FIGS.: Przewalski, 1883, pl. facing p. 42; Littledale, 1894, p. 447, fig.; Hedin, 1903, vol. 1, pp. 353, 370, figs., pl. facing p. 366, and vol. 2, pp. 101, 102, 107, figs.; Leche, 1904, pp. 50, 51, figs. 60, 61; Hedin, 1904, pp. 127, 256, figs.

The Wild Bactrian Camel still exists in restricted numbers in certain desert areas of Chinese Turkestan and Mongolia. It has long been a moot question as to whether this is the aboriginally wild animal, or merely the feral descendant of escaped domestic stock, or possibly a mixture of the two. The anatomical differences revealed by a comparison of specimens lend considerable weight to the view that *Camelus bactrianus ferus* is a genuinely wild animal, not contaminated to any appreciable extent with the blood of the domestic animal. Leche (1904, p. 60) considers the Wild Camel more closely related to certain Pleistocene species than to the Domestic Bactrian Camel.

Length of skin of an old male (from Altimish-bulak, at the southern base of the Kurruk-tagh) from snout to root of tail, 3,030 mm.; tail, 530 mm.; ear, 95 mm. In comparison with the

Domestic Bactrian Camel, its humps are smaller; elongated hairs occur only at the top of the humps, on the neck, on the lower chin, on the outer part of the thigh and the proximal part of the lower arm, and on the tip of the tail; the rest of the pelage is short and soft; the body hairs are grayish brown basally and reddish brown at the tip; the snout and the ears are shorter; the general size of the wild form is not greater than that of the domestic form, but its skull is not smaller than that of the latter. (Leche, 1904, pp. 49-54.)

Leche (1904, p. 61) quotes Sven Hedin as follows on the distribution of *C. b. ferus*. It ranges from the lower course of the Keriya-darya to the vicinity of the Tarim's former bed, the Atschik-darya. According to native report, it also occurs frequently in the desert areas south of the Tarim from the meridian of the Keriya-darya to the vicinity of Karaul (long. 86° 30' E.). It is most numerous in the deserts and mountains south of the Kurruk-tagh; it is also common in the mountain wastes between Kurruk-tagh and Tschöl-tagh [south of Turfan]. It visits the north shores of the newly formed lakes in the Lob Desert, and also the desert region from the Kurruk-tagh eastward to the route between Hami and Su-chow. Large herds were observed in the region north of the Anambaru-ula, in the deserts at the base of the Altyn-tagh, and in the valleys within the Altyn-tagh. (The animal was also reported in former days from Dzungaria, as will be seen later.)

Yule (in Prejevalsky, 1876, vol. 1, pp. xxvi-xxviii) reviews the testimony on the existence of genuine Wild Camels in Mongolia and Chinese Turkestan, and considers it irresistible; one of the records goes back as far as A. D. 1420.

Prejevalsky (1879, pp. 88-96) gives the following account:

According to the unanimous testimony of the Lob-nortsi, the chief habitat of the wild camel at the present day is the desert of Kum-tagh, to the east of Lake Lob; this animal is also occasionally found on the Lower Tarim, in the Kuruk-tagh mountains, and more rarely still in the sands bordering with the Cherchen-daria Twenty years ago, wild camels were numerous near Lake Lob, where the village of Chargalik now stands, and farther to the east along the foot of the Altyn-tagh, as well as in the range itself. Our guide, a hunter of Chargalik, told us that it was not unusual in those days, to see some dozens, or even a hundred of these animals together. He himself had killed upwards of a hundred of them in the course of his life (and he was an old man), with a flint and steel musket. With an increase of population at Chargalik, the hunters of Lob-nor became more numerous, and camels scarcer. Now, the wild camel only frequents the neighbourhood of Lob-nor, and even here in small numbers. Years pass without so much as one being seen; in more favourable seasons again the native hunters kill their five and six during the summer and autumn. The flesh of the wild camel, which is very fat in autumn, is used for food, and the skins for clothing. These fetch ten tengas or a ruble and thirty kopecks at Lob-nor. . . .

During the excessive heats in summer, the camels are attracted by the cool temperature of the higher valleys of Altyn-tagh, and make their way

thither to an altitude of 11,000 feet, and even higher . . . In winter the wild camel keeps entirely to the lower and warmer desert, only entering the mountains from time to time. . . .

When caught young, wild camels are easily tamed and taught to carry a pack.

[Enemies] are very few in number in the localities that it inhabits—man and wolves being the only ones it has to encounter. Even wolves are rare in the desert, and would scarcely be dangerous to a full-grown camel. . . .

It seems to me possible to arrive at the conclusion that the wild camel of the present day is the direct descendant of wild parents, but that from time to time escaped domesticated animals probably became mixed with them.

C. S. Cumberland (Proc. Zool. Soc. London 1892, pp. 370-371) writes as follows concerning the animal of Chinese Turkestan:

The habitat of the Wild Camel is the Gobi steppe [= Takla Makan Desert] from Khotan to Lob Nor. Except when snow lies on the ground these animals may be met with here and there along the old bed of the Yarkand and Tarim rivers, which they frequent for the pools of brackish water that are to be found here and there. But as soon as the snow falls they move off into the desert, as if then independent of the water-supply. . . . The Camel is very shy in its habits, and, so far as I could ascertain, has never been caught and domesticated. . . . They appear to me to be distinct from the Bactrian Camel; they are less stumpy in build, the hair is finer, closer, and shorter. They vary in colour, like the domestic species, from dark brown to lightish dun.

On several occasions in 1893 Littledale (1894, pp. 446-448) came upon Wild Camels in small numbers in the Lob-Nor region on the north side of the Altyn-tagh, and secured four of them. There was one herd of nine animals.

Sven Hedin writes (1903, vol. 1, pp. 357-358):

According to Przhevalsky, the wild camel was common in the desert of Kum-tagh, to the east of the marsh of Kara-koshun. At the present time he is never seen there, or very rarely indeed; which may be owing to the desiccation of the lake, or is, perhaps, due to the fact that the pools of water which still survive in that quarter are situated too near to inhabited regions. . . .

The wild camel is frequently seen quite solitary by himself, often also in pairs; but the general rule is for a troop of four to six individuals to associate together. Troops of 12 to 15 are extremely rare. . . .

The wild camel is found everywhere between Yardang-bulak [lat. 41° N., long. 89° E.] and the district of Khami; but he never goes west of the caravan route from Ying-pen [lat. 41° N., long. 88° E.] to Turfan.

Hedin also mentions (pp. 356-357) a young domestic animal, not yet broken to work, that "had once or twice run away . . . and joined itself to a herd of wild camels, and been received by them without hostility."

Younghusband, referring to the region about the southern base of the eastern Altai, at about long. 96°-100° E., says (1888, p. 495):

It was in this region, that I first heard of the wild camel. The guide one day pointed out to me a prominent peak in the Altai Mountains, and said that behind it was a grassy hollow, which wild camels usually frequented.

Later on I met a Mongol hunter who said the Mongols shoot the wild camel for the sake of its skin, and they also catch the young ones to train up for riding purposes, and I was assured that these would go for 200 miles a day for a week, but they can never be broken to carry a load. They were described to me as being smaller than the tame species, and were said to have short smooth hair in place of the long hair of the ordinary Mongolian camel. I was once shown the track of a wild camel, and it was certainly very much smaller than that of the tame one.

Lattimore (1929) contributes very interesting information concerning the Wild Camel of the Gobi. In passing along the more northerly route westward from Edsin Gol, he reports (p. 217):

The old way is said to pass through the chief country of the wild camels. I was told this by several caravan masters, and one young Mohammedan camel puller told me that he had seen one which was shot by a Turki caravan master. It was of a grayish color, of about the same height as an ordinary caravan camel, but slender in build and with very small humps "like a woman's breasts."

Wild camels are also found nearer to the Edsin Gol. I was told that a Mongol, the year before, had caught a very young one, but when I passed it had already escaped to the desert again. They say that on the Two Dry Stages the wild camels come sometimes out of the hills to look at the caravan herds at pasture, but that even so they seldom come at all near and are shy and almost impossible to shoot. There are men who say that even when caught extremely young they can never be tamed; but a Hami man told me he had known an Edsin Gol Mongol who used one for riding, and that the wild camel is considered a very fast and most distinguished mount for a Mongol who fancies himself. Reliable information about wild camels collected by modern travelers remains incomplete, but there seems to be a general agreement that they can be tamed for riding, though never for carrying loads; and everybody who has been told that they can be ridden has been told fantastic tales of the distances they can cover. It seems to be evident that it is a rare and startling thing even for a Mongol to catch and tame one.

In describing an area in the Gobi near the "House of the False Lama" (about lat. 42° 30' N., long. 98° E.), Lattimore writes (p. 243): "To this whole series of springs there come at night antelope, wild asses, and, they say, wild camels. . . . The tracks which were pointed out to me as those of wild camels were frequent. They were [not?] more than half the size of the tracks of a caravan camel, and more elliptical in shape. Nor, at least as it seemed to me, were the toe prints quite so deep—perhaps because the wild camel, whose gait is not affected by the carrying of loads, places his weight differently. The caravan men were positive that the tracks were not made by half-grown camels belonging to Mongols."

In former times, at least, Dzungaria formed part of the range of the Wild Camel. Elias writes (1874, pp. 79-80): "To the north of the Tian-Shan, the evidence I received on this subject in 1872 from intelligent Chinese travellers, as well as from the native Mongols, is undoubted. Many of the former, who declared they had seen these animals between Kobdo and Ili, Uliassutai and Kuchên, &c.,

I questioned as to their being really wild, or having become so subsequent to domestication; but the answers were always, emphatically, that they had never been tame The wild camels were always described to me as smaller in size and much darker in colour than tame ones."

Brehm (1876, pp. 339-340) had reports of Wild Camels about 250 versts southeast of the frontier post of Zaisan, in the direction of Guchen, where they were hunted by the Kirghiz and the Torguts. They ranged thence to the Tian Shan, and were found at times in herds of as many as 30 head.

"The camels inhabiting Dzungaria . . . are found in the neighbourhood of the towns of Guchen and Manas immediately north of the Bogdo-ola range, and some distance south of Zaizan, as indicated by Pallas; they are, however, in comparatively small numbers" (Lydekker, 1901, p. 272).

It is probably significant that Carruthers (1913), in his fine account of Dzungaria and its fauna, makes no mention of Wild Camels. I have found no recent record from that region.

In writing of northeastern Persia, Hedin says (1910, vol. 1, p. 398): "It was also said that forty years ago wild camels occurred in the sandy deserts at the edge of the Kevir, but that nothing had been heard of them in recent times." This region is so distant and so isolated by mountain barriers from the known range of *C. b. ferus* that it seems very doubtful if the Persian animals could be of the same origin and status. More likely they were merely feral.

Family TRAGULIDAE: Chevrotains or Mouse-deer

This family consists of two widely separated genera, the Asiatic *Tragulus* and the African *Hyemoschus*. More than 50 forms of *Tragulus* are recognized; they range from India through the Malay Peninsula to Java and Borneo. *Hyemoschus* consists of a single species, with three subspecies, ranging in the tropical forests from Gambia to the eastern Congo; and Dr. Allen contributes accounts of these to the present volume.

Water Chevrotain

HYEMOSCHUS AQUATICUS AQUATICUS (Ogilby)

Moschus aquaticus Ogilby, Proc. Zool. Soc. London 1840, p. 35, 1841. (Sierra Leone.)

FIGS.: Johnston, 1906, figs. 279-281, and col. plate opp. p. 726.

Bates's Water Chevrotain

HYEMOSCHUS AQUATICUS BATESI (Lydekker)

D[orcatherium] a[quaticum] batesi Lydekker, Proc. Zool. Soc. London, vol. 1, p. 133, June 7, 1906. (Efulen, Cameroons.)

Powell-Cotton's Water Chevrotain

HYEMOSCHUS AQUATICUS COTTONI (Lydekker)

D[orcatherium] a[quaticum] cottoni Lydekker, Proc. Zool. Soc. London, vol. 1, p. 133, June 7, 1906. (Ituri Forest, eastern Belgian Congo.)

The Water Chevrotain, as its name implies, is closely associated with the streams in heavy forest from the Gambia and Sierra Leone in the west to the Ituri Forest at the eastern border of the Congo Basin, and southward to the Cameroons. In addition to the typical race, two others have been named, from the southern and eastern



FIG. 44.—Water Chevrotain (*Hyemoschus aquaticus* subsp.). After Brehm.

corners, respectively, of the general range. A comparison of specimens from these regions, however, reveals little constant difference, so that it is doubtful if more than one form is distinguishable satisfactorily. For this reason all three are treated together.

The chevrotains are remarkable in that the long metapodial bones of both fore and hind feet are complete in the second pair of small outer digits, instead of being incomplete or absent as in typical deer, camels, or antelopes. Further, the stomach is less complicated, with only three instead of four compartments. The species of the African forest is the largest living member of these primitive ungulates, which are represented in the Oriental region by the little Mouse-deer (*Tragulus*). About 3 feet long, with stumpy tail, and standing some 14 inches high at the shoulder, this animal is of a rich brown, marked on the body with several lengthwise rows of

white spots which become fused to form broken lines on the flanks. A white stripe runs along the edge of the jaw and sides of the neck. The male is slightly darker than the female, and has the upper canines developed as projecting tusks about an inch long.

Little is recorded of the habits of this peculiar species. It is found along the watercourses in dense forests and, when disturbed, plunges into the water and is gone, to come up under the cover of overhanging vines and bushes farther upstream. It is more active by night, and then comes out to feed upon "grass, water weeds, and water-lily roots," according to Sir Harry Johnston (1906), but Büttikofer, who opened the stomach of one, found nothing but grass. Johnston has published photographs of the peculiar tiptoe-like posture of this Water Chevrotain when standing. According to the natives, it will sometimes climb up on a sloping trunk and lie out there resting. They hunt the animal, the flesh of which they much appreciate, either by means of snares or by driving a small section of bush, and catching the quarry in a long net. Their folklore has many tales of the cunning and intelligence of the creature.

Although probably in no special danger of extermination at present, the restricted range in the rain-forest areas of western Africa, the avidity with which it is sought for food and hide, and the fact that it is a modern survivor of an ancient group of primitive hoofed animals, make its preservation a matter of interest. In the London Convention schedule of 1933 it is therefore placed in Class A. Reports as to its abundance vary, some observers regarding it as scarce, others elsewhere reporting it fairly common. Probably its secretive habits enhance the belief in its rarity, while in some regions it is doubtless overhunted by natives, who constitute its chief enemy.

G. M. A.

Family MOSCHIDAE: Musk Deer

The Musk Deer constitute a single genus and species, with about half a dozen subspecies, all of which are treated in the following pages. They range from Siberia, Sakhalin, and Korea to the Himalayan region.

Siberian Musk Deer

MOSCHUS MOSCHIFERUS MOSCHIFERUS Linnaeus

Moschus moschiferus Linnaeus, Syst. Nat., ed. 10, vol. 1, p. 66, 1758. ("Tataria versus Chinam." Range restricted by Flerov (1929, p. 515) to "mountains of Western and Central Siberia"; further restricted by Harper (1940, p. 202) to "the Russian Altai.")

SYNONYM: *Moschus sibiricus* Pallas (1779) (cf. Harper, 1940, p. 202).

FIG.: Pallas, 1779, pl. 4.

The various subspecies of Musk Deer show remarkable powers of survival in the face of very severe persecution by native trappers and hunters in the mountains of Asia. Their small size and secretive habits constitute perhaps their chief protection. European hunters see comparatively little of them. Reports as to their present numbers vary considerably from one area to another. For the sake of completeness, all of the subspecies will be mentioned at least briefly in the following accounts.

In the group as a whole, the build is stout and heavy; the limbs (especially the hind ones) are long and thick; antlers absent; tail rudimentary; ears large; hair coarse, thick, brittle, pithy; lateral hoofs large and functional; upper canines greatly developed and projecting below the lips in the male, smaller in the female; male with a globular, musk-secreting gland in the skin of the abdomen. Height at shoulder, about 20-24 inches. (Lydekker, 1898*b*, p. 310.)

The general color of the typical subspecies is brownish (warm sepia or Prouts brown); spots reddish brown and yellowish; ears brownish gray at base, dark brown at tip; abdomen brownish gray (Flerov, 1929, p. 516).

The taxonomic status and the geographical distribution of the various proposed subspecies are not well determined and so can be given here only provisionally. The name *M. m. moschiferus* will be applied to the animal inhabiting the mountain areas from the Altai to eastern Siberia and Manchuria.

"The first musk deer to reach Europe was perhaps the one mentioned by Marco Polo, the Venetian traveller, who in the thirteenth century brought back with him the head and feet of a specimen he secured in his journey to 'Tartary.' He mentions it as abundant in the Altai and northern Chinese country, especially about Si-fan." (G. M. Allen, 1930, pp. 7-8.) Allen records two specimens from 45 to 60 miles northeast of Urga, Mongolia.

Pallas (1779, pp. 15-16) records the species from the Altai region, including the headwaters of the Irtish, the Ob, and the Yenisei; also from the upper Lena and the Vitim.

Carruthers writes (1913, pp. 157, 630) that in western Mongolia the Musk Deer is found only in the mountains of the Upper Yenisei Basin and that it is represented in the profusion of skins adorning every native's home in that region.

According to Salesski (1934, pp. 369-370), the range in western Siberia is largely restricted to the Altai region. Here it occurs from the headwaters of the two Abakan Rivers to Lake Teletzk and the Chulyshman Plateau. It is found also on the north slope of the Chuya Alps and on the southeastern side of the Sailugem Range. In this whole region it is more or less common. Twenty-five or thirty years ago it still occurred in the region of Abai and Ustj-kan.

In the Kusnetz Alatau it was found only on the upper courses of the Black and White Yussi. In the Yenisei region it is recorded from the headwater rivers, Mana and Kan, and in the northeastern part of the Minussinsk district. Here it is most numerous on the upper courses of the Kasyr and the Kisir.

According to Schrenck (1859, pp. 161-162), the Musk Deer occurs in various localities from the upper Amur to the Pacific coast, inhabiting chiefly coniferous forests in mountainous areas. It is numerous along the Amur below the mouth of the Gorin. It is used for both clothing and food by the natives of those parts. The tubular leg bones are utilized as arrowheads. An important trade in the musk pods is carried on with the Manchus and the Chinese. The animal is common along the coast south of the mouth of the Amur, but apparently absent on the coast to the northward, although Middendorff found it common on the crest of the Stanovoi Mountains. (Some of Schrenck's remarks apply to *M. m. parvipes*, if Flerov (1929, p. 517) is correct in extending the range of the latter north to the mouth of the Amur.)

Radde (1862, pp. 275-277) records the species in the Yablonoi and the eastern Sayan Mountains up to 7,000 feet. In the latter region good hunters get 30-40 animals per year; at the north end of Lake Baikal, 10-12 animals; in the Khingan Mountains, up to 20 animals. It was common in the Baikal Mountains until 1852, when it became rarer. It is rare in the mountains of Transbaikalia and in the Bureya Mountains. Along the tributaries of the Amur it is preyed upon by the Yellow-throated Marten (*Charronia flavigula*). It is commonly caught in snares. The skins are little utilized.

Sowerby (1923, pp. 109-111) contributes the following account (covering in part both *M. m. moschiferus* and *M. m. parvipes*):

One of the least often seen of the Manchurian deer, if not the rarest, is the little musk-deer. It does not appear to have been always as uncommon as it is now, and there are certainly places where it is still sufficiently plentiful to make it worth the hunter's while to set snares for it. It is by snares that the musk is captured, and the same type of snare is used in Manchuria and neighbouring regions as is used throughout China even to the Thibetan border. . . . This is at once a brutal and wasteful method, for females and young males, which have not yet developed musk-pods, are indiscriminately caught along with the old males (over three years) which alone are of any value. . . .

I saw a specimen . . . at I-mien-p'o, North Kirin, . . . and I also heard of the existence of the animal in other parts from the Yalu to the Lower Sungari and in Heilungkiang Province. So its range may be considered as coincident with the forested areas of the whole region. . . .

The musk is seldom seen, and even more seldom shot, by sportsmen. [The musk pod it carries] is the cause of its persecution. Every man's hand is against it. . . .

The flesh of the musk-deer is not considered very good, while the skin is too small to be of much value, though, owing to its toughness it makes excellent buck-skin leather when properly dressed.

G. G. Goodwin writes (*in litt.*, May 18, 1937): "The musk deer, . . . in eastern Siberia, is really quite plentiful, and I don't think that at the present time there is any danger of its immediate extermination. Hunters get a few in their traps from time to time, but [in 1929-30] I saw plenty of evidence of a number of animals in the Amur region."

The Cedar Valley Reservation (Kedrovaya Pad), on Amur Bay, comprising 7,500 hectares, provides for the protection of Musk Deer, among other animals (Makaroff, in Skottsberg, 1934, p. 433).

[The Musk Deer of the Verkhoyansk region of Siberia has been described as *Moschus moschiferus arcticus* Flerov (C. R. Acad. Sci. URSS, 1928A, no. 24, p. 516, 1929; type locality, "Mount Toulaiakhkhaia, north-eastern branch of the chain of Taskhaiakhtakh," 460 km. north of Verkhoyansk). It is described as having a smaller skull and darker coloration than *M. m. moschiferus*. Its range is given as the Verkhoyansk district, from latitude 60° N. to latitude 70°. (According to Pallas (1779, p. 16), the Musk Deer ranges as far east as the Indigirka, where it is rare.)

No recent information is at hand as to the numerical status of *arcticus*. Pallas, however, remarks (1779, p. 16) that at the junction of the Ilga with the Lena a hunter will often get over 100 specimens during a winter. (In the absence of information as to the exact location of the "Ilga," it cannot be stated with certainty to what subspecies Pallas's remark applies.)]

Sakhalin Musk Deer

MOSCHUS MOSCHIFERUS SACHALINENSIS Flerov

Moschus moschiferus sachalinensis Flerov, C. R. Acad. Sci. URSS, 1928A, no. 24, p. 517, 1929. ("The island of Sakhalin.")

The Musk Deer of Sakhalin is "threatened with destruction" (Miyoshi, in Skottsberg, 1934, p. 411).

It is distinguished from *M. m. moschiferus* on skull characters.

According to Schrenck (1859, pp. 162-163), it was found only in the high, forested mountains in the interior of the island. At that period skins and musk pods were being traded to a Russian-American company. Kuroda writes (1928, p. 228) that "it seems to be rare."

Korean Musk Deer

MOSCHUS MOSCHIFERUS PARVIPES Hollister

Moschus parvipes Hollister, Proc. Biol. Soc. Washington, vol. 24, p. 1, 1911. ("Mountains near Mok-po, South Tscholla Province, Korea.")

The Korean Musk Deer is doubtless suffering from the same sort of persecution as the other subspecies.

It is a smaller animal than *M. m. moschiferus*; legs slender and feet small, with much smaller main and lateral hoofs; color strikingly rich and dark, with sharp markings; hair of winter coat much softer and shorter than in *moschiferus*, only about 35 mm. long on shoulders (Hollister, 1911, p. 1).

Père David (1867, p. 29) was perhaps the first to record the Musk Deer from Korea.

Flerov (1929, p. 517) gives the range of the present subspecies as "Korea, Ussuri land, on the north as far as the mouth of Amour." Sowerby states (1937, p. 253) that it "occurs in Eastern Manchuria, the Ussuri, the Primorsk and Korea."

Some of the remarks quoted from Schrenck and from Sowerby in the preceding account of *M. m. moschiferus* apply to the present subspecies.

Kansu Musk Deer. Moschustier (Ger.)

MOSCHUS MOSCHIFERUS SIFANICUS Büchner

Moschus sifanicus Büchner, Mélanges Biol., vol. 13, livr. 1, p. 162, 1891. ("Southern Kansu," China.)

SYNONYM: ?*Moschus berezovskii* Flerov (1929).

FIGS.: Milne Edwards and Milne Edwards, 1868-74, pls. 19 (subsp.), 20; Schäfer, 1937, pls. facing pp. 192, 193; Engelmann, 1938, pls. 14-16, figs. 58, 59, 62.

This animal somehow manages to survive despite very severe persecution.

The outer surface of the ear is deep black, with a broad yellowish tip; inner surface yellowish or rufous; upper half with a conspicuous blackish border; skull large (Büchner, 1891, pp. 162-163). The general color is uniform yellowish brown; abdomen pale yellowish (Flerov, 1929, p. 518).

The range extends from Kansu, eastern Tibet, and Yunnan eastward at least as far as Shansi and Honan. A. Milne Edwards (1868-74, p. 176, pl. 19) records a Musk Deer of some subspecies from the mountains near Peking in Chihli; and others from Tibet and Szechwan. Prejevalsky (1876, vol. 1, p. 261) speaks of Musk Deer in the Ala-shan west and north of the Yellow River.

"Owing to ceaseless persecution by the Chinese, the Musk Deer has been nearly exterminated in the country [Chino-Tibetan borderland] where Mr. Zappé collected. The musk glands are keenly sought and much esteemed by the Chinese. In the mountains of western Szechwan, at Shuowlow, a single male was shot at an altitude of 14,000 feet. Although others were seen they were so shy that it was impossible to approach within range." (G. M. Allen, 1912, p. 205.)

Wilson (1913, vol. 2, pp. 169-171) gives the following account:

This pretty little animal . . . is still fairly common throughout the length and breadth of the Chino-Thibetan borderland, but is everywhere sorely hunted for its musk. . . . This Musk . . . is by far the most important export passing through the border towns of western Szechuan. Hosie . . . says that some 60,000 pods of musk, worth from 20 to 50 rupees each, according to size and quality, are annually sent through the district of Litang to Tachienlu, where they are trimmed and prepared for the Chinese and foreign market. An ordinary pod in its raw state weighs about an ounce, and with its fringe of skin and hair is about an inch across. . . .

Hosie . . . puts the annual exports of musk from Tachienlu at over 24,500 ounces, valued at Tls. 300,000. Watson . . . gives the export of musk through Kuan Hsien as 16,000 ounces, valued at Tls. 216,000; from Sungpan . . . to the value of Tls. 60,000. Through the Imperial Maritime Customs at Chungking between 40,000 and 50,000 ounces of musk pass annually. . . . But these figures represent only a part of the export, since they do not cover what passed through the Native Customs. In addition to this export large quantities are consumed in the wealthy cities west of Chungking. In the last Decennial Report (pub. 1904) the Commissioner of Customs, Chungking, writes: "The destruction of these animals must be enormous and must lead to their extinction if the present slaughter continues." The figures given above amply justify the commissioner's views.

This much persecuted little animal frequents the upper wooded country between 8000 feet altitude and the tree-limit (11,500 to 14,000 feet, according to climate) It occurs solitary or in pairs, though in a small area several may be found. . . . The natives trap, snare, and more rarely shoot them. . . .

The flesh is excellent eating We were informed that they [some animals in an enclosure] bred in captivity.

Sowerby writes (1923, p. 110): "In Shansi, North China, where the musk-deer is plentiful in the forested mountainous areas, the hunters will not tolerate this method [of snares], resorting to driving and shooting; which . . . ensures that only the males with musk-pods are taken. In view of the value of the musk-deer to the country it would be a good thing if the Chinese Government made it illegal to employ the snare in the hunting of this little animal."

According to the same author (1937, pp. 252-253), the present subspecies "ranges from South-western Kansu southward into Yunnan and north-eastward along the Tsing Ling range in South Shensi into Honan and West Shansi. . . . In the Chinese-Tibetan border regions the musk deer is hunted mainly with nooses set in the animal's runways. As this method kills females, which have no value, as well as males, it is very wasteful. Formerly abundant, the musk deer is rapidly approaching extinction. Nothing is done to protect this extremely valuable animal."

In Szechwan, according to Roosevelt and Roosevelt (1929, p. 266), "Musk deer . . . are plentiful in many localities. In their pursuit

the local hunters almost invariably use dogs. . . . The tushes of the deer are in common use as ornaments."

Schäfer writes (1933, pp. 301-303) that this is the commonest game animal of the border regions of China and Tibet. It is ubiquitous in the forested country, from 2,000 m. up to the tree line. It is a solitary animal, and flees from culture. It is very secretive and entirely nocturnal, and thus very difficult to meet with. The natives either hunt it with dogs or set foot snares for it.

According to Brooke Dolan, II (MS., 1938; cf. also Dolan in G. M. Allen, 1939, p. 280), Musk Deer are universally distributed throughout the marches of eastern Tibet. They range "from comparatively low altitudes to the highest growth of dwarf rhododendron. Their favorite habitat is probably at about 12,500 ft. in rhododendron, spruce or prickly oak. It is principally there that they are trapped by professional musk hunters, but their salvation seems to lie in the fact that there is a reserve in higher altitudes where the native hunters cannot trap them profitably."

According to a recent estimate, from 10,000 to 15,000 of the animals are killed yearly. In addition to the musk pods, the hide and the flesh are prized by the natives. Natural enemies include the Yellow-throated Marten, Wild Dog, Tibetan Lynx, Wolf, Leopard, Blue and Black Bears, and Golden Eagle. (Engelmann, 1938, p. 23.)

Himalayan Musk Deer

MOSCHUS MOSCHIFERUS CHRYSOGASTER Hodgson

Moschus chrysogaster Hodgson, Jour. Asiatic Soc. Bengal, vol. 8, p. 203, 1839. ("Cis and Trans-Himalayan regions"; type locality shown to be "Nepal" (Lydekker, 1915, vol. 4, p. 6).)

FIG.: Stockley, 1928, pl. facing p. 164.

The Himalayan Musk Deer has perhaps fared a little better at the hands of man than the other subspecies have.

Hodgson (1839, p. 203) applies the name *chrysogaster* to what is apparently one of several color phases found in the Himalayan region. He describes it as follows: "Bright sepia brown sprinkled with golden red; orbital region, lining, and base of ears, whole body below, and insides of the limbs, rich golden red or orange; a black-brown patch on the buttocks . . .; limbs below their central flexures fulvescent."

Blanford (1891, p. 553) gives the range, in part, as "throughout the Himalayas as far west as Gilgit, at elevations exceeding 8000 feet (in Sikhim in the summer above 12,000), in forest and brushwood." Lydekker (1915, vol. 4, p. 6) records a specimen from as far east as "Kachar" (Assam).

In the upper Himalayas, according to Vickers (in Louis, 1894, p. 160), "musk deer . . . literally swarm above 10,000 feet, but so cute and retiring are they . . . that I have never bagged one

"They are frequently snared for the musk of commerce, and the method employed is identical with that for pheasants, viz. a sharp pine-clad ridge is chosen, along it for some hundreds of paces a rough hedge is thrown up, unpassable except at certain places where a rope noose attached to a bent sapling is arranged to catch the animal."

Kinloch (1892, p. 253) records the Musk Deer "from Gilgit to Bhutan," and adds: "It is . . . much less common . . . than it used to be, for the value of the musk is well known, and no animal is more persecuted. In some of the more rugged parts of Kashmir, such as Gares and Tilel, and in the rugged district of Pangi, it is probably now as numerous as anywhere. The Ganges valley used to be a favorite locality, but I believe that few deer are now left there."

Burrard writes (1925?, pp. 143-144): "Indians poach them everywhere. . . . Musk pods will sometimes fetch as much as Rs. 30, a huge sum to a hillman."

The Musk Deer is greatly reduced in numbers within Indian limits. It has been recommended for special protection by the All India Conference. Shooting is controlled by regulations in Kashmir State. The musk pod is much in demand for perfume. (Bombay Natural History Society, *in litt.*, December, 1936.)

In Kashmir the animal is plentiful, but it is impossible to give even an approximate number. If a decrease should take place, it will be due to the high prices offered by exporters, making it worth the poachers' while to take the risk of game laws. The musk pod forms a very important ingredient of many Indian medicines and of perfumes; hence its high value. Shooting is prohibited except under a special license, for which a prohibitive fee is charged. Heavy penalties are imposed for poaching, and protection is thus very adequate. (Game Warden, Kashmir, *in litt.*, May, 1937.)

Musk Deer were formerly plentiful in the forested hills of Kumaun above 10,000 feet. Now they are very scarce and confined to a few isolated areas in the Almora district. Netting, noosing, and shooting are the causes of depletion. No measure is taken for the preservation of the species. (Major Corbett, Joint Secretary Game Preservation Association of the United Provinces, *in litt.*, March, 1937.)

The Game Warden of the Punjab and North West Frontier Province reports (*in litt.*, November, 1936) that the species is now never seen in localities where it was once common. Relentless poaching is perhaps the sole cause for its decline. The musk is used as a

base for scents, as an aphrodisiac, and, among the rich, for imparting aroma to food. The animal is protected throughout the year and can be trapped only to the extent provided by prescriptive sporting rights.

According to information received from the Government of North West Frontier Province (*in litt.*, December, 1936), the Musk Deer was formerly fairly common in the higher wooded hills of the Hazara District, but is now very scarce.

"It is a great pity that these little beasts are so terribly persecuted . . . , for they are most harmless and interesting. How they, with their foolishly confiding ways, have managed to survive at all, is surprising, for they are still fairly common in parts of Kashmir." (Stockley, 1936, p. 160.)

Family CERVIDAE: Deer

The deer family is composed of approximately 20 genera and 200 species and subspecies. It occurs over the greater part of the earth but is absent from the West Indies, all of Africa except the extreme north, and the Papuan and Australian regions. Dr. Allen (1942) provides accounts of 34 New World forms, and the present volume includes 25 Old World forms. The large proportion of endangered or vanishing species is due chiefly to man's reckless exploitation of these graceful animals for the sake of their flesh, hides, and antlers.

Hairy-fronted Muntjac

MUNTIACUS CRINIFRONS (P. L. Sclater)

Cervulus crinifrons P. L. Sclater, Proc. Zool. Soc. London 1885, p. 1, pl. 1, 1885. ("Vicinity of Ningpo, China.")

FIGS.: Proc. Zool. Soc. London 1885, pl. 1 and p. 2, fig.; Lydekker, 1898b, pl. 16, fig. 2.

Known only from three specimens from Chekiang Province, this species must be close to extinction.

"A large muntjac, . . . of a general dark blackish-brown color, including the dorsal surface of the tail, but the head and neck very slightly mixed with ochraceous; forehead, sides of the face, backs of the ears, and the occiput including its well-developed tuft of longer hairs, ochraceous; interramal area, a small mark above each hoof, the edges of the buttocks, the lower side of the tail, and the inguinal area white, the last with a narrow ochraceous border. Antlers short [65 mm.], with a small projection on the inner side at the base." (G. M. Allen, 1930, p. 15.) Height at shoulder, about 24 inches; tail, about 9 inches (P. L. Sclater, 1885, p. 2).

Shortly after Sclater's description of the type, Styan (1886, pp. 267-268) records a female specimen from Ningpo, and adds:

"This species appears to be very rare; ever since the description of it first appeared, the man I employed to hunt has been specially looking for it, but has only procured this single specimen."

G. M. Allen remarks (1930, p. 15): "Special interest . . . attaches to the capture of a third specimen, a male, brought back by the Asiatic Expeditions from Tunglu, Chekiang Province. . . . Probably this is a species close to the verge of extinction, of which a few remain in eastern China."

Schomburgk's Deer

RUCERVUS SCHOMBURGKI Blyth

Rucervus schomburgki Blyth, Proc. Zool. Soc. London 1863, p. 155, 1863.

("Probably . . . Siam.")

FIGS.: Proc. Zool. Soc. London 1863, p. 156, figs.; Blyth, 1868, pp. 837-839, figs. 6-12; Lydekker, 1898*b*, p. 194, fig. 53; Lydekker, 1915, vol. 4, p. 98, fig. 19; Kemp, 1918, pl. 1; Ward, 1935, p. 20, fig.; Leister, 1935, p. 63, fig.; Gühler, 1936, pls. 19, 20.

Schomburgk's Deer, first introduced to science in 1863, is now on the verge of extinction if not already extinct. It is scarcely known outside of Siam.

"Height at shoulder about 3 feet 5 inches; hair in winter rather long and coarse. General colour of pelage uniform brown, darkest on the nose and the upper surface of the tail, and lightest on the cheeks and flanks; under-parts, lower surface of tail, and lower lip whitish; a tinge of rufous on the upper lip, the back of the head, and limbs; the hair on the front of the lower part of the fore-leg elongated to form a fringe. Antlers large, complex, smooth, and polished; the brow-tine very long, frequently forked, and arising nearly at a right angle from the beam; the beam very short and more or less laterally compressed, then forking dichotomously, with each of the main branches about equally developed, and again forking in a similar manner, to terminate in long cylindrical tines." (Lydekker, 1898*b*, p. 194.) The record length of antlers, measured on the outside curve, is 35½ inches (Ward, 1935, p. 29).

Valuable information on this species has been contributed by Kemp (1918), Kloss (1921), Pigot (1929), Bhicharana (1932), and Guehler (1933). More recently the last-mentioned author (Gühler, 1936) has furnished a comprehensive summary, from which the following account is mainly derived.

This, perhaps the rarest of all deer, has never been seen in the wild by a European, although a number of scientific expeditions have sought it in Siam. From 1862 to 1911 eight living examples were known in zoos (at London, Hamburg, Berlin, Köln, Paris, and Shanghai). The only known mounted specimen in existence is preserved in Paris; it is doubtless the one that lived in the Jardin des

Plantes in 1867. Many antlers (perhaps to the number of 300 or 400) and some skulls are found in various museums and in private possession. The antlers figure particularly in the Chinese pharmaceutical trade. The female is practically unknown.

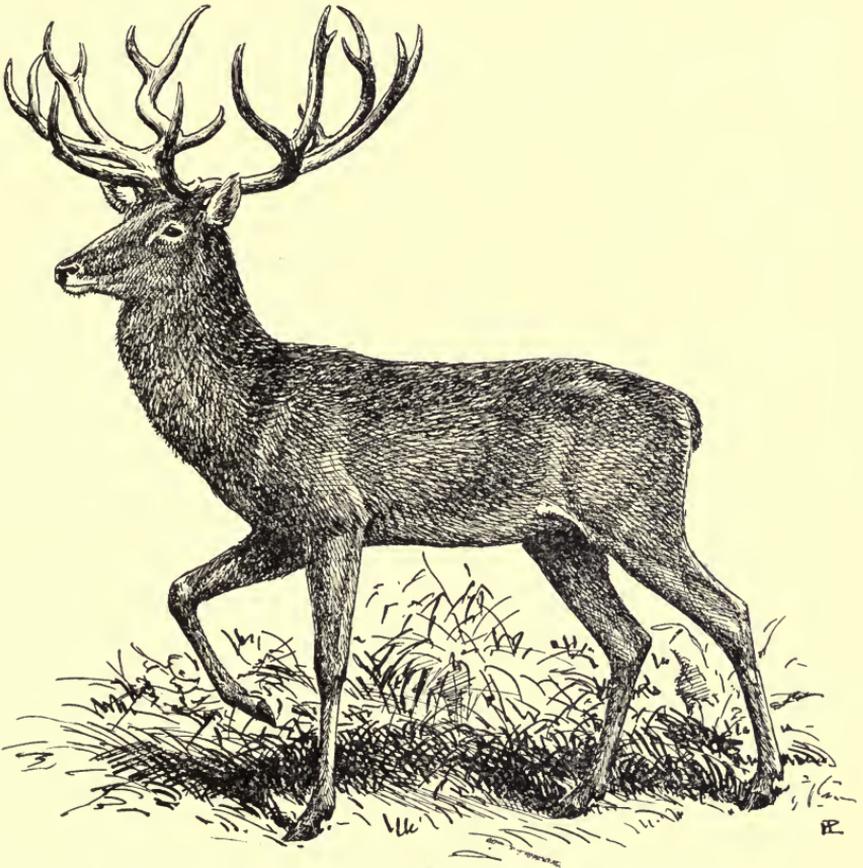


FIG. 45.—Schomburgk's Deer (*Rucervus schomburgki*)

Perhaps the most recent specimen is said to have been shot in September, 1932, in the forests near Sayok (lat. $14^{\circ} 30' N.$, long. $98^{\circ} 50' E.$), along the Qwe-Noi River. Although the date of the specimen is questioned in some quarters, the record gives some ground for believing that the species still exists.

Forty or fifty years ago entire herds occurred in the swamps near Rangsit (lat. $14^{\circ} 05' N.$, long. $100^{\circ} 35' E.$). At times of high water the deer were said to have been hunted with boats, driven on to dry islands, and killed with spears.

There are a few early reports of the species from beyond Siam—

in Yunnan, the Shan States, and Indo-China. Bentham (1908, p. 89) figures an apparently authentic frontlet and antlers from the Sanda Valley, Yunnan, presented by J. Anderson in 1878. The report from the Shan States (Blanford, 1891, p. 540) is highly indefinite, and that from Indo-China erroneous (Lydekker, 1915, vol. 4, p. 99). Kemp (1918) limits the range to a quadrilateral in Siam between latitude 15° and 17° N. and longitude 101° and 103° E. But Gähler changes the boundary of this area to latitude 14° and 16° N. and longitude $98^{\circ} 30'$ and 102° E. Bhicharana (1932) believes that the animal still occurs between the Suphan and the Meklong Rivers, while Stockley (1933) indicates the area about Sayok as "practically our last hope."

We may safely conclude, from the number of antlers still extant and from the reports of the Siamese, that Schomburgk's Deer was not uncommon toward the end of the past century. It was adapted to open lands with abundant moisture and sparse tree growth. Increasing cultivation of the land, together with the introduction of railroads and irrigation, forced it more and more into thick forests and into a generally unsuitable environment. Thus man has contributed both directly and indirectly to its disappearance. Hitherto in Siam there have been no game laws or game preserves. The antlers of Schomburgk's Deer perhaps fetch a better price with the Chinese than those of the Sambar or the Thamin.

No one knows whether a few of the present species may still survive in the inaccessible parts of the Suphan district.

In 1931 total protection was recommended by the Siam Society.

Kloss (1921, p. 105) quotes Seidenfaden [1920] concerning a tribe of savages who live "on the slopes of the big Pu Kio mountain [between lat. 16° and 17° N. and long. 101° and 102° E.]" and "chase and kill . . . that rare animal, Schomburgk's deer, which is living just in this region."

Bhicharana reports (1932, p. 312):

I used to question some of my old surveyors as to whether they had ever seen animals called sa-man while doing their work up-country twenty-five or more years ago. They told me there were plenty of such deer. . . . The particular area which these surveyors reported as being frequented by this deer was between the Suphan and Menam Noi Rivers. About 1926 I sent men to make inquiry as to whether this deer was still to be found there, but it was reported that all had disappeared, as the people had opened up the bamboo jungle which once existed and converted it into rice fields.

In 1928 when going up Klong Makam Dhao I . . . learned that there was still one Schomburgk deer which the people saw roaming about. . . . In 1930 I was told that this deer had disappeared.

Dr. John C. Phillips writes (*in litt.*, August 10, 1937): "Arthur Vernay . . . agrees with us that it's extinct, that he made three journeys to Siam for this animal, the first one being in 1920; another

going from Moulmein [Burma] right through to Bangkok covering untouched territory on the Meklong River."

**Brow-antlered Deer; Burmese Thamin; Eld's Deer.
Sangnai (Manipuri)**

RUCERVUS ELDII ELDII (M'Clelland)

Cervus Eldii M'Clelland, Calcutta Jour. Nat. Hist., vol. 2, p. 417, 1842. ("The valley of Muni-pore" [Manipur], Assam.)

SYNONYMS: *Cervus (Rusa) frontalis* M'Clelland (1843); *Rucervus thamin* Thomas (1918); *R. t. brucei* Thomas (1918).

FIGS.: Eld, 1842, pl. 12; M'Clelland, Calcutta Jour. Nat. Hist., vol. 3, pls. 13, 14, 1843; Blyth, 1868, p. 841, figs. 13-17; Lydekker, 1898b, p. 197, fig. 54, p. 199, fig. 55; Lydekker, 1900, pl. 6, fig. 8, p. 235, fig. 49; Lydekker, 1915, vol. 4, p. 101, fig. 20; Stockley, 1928, pl. facing p. 160; Peacock, 1933, pl. 21; Jour. Bombay Nat. Hist. Soc., vol. 37, no. 1, suppl., pl. 25, 1934; Ward, 1935, p. 18, fig.; Pocock, 1937, p. 694, fig.

This Thamin, ranging from Manipur through Burma, has suffered so severely from overshooting and from the extension of cultivation that there is much apprehension as to its chances for survival.

"Mature stags are dark brown or almost black in colour, with a long, thick ruff of coarse hair around the neck. The hinds are fawn-coloured." (Peacock, 1933, p. 137.) The antlers "are rounded and rough, with a long curved brow-tine, forming a continuation of the curve of the beam, which is set at right angles to the pedicle; the beam unbranched for some distance, much curved, and finally forked, with the outer prong more subdivided than the inner. Height at shoulder, about 4 feet 3 inches." The record length of antlers on the outside curve, not including the brow-tine, is 42 inches. (Ward, 1935, p. 16.) The female is much smaller than the male.

Assam.—According to Eld (1842, p. 415), this deer is found [in Assam] only in the Valley of Manipur, and not in Cachar or the Kubo Valley or the Naga Hills. "After the annual grass burning, I have frequently seen herds of two or three hundred."

The following information on its present status in Assam comes from the Political Agent in Manipur and J. C. Higgins (*in litt.*, March, 1937). It lives only in the swamps in the low parts of the Manipur Valley. It has decreased in numbers in recent years, partly owing to extension of cultivation, but more to poaching. There are rules for its protection, which are often disregarded, because there is no special staff to enforce them.

The Bombay Natural History Society writes (*in litt.*, December, 1936) that Wild Dogs and poachers are factors in its decrease. "In time of high flood the animals are driven out of their haunts to isolated places of high ground and slaughtered regardless of sex or age." The meat, hide, and horns are utilized.

Burma.—The following comprehensive account is furnished by Peacock (1933, pp. 137-141):

Before the introduction of guns and rifles, *thamin* were probably the most numerous of the deer tribe in Central Burma. Their range extended from the Katha District in Northern Burma to the Pegu district in Lower Burma. . . .

At the present time *thamin* are found in greatest numbers in the Dry Zone, in the forest divisions of Shwebo, Mu, Lower Chindwin, Yaw, Meiktila, Minbu, Magwe and Thayetmyo. A few *thamin* are also to be found in parts of the Mogok, Yamethin, Henzada and other Divisions, but their numbers are decreasing so rapidly that they are sure to be eliminated very soon from all except typically Dry Zone Divisions.

The case of the *thamin* is one of the very black spots in the page of game conservation in Burma. In the face of a terribly rapid diminution in their numbers one of the most beautiful species of deer remain unprotected by a single sanctuary or game park.

The brow-antlered deer is one which cannot tolerate heavy forests or hills. His habitat is the open scrub and *indaing* forests on the flat or undulating land No matter how he is persecuted he will not change his habitat. Moreover, he is remarkably stupid in that he will allow a bullock-cart to be driven within a few yards of his stand. Previous to the revision of the game rules and the prohibition of shooting from any vehicle, *thamin* were slaughtered in hundreds by sportsmen(?) and poachers who approached them in this manner.

The habitat of *thamin*, always very accessible, is now being increasingly threaded by railway, road and water communications, and the number of guns issued to natives of the country is also on the increase. Cultivation has spread over the grounds occupied by *thamin* and, since these deer will not change their grounds or cease from their habit of feeding on man-made crops within their reach, they are being shot out partly in defence of crops and partly under cover of that excuse.

Obviously, the only certain means of perpetuating the existence of *thamin* is to set aside a few sanctuaries or parks in localities which are not required for cultivation and sufficiently removed from crops to render the preservation of these deer feasible. This course would have been an easy one a few years ago: now it is not so easy. . . .

In the absence of sanctuaries there is nothing so certain as an early termination to the existence of the brow-antlered deer. . . .

In the Singaung area in the Shwebo District I saw herds of fifteen animals and more as recently as last year. . . .

They enter crops and the stubble of crops nightly when such are within reach, and fall a frequent victim of the poacher, the light from whose electric torch appears to fascinate them into immobility. . . .

Thamin . . . can become an unmitigated nuisance to the villager in some localities. . . .

Females, and stags not in hard horn, are protected throughout the year.

Stags in hard horn may be shot in unclassed forests without a game license and, in reserved forests, under authority of a game license. The license usually prescribes that only one stag may be shot, and that his horn must exceed 30 inches in length.

Any wild animal engaged in crop destruction may be shot. . . . So there is every opportunity for the poacher and field-owner to shoot these deer under cover of crop protection.

C. W. A. Bruce writes (in Lydekker, 1900, pp. 407-408):

The flesh is coarse and poor eating; many Burmans will not touch it, as they say it renders the eater liable to leprosy.

Thamin are often killed by Burmans with a dah (large knife). Two men go out at night, one with a light on his head (in a cooking-pot, the light shining through a hole broken in the side); the thamin, when he sees this light, stands staring at it, while the man's companion, the one armed with the dah, sneaks round and hamstring the deer. Many also are caught in huge nets into which they are driven, and many in the rains are speared from boats while swimming from islands left in the inundated plains.

The Game Warden of Burma writes (*in litt.*, November, 1936): "During the past 15 years this deer has been disappearing at an alarming rate Government has now ordered steps to be taken, for the provision of some sanctuaries for this animal and at the moment two areas, one in Shwebo Forest Division and one in Minbu Forest Division, are being investigated."

Siamese Thamin; Siamese Brow-antlered Deer. Lamang (Siamese)

RUCERVUS ELDII PLATYCEROS (J. E. Gray)

Panolia platyceros J. E. Gray, List Mammalia Brit. Mus., p. 181, 1843. (Based upon "Cervus, n. s., Gray, Proc. Zool. Soc. 1837, 45"; type locality, "India" = Siam.)

SYNONYM: *Cervus eldi siamensis* Lydekker (1915).

FIGS.: Blyth, Proc. Zool. Soc. London 1867, p. 841, figs. 20-23; Kloss, Jour. Nat. Hist. Soc. Siam, vol. 3, pl. 8, 1919.

Severe hunting has evidently reduced the Thamin of Siam and Indo-China to a fraction of its former numbers.

"Antlers with the main termination much flattened, a number of small snags on the sharp hind edge, and the brow-tine relatively short; general colour reddish at all seasons, with spots along middle of back, and in some cases also on sides" (Lydekker, 1915, vol. 4, p. 105). The record length of antlers on the outside curve, not including the brow-tine, is 40 inches (Ward, 1935, p. 18).

Siam.—Irwin (1914*b*, pp. 113-115) gives the following account:

It undoubtedly occurs, or was found until recently, in Ratburi Province. [In 1908 a herd of six was seen in the neighborhood of Chawm Bung, a swampy plain at about latitude 13° 40', longitude 99° 35'.]

In recent years the plain of Chawm Bung itself has been largely brought under cultivation. Formerly it would have furnished an ideal haunt for these deer. There has also been an enormous increase in the number of people who enter this district The wood-cutters do a certain amount of game shooting by sitting up over waterholes, and . . . it seems to me probable that this deer may have been almost, if not quite exterminated by now on the west side of the Meklawng River by this method of shooting. . . .

In the Province of Nakawn Chaisi . . . the "lamang" occasionally enter and feed on the rice crops during the wet season. . . .

These deer were found until recent years in patches of high grass-jungle between the railway and the river, north of Lopburi in Krung Kao Province, approximate Lat. $14^{\circ} 55'$, where I saw them on more than one occasion in the year 1906. Since then some of this jungle has been brought under cultivation, possibly all of it. . . . I see no reason why "lamang" should not be found on the west of the Menam Chao Praya in this latitude.

Gyldenstolpe writes (1919, p. 172): "Thamins' are not uncommon in suitable localities throughout the whole country, but their southern limit of range still not ascertained. Specimens recorded from Chienghai, Me Lua (N. Siam), Non Luum (E. Siam), Chawn Bung and Nawng Pla Duk (Ratburi), Choraké Sampan (Kanburi) and from the neighbourhood of Lopburi (Central Siam)."

In 1931 protection of the female only throughout the year was recommended by the Siam Society.

Indo-China.—"Mr. H. Warington Smith . . . says the plain round Battambang 'is much frequented by herds of the *Lamang*, or *Eld's Deer*,' and describes how the Cambodians capture them" (Flower, 1900, p. 372).

The Résident Supérieur of Cambodia writes (*in litt.*, November 20, 1936) that this species is found in 11 provinces of Cambodia. The shooting of females is forbidden.

In Cambodia it still maintains itself well, but in Cochin China and Annam, where it abounded about 1920-25, it has been quickly wiped out by the intensive pursuit of native hide-hunters. Its predilection for open savannas and its confiding nature place it in a worse position for survival than the other deer. (André Kieffer, *in litt.*, November 21, 1936.)

In Cochin China its former range was more extensive and more densely populated than the present range. It now occurs in the north of the Provinces of Tayninh and Thudaumot and in the east of the Province of Bienhoa. Its numbers are about a thousand. It is of interest as a game animal, but the value of its hide and antlers is insignificant. The hunting is regulated. (Roche, Chef du Service Veterinaire du Cochinchine, *in litt.*, December, 1936.)

P. Vitry writes (*in litt.*, December, 1936) that this deer formerly occurred in all the plains and open forests in Lower and Middle Laos, including the provinces situated south of Luang Prabang and Tran-ninh. The greatest frequency was in the southern half of Savannakhet, the basin of Sédone, the middle and lower basin of Sékong, and the two shores of Mékong, except the mountainous and densely forested parts. In the basin of Sédone alone there were more than 1,000 head in 1910; but less than one-fourth of that number are left at present. The herds found on Attopen some years ago have been reduced to a few individuals. The present range includes the southern part of Savannakhet, the center of Saravane, and the

extreme southern part of Bassac. The animal is nowhere frequent. Where three herds of 15 to 30 head each could be met with in one day, only one herd is observed now—and not every day—of 2 or at most 5 head! The causes of depletion are: hunting by night with lanterns (in the whole territory); hunting with nets (particularly in Saravane); and organized encircling hunting (in Saravane alone on two occasions previous to 1921). Protective measures which ought to be adopted are: prohibition of the forms of hunting mentioned above; prohibition of hunting during the breeding season; and establishment of temporary reserves. Economic uses include consumption of the meat and trade in the horns and hides.

James L. Clark writes (*in litt.*, June 26, 1936):

“The sambar and the hog deer and also the Eld’s deer, which grow horns in the velvet, are, of course, in danger at all times from the onslaught of the Chinese and their agents.

“About 1925, in and around Dalat, the natives and others were killing the Eld’s Deer by night and by day, so fast that the Government shut down completely on their killing and established an enclosed area, now completely surrounded by a road, which has frequent parking places where people can stop and view the animals from the road.

“No one is allowed to carry a gun within this area, and apparently the French are controlling it very well.

“As a guess, it is estimated that there are from 2,000 to 5,000 Eld’s deer in the Dalat reserve.”

[The Hainan Brow-antlered Deer (*Rucervus eldii hainanus* Thomas, 1918) is restricted to that island. No information is at hand concerning its numerical status or need for protection. It is figured by Lydekker (1898b, pl. 15).]

Shansi Sika

CERVUS NIPPON GRASSIANUS (Heude)

S[ikaillus] grassianus Heude, Mém. Hist. Nat. Empire Chinois, vol. 4, pt. 4, p. 210, pl. 37, fig. 13, 1898. (“Chan-si septentrional” = Tching-lo-hsien, near Ning-wu-fu, Shansi (*vide* Sowerby, 1917, pp. 11, 17, 18).)

This deer is evidently facing extinction.

Head in general grayish brown; body dark grayish brown, shading into rich brown on the back and lower portions of the legs; spots almost invisible; a patch of long white hairs, surrounded by black, on outer hind leg below heel; tail black above, white beneath; croup disk white, edged with black above; belly and inner surface of thighs white. Head and body, 60 inches; height at shoulders, 42 inches; tail, 8 inches; horns, 19 $\frac{3}{4}$ inches; weight of male, about 220 lb. (Sowerby, 1918, p. 120.)

Sowerby (pp. 120-121) continues:

The habitat of this species may be considered as confined to the forested and mountainous areas of that part of Shansi that lies west of the Fen Ho. Even here it occurs only in a few isolated districts, namely: [south of Ning-wu Fu; 90 miles west of Tai-yuan Fu; and 100 miles southwest of Fen-chou Fu.]

Formerly its range extended throughout the whole of the mountainous area of West Shansi, as well as in the mountains that extend in a north and south line between Shansi and Chihli; but it has been almost exterminated by native hunters for the sake of its horns, which are highly valued as medicine. Only a few isolated herds occur in the districts above mentioned, where they keep to the densest parts of the forest. Even so, they are being steadily exterminated.

. . . It is during August and September that this species is most sedulously hunted by the natives, for then the horns are considered to be in their prime.

"The last specimen known to have been shot was killed by a Chinese hunter-guide in 1920. The forests in West Shansi, formerly fairly extensive, have been greatly reduced during the past few years, and with them must vanish this fine deer. It is probably now too late to save it." (Sowerby, 1937c, p. 252.)

The distribution of the three Chinese Sikas is mapped by G. M. Allen (1940, fig. 67).

North China Sika

CERVUS NIPPON MANDARINUS A. Milne Edwards

Cervus mandarinus A. Milne Edwards, Recherches Hist. Nat. Mammifères, p. 184, pls. 22, 22A, 1871. ("La Chine"; type locality restricted by Lydekker (1915, p. 114) to "N. China.")

FIGS.: Milne Edwards and Milne Edwards, 1868-1874, vol. 2, pls. 22, 22A; Proc. Zool. Soc. London 1897, pl. 1 (subsp.?); Lydekker, 1898b, pl. 9 (subsp.?); Lydekker, 1901, pl. 4, fig. 4, and p. 235, fig. 56.

The North China Sika is apparently in much the same unfortunate status as the Shansi Sika.

White spots of the body in summer pelage much larger and less numerous in this form than in *mantchuricus*; general color paler; less white in the rump patch; belly not white, but colored like the flanks. Winter pelage dark, spots on back remaining visible; hairs of neck long and shaggy. Antlers more divergent than in *mantchuricus*. (A. Milne Edwards, 1871, pp. 185-186.)

"This species occurs in a wild state only in the Imperial Hunting Grounds, north of the famous Tung Ling (Eastern Tombs), and in the Wei-ch'ang to the north of Jehol, both in Chihli province, to the north and north-east of Peking. It occurs in a semi-domesticated state in the magnificent park at Jehol.

"Up to recent times this deer has been strictly preserved, but in 1911-12 the Manchu soldiers that were sent out of Peking and were camped in the Eastern Tombs and Imperial Hunting Grounds were

allowed to kill as many as they liked, while since that date native hunters have been allowed to hunt in these districts, with the result that in the wild state the species is practically extinct." (Sowerby, 1918, p. 122.)

The same author writes (1937, p. 252) that this form "still occurs, though in greatly reduced numbers, in the Tung Ling area" and that it "is preserved in captivity in the Jehol area on Chinese deer farms."

Manchurian Sika

CERVUS NIPPON MANTCHURICUS Swinhoe

C[ervus] mantchuricus Swinhoe, Proc. Zool. Soc. London 1864, p. 169, 1864.

(Based upon a captive specimen obtained at Newchwang, Manchuria.)

SYNONYMS: *Cervus hortulorum* Swinhoe (1864); *Cervus dybowskii* Taczanowski (1876).

FIGS.: Wolf, 1867, vol. 2, pl. 13; Trans. Zool. Soc. London, vol. 7, pls. 31, 32, 1871; Noack, 1889, pp. 10-11, figs. 1-3; Lydekker, 1898b, pl. 7, and p. 115, fig. 30; Lydekker, 1901, p. 233, fig. 55.

The Manchurian Sika is being rapidly exterminated in a wild state, but is preserved in domestication in considerable numbers.

"Size larger than *C. taiwanus*, with horns short in the stem, and more resembling those of *C. sika*. Colouring very similar (in winter coat) to that of *C. taiwanus*. Red patch on occiput, on each shoulder, and on side of neck. Black line down back somewhat indistinct; mane from side and back of neck rather long, thick, shaggy, and dark-coloured. Belly pale reddish white. Thighs light reddish brown." (Swinhoe, 1864, p. 169.)

"This fine deer . . . is still found in the eastern part of Manchuria and the neighbouring Ussuri, Primorsk and Amur regions of Eastern Siberia and Northern Korea, but is rapidly being exterminated in a wild state. . . . Formerly it was very plentiful, observers having reported large herds on the move in the Amur-Ussuri Region." (Sowerby, 1937b, p. 252.) Elsewhere (1923, pp. 106-108) Sowerby writes:

[The Manchurian Sika] is a somewhat rare animal at the present time owing to the persecution to which it has been subjected for the sake of its horns when in velvet, which are supposed by the Chinese to be better than those of the wapiti, and so fetch the highest prices. The only living specimens I have come across have been in captivity. At Hua-shu Lin-tzu on the Upper Sungari there were three or four bucks and a herd of about thirty does kept on a farm. There are many such farms scattered over Manchuria, so that it is to be hoped that the species is thus being preserved from extinction.

In North Corea a sika . . . is said to be very plentiful, and from all accounts is on the increase. This is due to the fact that the Japanese, themselves but indifferent hunters, have forbidden the use of fire-arms and traps amongst the Koreans. . . .

The pitfall is the chief means employed by natives to capture this deer, though they also resort to driving and shooting. . . .

My friend Mr. Jacobus, who resided in Vladivostok for some time, informs me that some of the Russians there have immense farms of these deer, which they keep for the sake of their horns, and which are allowed to roam at will over very extensive forested grounds. The number of head so kept runs into thousands.

South China Sika; Kopsch's Deer

CERVUS NIPPON KOPSCHI Swinhoe

Cervus kopschi Swinhoe, Proc. Zool. Soc. London 1873, p. 574, 1873. ("Department of Kienchang, on the eastern side of this province (Kiangse), bordering on Fokien," China.)

This deer of the lower Yangtze Basin is apparently facing extinction.

The upper parts are brown, mottled with light yellowish brown; a dark median dorsal stripe from crown to rump, with a row of indistinct white spots along each border; shoulders, flanks, and thighs light purplish brown; head, neck, and outer surface of ears brown; hair on neck rather coarse, on abdomen long and curly; belly and inside of limbs brownish white to white; a deep brown median line on breast; glandular metatarsal spot grizzled black and white, with a buff border; upper surface of tail black. Height at shoulder, about 34 inches. (Swinhoe, 1873, pp. 574-575.)

Swinhoe (1873, p. 574) had reports of this deer from the mountains along the border of Anwhei and Chekiang, where "men from the Fokien province came yearly . . . to hunt Stags for their velvet, which is greatly valued for its medical properties At Kiu-kiang, up the Yangtse river, . . . now and then dead antlered Deer were brought into the market . . . for sale during the winter."

According to Wallace (1915, p. 171), "Kopsch's deer . . . is . . . found in the province of Anwhei. Commander Hon. R. O. Bridgeman tells me he spent the greater part of two years trying to obtain a specimen in the Feng-huan-shan and Wei-yao-shan ranges. Major M'Neill also hunted them without success, though Europeans are said to have killed them. They inhabit rough, stony bush-clad hills about 4,000 feet high, and always keep in the densest cover. Commander Bridgeman writes: "The stags I saw generally had eight points, but I saw certainly one with fourteen.'"

The British Museum has specimens from Chin-teh and Tai-Kung-Shan, Anwhei (Lydekker, 1915, vol. 4, p. 115). Sowerby (1937, p. 251) writes:

The beautiful spotted Kopsch's deer, which once ranged over a wide area in the Lower Yangtze Valley and southward into Chekiang and Kiangsi Provinces, is now all but extinct. It is to be found only in a more or less

restricted area in the mountains of Southern Anhui and closely adjacent North-western Chekiang and South-eastern Kiangsi. Its horns when in velvet fetch a price of several hundred dollars a pair, and consequently it is hunted mercilessly by local hunters. No protection of any kind is afforded this or any of the foregoing species of deer, and their extermination in the near future is certain.

Specimens of deer of this type, collected some forty to fifty years ago and now in the Heude Museum . . . in Shanghai, show that it ranged all through the Yangtze Valley and Central China, being found in areas where it is now extinct.

Manchurian Wapiti

CERVUS ELAPHUS XANTHOPYGUS Milne Edwards

Cervus Xanthopygus A. Milne Edwards, Ann. Sci. Nat., ser. 5, zool., vol. 8, p. 376, 1869. ("Environs de Pekin"; later Milne Edwards (1868-74, text to pl. 21) gives "Mantchourie" as the place of origin of the type specimen.¹)

SYNONYMS: *Cervus lühdorfi* Bolau (1880); *C. isubra* Noack (1889); *C. bedfordianus* Lydekker (1897).

FIGS.: Milne Edwards, 1868-74, pl. 21; Bolau, Abhandl. Naturwissen. Verein Hamburg, vol. 7, pl. 4, 1880; Noack, Humboldt, vol. 8, p. 13, fig. 5, 1889; Lydekker, 1897, pls. 48, 49; Lydekker, 1898b, pl. 3; Lydekker, 1901, pp. 71-75, figs. 19-22; Natural History, vol. 20, p. 358, lower fig., 1920.

This is another of the much persecuted Asiatic deer, which has been exterminated in some parts of its extensive range. The range includes southeastern Siberia, northeastern Mongolia, Manchuria, northern Korea, and northeastern China.

The Manchurian Wapiti is about the size of a large European Red Deer. The general color in summer is bright reddish brown (duller in older animals); in winter it is brownish gray, with darker under parts and a long blackish mane; a large orange rump-patch. Antlers shorter and stouter than in *songaricus*; tips of fourth and fifth tines in subadult stags curving toward one another; length of antlers on outside curve, 33-43 inches. Height at shoulder, about 54 inches. (Lydekker, 1901, pp. 74-75, and 1915, vol. 4, p. 134; Ward, 1935, p. 4.)

Middendorff (1853, p. 121) extended the range of this Wapiti north to the Stanovoi Mountains, and reported it on the upper tributaries of the Selemja and the Bureya (where formerly it was very common).

According to Schrenck (1859, pp. 172-173), it was not less numerous than the Roe on the upper Amur. Here it was of great importance to the natives, not merely for its flesh and its hide (the latter being tanned for use as clothing); the horns in the velvet were traded with the Manchus, the Chinese, and the Russians, and

¹ Lydekker makes various statements regarding the type locality: "Northern China" (1897, p. 933); "Imperial gardens at Pekin" (1898b, p. 81); "Manchuria" (1901, p. 70); "Northern Manchuria, probably the Usuri district" (1915, vol. 4, p. 134). The Ussuri district is in eastern, rather than northern, Manchuria.

the animal was also utilized in the payment of tribute to the Chinese. It was numerous about the mouth of the Ussuri, and extended down the Amur as far as the mouths of the Gorin and the Chelasso Rivers, where it reached its final limit at latitude 51° N. It also occurred along the seacoast northward to within two days' journey of Alexandrovsk.

Radde (1862, p. 285) extended the range west to the Yablonoi Mountains. In the Khingan Mountains a single hunter in 1856 secured 60 animals. The species was everywhere rather common in the Bureya Mountains, where the average annual kill for a good hunter was 7 to 8 animals.

Sowerby (1923, pp. 103, 105) writes of this deer:

In Manchuria the wapiti is to be found wherever there are forests, though it is comparatively rare in those parts that are being invaded by settlers. It is nowhere plentiful except in the most inaccessible parts of the Kirin forest, in the upper and middle basin of the Ussuri, and in the central and western parts of Heilungkiang. . . .

The Manchurian wapiti, by reason of much persecution, has become very timid and difficult to approach. The natives hunt it with the gun, but more often they dig pitfalls in the paths that the animal frequents. Deer-farming has become a very profitable industry, and a live deer is worth much more than a dead one. . . . The value of a deer lies in its horns, which when in the velvet fetch anything from £10 to £30 per pair at the apothecary's emporium. It has been found that the horns in the velvet may be cut from the living animal without injury to it, or endangering the growth of the following year. Thus a stag which costs but little to feed brings in an annual sum that is a small fortune to the poor settler that owns it. It is on this account that the Chinese prefer to trap the deer alive.

In writing on the Wild Dogs (*Cuon alpinus*) of the Manchurian region, Sowerby says (1923, p. 46): "The lordly wapiti stag . . . cannot escape these relentless hunters, unless he can succeed in placing some wide and swift river between himself and them."

"The Manchurian wapiti is rapidly being exterminated by Chinese and Russian hunters for the sake of its horns The female is hunted for the sake of the foetal young, which is also considered of high medicinal value. Formerly this large and handsome deer was very plentiful in the forested areas of Manchuria, the Amur, Transbaicalia, the Ussuri, the Primorsk and Northern Korea. To-day it is greatly reduced in numbers, and has actually been exterminated in many areas." (Sowerby, 1937, p. 250.)

G. M. Allen (1930, p. 16) refers to this subspecies a specimen from 60 miles northeast of Urga, Mongolia.

"The Manchurian Wapiti . . . is in some danger of extermination, due to the fact that the antlers in the velvet bring a good price in China, and also tails of the animal are in great demand. I saw one hunter with a collection of ten or twelve tails. These practices are strongly disapproved of by the government and are against the

law. Despite this there is still quite a trade going on. There are, however, a few wapiti in eastern Siberia." (G. G. Goodwin, *in litt.*, May, 18, 1937.)

W. G. Heptner writes (*in litt.*, December, 1936) that during the last decades the numbers have decreased, and this Wapiti is now common only in the most remote mountain regions. It is most frequent in the Sikhota Alin (Ussuri territory) and especially in the great reserves, comprising 1,000,000 hectares. The hunting of males is allowed.

Ala-shan Wapiti

CERVUS ELAPHUS ALASHANICUS Bobrinskoy and Flerov

Cervus canadensis alashanicus Bobrinskoy and Flerov, Arch. Mus. Zool. Univ. Moscou, vol. 1, p. 29, 1934. (The Ala-shan, Inner Mongolia.)

FIG.: Bobrinskoy and Flerov, 1934, p. 40, fig.

While no information concerning the present numerical status of the Wapiti in the Ala-shan is available, it is no doubt seriously threatened in the same manner as the neighboring forms.

It was found in the Ala-shan, west and north of the Yellow River, by Prejevalsky, who reports on it (1876, vol. 1, pp. 261-262) as follows: "Deer are plentiful in the Ala-shan mountains, where they are strictly preserved by order of the prince. They are nevertheless killed secretly, especially in summer, at the season of the growth of the young horns, so valuable in China. While we were in the mountains . . . the loud call-note of the males resounded in the forests day and night." One specimen was secured.

This specimen has been made the type of Bobrinskoy and Flerov's *alashanicus*. Their paper is wholly in Russian.

The following records may be at least provisionally considered as applying to the same form. In 1912 and 1913 Sowerby (1918, pp. 122-128, 207-208) found numbers of Wapiti in the mountains of the Kueihuacheng district of northern Shansi (now in Suiyan). R. C. Andrews (1920, pp. 358, 372) records three specimens from northern Shansi, and remarks: "The elk of north China will soon be extinct." A. B. Howell (1929, p. 76) records six specimens from west of Kueihuacheng, Shansi.

"The North China wapiti is found in the mountains of Suiyan Province on the Mongolian border of Shansi, westward into Ninghsia It occurs only in more or less restricted areas, is nowhere abundant, and is much hunted." (Arthur de C. Sowerby, *in litt.*, April 24, 1937.)

Kansu Wapiti

CERVUS ELAPHUS KANSUENSIS Pocock

Cervus kansuensis Pocock, Proc. Zool. Soc. London 1912, p. 558, 1912. ("30 miles S.E. of Tao-chou, Kansu, in China, at an altitude of 11,000 feet.")
 Figs.: Wallace, 1913, pls. facing pp. 200, 206, 214; Wallace, 1915, pl. 66.

The Kansu Wapiti, ranging from southern Kansu to northern Szechwan, is evidently faced by the same threat of extinction as its Asiatic relatives.

The winter pelage of the stag is brown-gray; legs darker than the body; height at the shoulder, about 57 inches; antlers with 5 or 6 tines, length along the curve up to 43½ inches (Wallace, 1913, p. 203). The general color of the female is speckled brown; a blackish-brown patch on the croup; white of the hind-quarters of about the same extent as in *macneilli*; tail with a narrow median dark stripe (Pocock, 1912, p. 572).

Wallace (1913, pp. 199-206) gives the following account of this Wapiti as he found it in the Min Shan along the boundary between Kansu and Szechwan:

The huge forests which originally existed on the borders of North-Western [northeastern] Thibet, have, during the course of centuries, been fearfully depleted. The natural home of the wapiti, . . . deforestation alone, even to the enormous extent to which it has been carried, would have had but small effect upon their numbers. They have, however, been reduced to an even greater extent than have the firs and pines which form their home. Nor is the reason far to seek. Whatever the true medicinal value of hartshorn, its efficacy has been magnified a thousand fold by the Chinese. The wretched wapiti have but practically two months' immunity from slaughter in the year, namely May and June. They shed their horns in April and therein lies their sole safeguard, for minus their horns their commercial value is small. . . . It is a matter of astonishment that they have not been totally exterminated long since. . . .

Given . . . a race of hunters (and nearly every man on the Thibetan border possesses a gun), plus a powerful motive for the killing of game, and its annihilation becomes inevitable. It may take generations—some exotic factor such as the importation of modern rifles may hasten it within an inconceivably short period—but that it will sooner or later disappear, unless the evil is checked by drastic reforms, is as certain as the setting of the sun. . . .

According to the old hunters, even within their own lifetime, a noticeable decrease has taken place in the numbers of the wapiti. . . . As it is, he may survive for a few remaining years. . . .

Of the numbers killed annually some idea may be gained from the fact that Dr. Smith tells me that while crossing the Kialing River, he saw on the ferry-boat a string of about fifteen mules loaded entirely with wapiti horns. They were bound from Sining to Hanchung-fu. The horns were in the dry state and were intended for eye-medicine. An average mule-load is between 300 lb. and 400 lb. Taking the horns at 20 lb. per pair, it gives fifteen to twenty pairs per mule. This gives between 250 and 300 pairs of horns in one string, though doubtless many were "shed" . . .

A very large number of females and young are also killed annually. In addition to human hunters, a persistent enemy of the wapiti is a species of wild dog called *tsaikou* [*Cuon alpinus*]. . . .

I saw only three stags

They are found in the Minshan Mountains over an area of about fifty by twenty-five miles. They do not extend to the north, east or west, but are said to exist to the south beyond the mountains.

They are kept in captivity by the Chinese, who saw the horns off annually when they are in the velvet. Many of these animals are in a wretched condition, being haltered to a stall.

Altai Wapiti. Maralhirsch (Ger.). Maral (Russ.)

CERVUS ELAPHUS ASIATICUS Lydekker

[*Cervus maral*] *Var. asiatica* Severtzov, Izvestia Imper. Obshchestvo Liub. Estest., Antrop. Etnogr. [Moscow], vol. 8, pt. 2, p. 109, 1873 (*nomen nudum*).

Cervus canadensis asiaticus Lydekker, Deer of All Lands, p. 104, pl. 6, 1898. ("The Altai and Thian-Shan Mountains"; type locality restricted by G. M. Allen (1930, p. 17) to "the district to the southward of Lake Teletsk, near the sources of the Yenisei." This lake is actually on the Bija River, one of the headwaters of the Ob.)

SYNONYMS: ?*Cervus wachei* Noack (1902); *Cervus biedermanni* Matschie (1907); *Cervus canadensis baicalensis* Lydekker (1915).

FIGS.: Lydekker, 1898*b*, pl. 6 and p. 106, fig. 27; Elwes, 1899, pp. 31-32, figs.; Demidoff, 1900, pp. 50-53, figs.; Lydekker, 1901, pp. 68-69, figs. 17, 18.

The Altai Wapiti was evidently common three-quarters of a century ago but had become scarce by 1898 and has now, over the greater part of its range, seriously dwindled in numbers in a wild state, although many are maintained in domestication. The range of *asiaticus* will be provisionally considered to extend from the Altai to the Baikal region, including the Tannu-Ola and Sayan Mountains and the upper Yenisei and Irtish Basins.

The Altai Wapiti is somewhat lighter in color and perhaps smaller than that of the Tian Shan (Severtzoff, 1876, p. 377). The antlers of the former are less stout and lighter in color, and have the fourth tine inclining outward instead of inward; backward inclination of the beam less marked; only one large tine (the fourth) on the front surface of the upper half of the beam (Lydekker, 1915, vol. 4, p. 135). The record length of the antlers on the outside curve is 50 $\frac{3}{4}$ inches (Ward, 1935, p. 3). Height at shoulder, about 5 feet (Lydekker, 1898*b*, p. 108).

Pallas (1811, vol. 1, p. 217) extended the Wapiti's range as far as the headwaters of the Lena and the Vitim.

According to Radde (1862, p. 285), it was often met with up to 1858 in the eastern Sayan Mountains, about the sources of the Dshida, the Irkut, and the western Oka. But by the next year it had been largely driven from these areas by the Siberian Wild Dog (*Cuon alpinus*).

Atkinson (1858, p. 373) speaks of securing "many a stag" in the Tannu-Ola Mountains in the 1850's.

Severtzoff (1876, p. 383) says this Wapiti is met with only occasionally in the Karkalinsk and Bayan-aulsk mountains of Semipalatinsk. He adds (p. 384) that in several places stags are kept and bred for the sake of their horns, especially in the Altai Zabaikalje. "This stag inhabits in Siberia the country about the upper part of the Jennissey, as far as Crasnojarsk, as well as the wooded hills of the Sajon and Zabaikalje; to the south it probably goes as far as the desert of Gobi" (p. 385).

Elwes (1899, pp. 29-31) gives the following account:

* This species has now become scarce in a wild state in the Russian Altai owing to the number which are shot by the native and Russian hunters, who sell their horns, if killed while "in the velvet," at high prices to the Chinese. They are, however, kept alive in parks at several places in the Altai for the sake of their horns, which are annually cut for sale, and which sometimes realize as much as 100 roubles a pair at the rate of 10 roubles a pound.

The killing of these deer has now been prohibited by the Government in the Altai district, and we never saw the animal in a wild state, and though we picked up horns, shed many years previously, in the high treeless mountains south of the Tchuja valley . . . , I believe that they are now very scarce except in the heavily wooded country east of the Katuna. In the Yenisei and Abakan valleys this deer, or a nearly allied form of it, is much more numerous.

Lydekker writes (1898b, p. 108): "During the winter months large numbers are captured by the natives, who drive them into nets."

Carruthers (1913, pp. 161-162) contributes the following on the economic exploitation:

Wapiti come so close to the village [of Sabie, in Tannu-Tuva] that it is an easy and profitable undertaking to capture the younger animals alive. These the colonists keep in enclosures (as is the custom in all localities along the Russo-Chinese frontier where wapiti exist), and take a yearly tribute from the stags in the shape of their soft horns when in velvet. The nearness of the Chinese markets, to which these horns find their way, as well as the existence of many wild wapiti, has caused Sabie to be a flourishing settlement. The inhabitants told us that, during the winter, they employed the Uriankhai, owing to their exceptional skill in forest-lore, to catch the wapiti. The method they employed was to dig pitfalls and to attract the stags to the locality by distributing salt in the neighbourhood.

Wallace writes (1915, p. 208):

Owing chiefly to the persecution of native hunters, who are encouraged by the value put on the immature horns by the Chinese, the fine deer of Central Asia are rapidly being exterminated. This is the real reason why good heads are so difficult to procure and why the pursuit of large deer in districts under Chinese influence is attended by so much disappointment. The introduction of modern rifles, the gradually increasing nomadic population, . . . tend to drive the deer into the most remote and inaccessible

retreats they can find. They are now rarely to be met with in the lower parts of the upper foothills.

W. G. Heptner (*in litt.*, December, 1936) informs us that during the last 50 years the numbers in Siberia have decreased considerably; in certain regions the animal has become rare, and its range has, in general, been restricted. However, there are still regions in the Altai where the animal is very numerous. Hunting is completely forbidden.

Salesski (1934, pp. 373-375, distr. map) contributes the following information: The range is quite restricted, including the Altai, [Kusnetsk?] Alatau, and Sayan. In the lowland the animal appears only accidentally, as when it descends from the Kusnetsk Alatau as far as the middle course of the Chulym. In the middle of the last century the Maral was everywhere common in the Altai, from the Tigirek and Korgon Alps to the Mongolian boundary on the east. During the winter wanderings it extended to the southwestern Baraba (between Chany and Slavgorod). Now it occurs only in the central and eastern Altai; in the Chuya and Kuraja Alps, on the divide between Lake Teletsk, Bashkaus, and Katum, toward the north not farther than Chemal, Pysko, and Uimenj, likewise between the Bashkaus and Chulyshman and on the upper Abakan. During the World War, when there were fewer hunters, the Maral increased and appeared for a time in the Sseminsk Mountains between the Katum and Pestshanoye Rivers.

So far the Maral is still common in the northern part of the Shorien mountain country, on the upper courses of the Tom and the Taransk. Southward on the Mrassu it occurs in smaller numbers. It is not rare at the northern point of the Kusnetsk Alatau. It is much rarer on the Urjup, a tributary of the Chulym.

In the West Sayan it is pretty common on the Rivers Dzebash and Ana. It is also not rare on the upper course of the Kabansuk.

In the Yenisei taiga it remains chiefly on the passes through the Sayan Mountains. It also occurs on the whole course of the Uss and on the middle course of the Oya. Farther east and northeast it is common on the Rivers Kizir, Kazir, and Amil. From the Amil region the bulk of the Marals migrate to Tannu-Tuva, though some remain in the districts with less snow.

Demidoff (1900, pp. 49-55) describes a "maralnik," or enclosure for Maral, in the country south of Bisk, in the upper Ob Basin. Here about 150 animals were confined. He says:

Some of the animals had been bred in the enclosure, others had been caught in the woods, when young, by native Kalmuks with dogs, in winter, when deep snows render this task easier. . . . There are many similar enclosures in the Altai district, especially in the eastern parts, and statistics show that about 6,000 deer are thus enclosed in parks, constituting one of the most important trades of the country with China An average head

fetches from 100 to 120 roubles (£10 to £12) The Maral is becoming exterminated in the Altai

On our return journey we met several caravans [laden with horns on their way to Mongolia and China].

An extensive account of Maral raising is given by Nikolskii (1927). This industry originated in middle Asia during the seventeenth century and was brought there from North China (Amschler, 1931).

Tian Shan Wapiti

CERVUS ELAPHUS SONGARICUS Severtzov

[*Cervus maral*] Var. *songarica* Severtzov, Izviestia Imper. Obshchestvo Liub. Estest., Antrop. Etnogr. [Moscow], vol. 8, pt. 2, p. 109, 1873; English translation in Ann. Mag. Nat. Hist., ser. 4, vol. 18, p. 386, 1876. (The Za-ilisky Alatau, east of Vyernyi, on the summits of Turgeni, near the eastern portion of Issik-kul, and the fir-woods of Shamsi in the Alexandrovsk Mountains; type locality restricted by Harper (1940, p. 203) to the first of these two localities.)

SYNONYM: *Cervus eustephanus* Blanford (1875).

FIGS.: Wallace, 1915, pls. 74, 75.

The Wapiti of the Tian Shan, like most of the Asiatic deer, has been seriously reduced in numbers by the demand for antlers in the Chinese market.

The general color of this animal is brownish gray tinged with yellow, the head and neck being darker. It is very similar to the American Wapiti but is "apparently distinguished by the narrower and more orange-coloured rump-patch, not including the middle line of the tail, which is coloured like the back; the larger amount of black on the borders of the rump-patch, thighs, and flanks, the greyer general colour in summer, and the shorter and stouter fourth tine of the antlers." The antlers are said "to be distinguished by their stoutness and the length and massiveness of their tines, as well as by their dark colour." (Lydekker, 1915, vol. 4, p. 136.) The antlers measure 50-60 inches along the curve, and have 14 to 16 points or even more (Wallace, 1915, p. 198). Height at shoulder, 58-60 inches (Severtzoff, 1876, p. 377).

This Wapiti is found more or less throughout the Tian Shan system, extending west on the Russian side to the area between the Chu and the Naryn Rivers, and on the east to the Karlik Tagh beyond Hami. According to Lydekker (1915, vol. 4, p. 136), the range also includes the Tarbagatai district. On the other hand, Wallace states (1915, p. 198): "The Ala Tau is their northern limit, though a few stragglers may be found in the Barlik Tagh. To the south the Narin River is approximately their boundary, while to the west they extend to the Issi Kul Lake and the Alexandrovsk range."

Severtzoff writes (1876, pp. 383-385) as follows:

In Russian Siberia it has been met with on the Semiretchje and Zailisky Alatau, in the mountains near Issik-kul and Narin, everywhere in fir-woods, and only in the greenwood districts. . . .

During the months of June and July the newly-grown horns are soft; and this is the time when these animals are mostly pursued by the Cossacks for the sake of their horns, which are readily bought by the Chinese people.

According to the statements of the Kirgies it is to be met with on all the mountain-chains of the western Thian-Shan, on the tributaries of the Susamir, Talas, and Chirchik, as well as in the Karatau mountains.

According to Carruthers (1913, p. 630), the animals "range over the northern forested slopes of the Tian Shan, Ala-tau, and Barlik ranges, and extend eastwards as far as does the forest. The large wapiti probably stop at the Karlik Tagh."

J. H. Miller (in Carruthers, 1913, pp. 576, 582, 601) contributes the following items. Tracks were noted in the Urta Saryk Valley, south of the Ala-tau. In Dzungaria in general "the dark forests of spruce and scrub conceal wapiti—of all beasts in this land the most persecuted by man." In the Tian Shan south of Ta-shih-tu the program of two Chanto hunters was to go into these mountains in June for a month's stag-hunting. "The Chinese merchants will readily give as much as from a hundred to two hundred rubles for a good pair of wapiti horns in the velvet."

Roosevelt and Roosevelt (1926, pp. 171-192) describe their experiences in hunting Wapiti in the Tian Shan in the region of the Kooksu River and the Akyas Valley. "All the native hunters, Kalmuks, Kazaks and Kirghiz, hunt them continually during the late spring and early summer. . . . Church in his book written in 1899 considered them to be on the verge of extinction. . . . All told we had seen ten wapiti during the week we had been hunting them."

Morden writes (1927, pp. 185-186, 196) concerning the Kok-su district:

Native hunters . . . come to shoot stags when the horns are in the velvet and immature. The antlers of the Thian Shan stag . . . are used when in the velvet by the Chinese for medicinal ingredients, and numbers of them are annually brought into the bazaars of the cities of Sin Kiang. . . .

Owing to the number of stags annually killed while the horns are in the velvet, they are much less numerous now than they were a few years ago. This will become increasingly true with the advent of modern firearms, which are slowly creeping into all sections of Central Asia.

Nazároff writes (1932, p. 236) that there are plenty of Wapiti in the mountains between the Chu and the Naryn Rivers.

According to W. G. Heptner (*in litt.*, December, 1936), this animal is evidently found in the mountainous region in the east and the

northeast of Semiretchie, but is absent in the Alexandrovsk Range. Its occurrence in the coniferous forests of the mountains is sporadic but not numerous, although a certain increase has been observed during the last 15 years. Hunting is not allowed.

Domestication.—"A maral stag, if caught when young, is very easily tamed; the one seen by me in Vernoe [in the Alatau region] followed its master like a dog, and was also very friendly with strangers. . . . Sometimes it ran about the town, and, in fact, knew the streets very well indeed, as it came home by itself and never lost its way.

"M. W. P. Semenoff also kept a stag for about six years. It was always allowed to run about at liberty, sometimes keeping in the mountains for several days, but always coming back again. During the breeding-season it associated with the wild deer; but after this season was over it came back again to stables, which it very seldom left during the winter." (Severtzoff, 1876, p. 384.)

Red Deer of Central Spain. Ciervo (Sp.)

CERVUS ELAPHUS BOLIVARI Cabrera

Cervus elaphus Bolivari Cabrera, Bol. Real Soc. Españ. Hist. Nat. [Madrid], vol. 11, p. 558, 1911. ("El Pardo," Madrid, Spain.)

FIGS.: Chapman and Buck, 1910, pls. facing pp. 162, 172, and figs. on pp. 168, 169; Cabrera, 1914, pl. 21.

This Red Deer seems to be declining seriously in numbers.

The ochraceous rump patch is bordered with a dark zone, as in *C. e. atlanticus*; antlers as large as in the latter; winter pelage paler and without a mane. Head and body, 2,150 mm.; height at shoulder, 1,120 mm.; antlers along outside curve, 1,110 mm. (Cabrera, 1911, pp. 558-559.)

The range includes the mountainous interior of the Iberian Peninsula, from Aragon (where it is very rare and has disappeared in many localities), the Sierra de la Demanda, and the Montes de León, south to the Sierra Morena in Andalusia; and from Portugal to the Serranía de Cuenca. In the greater part of this area it is found only in certain mountains, as in the Provinces of Madrid and Segovia, where it has become restricted to the royal country seats of El Pardo and Río Frío; in Portugal, outside of the mountains of the district of Castello Branco, it seems to be met with only in some enclosures of Lisbon. It is still abundant, however, in the Sierra de Grata (Las Hurdes), in some mountains of the Provinces of Cáceres and Badajoz, and especially in the Montes de Toledo and in the Sierra Morena and its spurs. (Cabrera, 1914, pp. 339-340.)

"All lands in which deer are found, both on mountain and plain, are preserved" (Chapman and Buck, 1893, p. 437).

Apparently the deer derive considerable protection from the dense cover they affect. In such places as the Sierra Morena shooting is practically confined to "driving" with beaters (Chapman and Buck, 1910, p. 158.)

"The only enemies the full-grown stag has to fear are mankind and the wolf, but chiefly the latter, since not only do single wolves destroy in the sierra large numbers of the newly born calves, but, worse still, when a troop of wolves have once tasted venison they commence habitually to hunt both hinds and even the younger stags, which they persistently follow day after day till the deer are absolutely worn out. . . .

"The calves of red deer . . . are also preyed upon by golden eagles." (Chapman and Buck, 1910, p. 156.)

In 1933 the Spanish Director General de Montes, Pesca y Caza reports that the Red Deer is in danger of disappearing and is worthy of special protection.

[*Cervus elaphus hispanicus* was described by Hilzheimer (Archiv für Rassen- und Gesellschafts-Biologie, 1909, p. 313) on the basis of a skull fragment, with antlers, from an unknown locality in Spain. Cabrera (1911, p. 557; 1914, p. 343) restricts this name to the Red Deer inhabiting the littoral of the Province of Huelva, between the Río Odiel and the Guadalquivir. Chapman and Buck (1910, pp. 43 ff.) describe the hunting of this animal at some length. Apparently it was common at that time. No recent information on its numerical status is at hand.]

North African Red Deer; Barbary Stag

CERVUS ELAPHUS BARBARUS Bennett

Cervus barbarus Bennett, List Animals in Gardens Zool. Soc., London, p. 31, 1887. (North Africa.)

FIGS.: Jour. Soc. Preservation Fauna Empire, n. s., pt. 30, pl. facing p. 65, 1937; Bryden, 1899, p. 512; Fraser, Zoologia Typica, pl. 13, 1849; Ward, 1935, pl. facing p. 1 (antlers).

The presence of a Red Deer in northern Africa adds a Palearctic element to its fauna, but the species is at present rapidly declining and is confined to a circumscribed area of forested territory on the Algerian-Tunisian border.

The Barbary Stag is slightly smaller than the typical Red Deer of southern Sweden, standing about 46 inches in height at the shoulder. The coat usually retains in the adult some trace of white spots in the otherwise dark brown of the body; there is a grayish-brown dorsal stripe, and a rump patch much lighter than the back, without dark anterior border, and including the tail. The antlers are peculiar in usually lacking the bez tine; but they show the cupping of the

three terminal tines. Record antler has a length on the outside curve of $38\frac{7}{8}$ inches.

In former times, according to Cabrera (1932, p. 311), this deer was represented in Morocco and was probably found there at least



FIG. 46.—Barbary Stag (*Cervus elephus barbarus*)

up to the period of Roman domination. In spite of a report as late as 1920 (Carpentier, 1932, p. 21) of one having been seen at the post of Tagouzatt, by a Captain Vizios and his companions, it seems very unlikely that any exist there at the present time. Nor it is easy to believe Lydekker's (1915) statement that it formerly occurred in Senegambia. In 1848 Gervais recorded it from the forests in the vicinity of Bône, Calle, and Tebessa, and here is where it still persists. Lataste, in 1885, writing of the deer in this region, mentions that it was common in Gervais's time and that there was a con-

siderable export trade in the antlers. According to information gathered by Miss Hone (1933, p. 44), this deer is most numerous in the cork-oak forests of northwestern Tunisia and the pine forests east of Tebessa, which is a strip of well-forested and mountainous country extending from the Mediterranean coast near La Calle, along the Algerian-Tunisian border. Within this area, the forests of Feidja, Gardimaou, and Khroumirie and the region about Feirana are given as specific localities. Joleaud believed that these deer which still lived a few years ago in the region of Negrine must often have gone without drinking, since the few springs in the south of the Nemencha country were constantly surrounded by encampments of natives, thus making another element of an unfavorable nature.

Through correspondence with consular offices, a certain amount of information has been gathered as to the present attitude of the officials in the countries where the Barbary Stag still exists, from which it appears that in Algeria the killing of the species is prohibited, as well as in Tunisia. According to the Directeur du Service des Forêts in the latter country, it is believed that about 50 deer remain, in the extreme northwestern part, near Tabarka and Ain Draham. Nevertheless, in Algeria a proprietor or tenant of land may legally kill a deer on his own property, provided that it is actually causing or threatening to cause damage, but this permission applies only to land actually having crops or fruit trees on it. Furthermore, the sale during the closed season, of animals killed legally, is forbidden. The Barbary Stag is placed among the species in Schedule A, of the London Convention of 1933, to be protected at all times. Although Johnston (in Bryden), writing in 1899, believed that in this section of Tunisia the stag was actually increasing "considerably" in numbers, Capt. M. W. Hilton-Simpson (in Maydon, 1932, p. 123) reports that they are "so scarce that they may not even be seen in the course of, say, a fortnight on the shooting ground," and Dr. K. Jordan in the same year (1932) wrote that there are "very few specimens left, but protection will no doubt enable the species to recuperate."

G. M. A.

Sardinian Stag

CERVUS ELAPHUS CORSICANUS Erxleben

[*Cervus*] *Corsicanus* Erxleben, Syst. Regni Anim., vol. 1, p. 304, 1777. (Corsica.)

This deer, limited to Corsica and Sardinia, has been greatly reduced by overshooting.

The general color is darker than in any of the small continental forms. Height of male at shoulder, 800 mm. (Miller, 1912, p. 970.)

Miller (1912, p. 969) quotes Polybius (xii, cap. iii) to the effect that this stag is not native to Corsica.

De Beaux (1932, p. 9) expresses concern for its future.

According to Colosi (1933, pp. 39, 85), it still lives in the wild state in Sardinia; it is also widespread and rather abundant in Corsica, although pitiless hunting has decimated the herds in the wooded zone of medium altitude.

It inhabits the public forests and certain other areas, but is not numerous and is decreasing. It will be protected in the Sardinian National Park now under preparation. (Laboratorio di Zoologia Applicata a Caccia, *in litt.*, September, 1936.)

McNeill's Deer. Macneillshirsch (Ger.)

CERVUS MACNEILLI Lydekker

Cervus cashmirianus macneili [sic] Lydekker, Abstr. Proc. Zool. Soc. London, no. 71, p. 26, 1909. ("Sze-chuen.")

Cervus cashmirianus macneilli Lydekker, Proc. Zool. Soc. London 1909, p. 590, pl. 69, 1909. ("Sze-chuen." The type locality has been subsequently restricted: "Tibetan side of the border" (Lydekker, 1911a, p. 987); "Sze-chuan border of Tibet" (Lydekker, 1915, vol. 4, p. 145); "near Litang" (Brooke Dolan, II, MS., 1938).)

SYNONYM: *Cervus canadensis wardi* Lydekker (1911).

FIGS.: Lydekker, 1909, pl. 69; Lydekker, 1911a, p. 988, fig. 143; China Jour., vol. 25, no. 5, pl. facing p. 288, 1936; Engelmann, 1938, pls. 18-20; G. M. Allen, 1939a, pl. 23.

This little-known deer of the Chino-Tibetan borderland, much persecuted for the sake of its horns, it is believed by Brooke Dolan, II, to be rapidly approaching extinction.

The general color of the female is pale speckled French gray, somewhat darker on the back and more so on the head; the white of the hindquarters restricted to the back of the hams; tail almost wholly black above; a blackish brown patch on the croup; ears and muzzle similar to those of *Cervus wallichii affinis*. Antlers 6-tined, terminal fork comparatively narrow. (Lydekker, 1915, vol. 4, p. 145, and 1911a, pp. 988-989.)

"The winter pelage as represented by Mr. Dolan's skins, seems grayer [than the summer pelage of the type], with a brownish wash on the back, the throat and sides of the neck a mixed gray. The white pygal area is as narrow as in the summer condition. . . . In adult males both brow and bez tines are long and well developed, with a light upward curvature; the course of the main beam is then upward and outward, as seen from in front, until the trez tine is reached, situated on the outer side of the beam. . . . At this point the main beam turns decidedly inward." It "forks in such a way that there is an anterior and a posterior tine, . . . while a third one arises on the outer side." (G. M. Allen, 1939a, pp. 283-284.)

Height of adult male at shoulder, 137 cm.; length of antlers, 115 cm. (Engelmann, 1938, pp. 31, 33).

The two original female specimens secured by Capt. Malcolm McNeill, and the set of antlers described as *Cervus canadensis wardi*, remained for years as the only available specimens of this deer.

"Under its native name of Peh Lu-tsze I have heard this animal spoken of as far north as Sungpan, and very likely it ranges throughout the whole Chino-Thibetan borderland" (Wilson, 1913, p. 164).

R. C. Andrews writes (1919, pp. 175-176) concerning the region between Taku ferry and Chung-tien, northwestern Yunnan: "We made arrangements to go with a number of the Lolos to a spot fifteen miles away on the Chung-tien road to hunt wapiti (probably *Cervus macneilli*) which the natives call *maloo*. . . ."

"At present these deer are abundant in but few places. . . . The growing horns . . . are considered of great medicinal value and, during the summer, the animals are trapped and hunted relentlessly by the natives. In Yün-nan, when we were there, a pair of horns were worth \$100 (Mexican)."

According to Sowerby (1937, p. 250), "This deer replaces the foregoing [*C. e. kansuensis*] in eastern Tibet, Sikong and West Szechuan. It does not appear to be very plentiful. . . . It is probably on the way to extinction."

Brooke Dolan, II (MS., 1938; *cf.* also Dolan in G. M. Allen, 1939a, p. 285) contributes the following: "McNeill's deer occurs in the marginal forests of the Mekong, Yangtze and Yalung ranges, usually above 11,000 ft., in heavy growth of dwarf rhododendron. First collected near Litang by Captain McNeill, they are now very scarce in that locality, and we saw no evidences of them except antlers and velvet shown to us by merchants in Litang and said to have been killed in the vicinity, although they might very well have come from far away. We collected them in March of 1935, two days to the west of Jyekundo. . . . Schäfer later collected them in the Mekong drainage southwest of Jyekundo, and in September found them most plentiful near the monastery of Dzogchen, not far from Derge in the Yalung watershed. . . . These deer have been much persecuted by the natives for the aphrodisiac properties believed by the Chinese to be inherent in antler velvet, and probably they were once plentiful over most of eastern Tibet. They are now protected by the monastery at Dzogchen, and we heard in Jyekundo that native chieftains protected them to the west of Jyekundo." Mr. Dolan adds that he very roughly estimates the total numbers of the animal at possibly 5,000.

Yarkand Stag

CERVUS YARKANDENSIS Blanford

Cervus [cashmirianus] yarkandensis Blanford, Proc. Zool. Soc. London 1892, p. 117, 1892. ("Eastern Turkestan."¹)

FIGS.: Blanford, 1892*a*, p. 116, fig.; Lydekker, 1901, pl. 4, fig. 2; Hedin, 1904, p. 279, fig.; Leche, 1904, p. 45, fig. 56; Lydekker, 1915, vol. 4, p. 140, fig. 25.

This animal, which is apparently restricted to Chinese Turkestan, is said to be "practically extinct" (Morden, 1927, p. 123).

It is a rufous-fawn deer, with a large and well-defined orange rump patch, which includes the tail; antlers usually five-tined, the terminal fork placed at right angles to the middle line of the head, so as to look directly forwards; fifth tine larger than the fourth, and generally inclined inwards; length of antlers on outside curve up to 41½ inches (Lydekker, 1915, vol. 4, p. 139; Ward, 1935, pp. 8-9). Height, 55 inches (Cumberland, 1895, p. 153).

According to Blanford (1892*a*, p. 117), "Prejvalski . . . found this Deer common around the Lower Tarim and Lobnor in 1876."

In 1889-90 Cumberland (1895, pp. 145-160) found the species rather common at various points between Yarkand and Aksu.

Leche (1904, pp. 45-49) records a skeleton from the Cherchen Darya and a skull from the vicinity of Kashgar, and adds that Sven Hedin met with this deer at various places along the Tarim River. He also presents a figure of a tamed individual. Hedin (1905, p. 389) refers to the species as plentiful along the Cherchen Darya.

"The Yarkand stag . . . is found on the lower courses of the Kashgar, Yarkand and Khotan Rivers, and on the main Tarim.

"These stags are fairly numerous, but very difficult to hunt . . .

"The natives, of course, are always after them in the summer when their horns are still soft . . . whereas during the period when

¹ Contradictory statements by Lydekker indicate a state of confusion in regard to the type specimen and the exact type locality of *yarkandensis*. In Blanford's original description (1892*a*, pp. 116-117) there is no designation of a type. He exhibited before the Zoological Society of London, on February 16, 1892, two heads and a skin, "lent for exhibition by Major C. S. Cumberland, who shot the animals in the woods on the Yarkand or Tarim River in 1890." (Cf. Cumberland, 1895.) Blanford also presented notes on three heads "obtained by Mr. A. O. Hume from Yarkand" and "now in the British Museum"; one of these he figured. It would probably be proper to consider all five or six of the Cumberland and Hume specimens as cotypes. Lydekker states (1913*b*, p. 35): "The type [= lectotype?] specimen is a skull, with antlers, presented to the Museum by Major C. S. Cumberland." However, two years later (1915, vol. 4, pp. 139-140) he not only fails to list any skull or antlers from Major Cumberland among the specimens in the British Museum, but he states that specimen "91. 8. 7. 4. Skull and antlers," presented by A. O. Hume, 1891, is the "type" [= lectotype?]; this specimen is from the "Maralbashi Forest, Eastern Turkestan," which Lydekker here designates as the "typical locality." Possibly the question of type or lectotype and type locality could be settled by reexamination of the material in the British Museum.

the stags are worth shooting from our point of view they are not so harassed." (Carruthers, 1915, pp. 154-155.)

At Maralbashi "a tame Yarkand stag and doe . . . were led out for our amusement. They were full grown animals which the *Amban* said had been captured in the forests a few miles from Maralbashi. . . . The Yarkand stag is practically extinct. We heard that a few stags were occasionally killed by native hunters." (Morden, 1927, p. 123.)

J. H. Miller writes (in Carruthers, 1913, p. 609) of the virtually unknown Wapiti of the Dzungarian lowlands:

The habitat of the stag points to its being identical with *Cervus cashmirianus yarkandensis* of the Tarim basin, on the south of the Tian Shan. The altitude, the dense reed-beds, and the poplar forests are identical. To the best of my knowledge, no specimen of this Dzungarian stag has ever been brought to Europe for identification. They are not much hunted by the natives, owing to the density and mosquito-scourged nature of their country, the mountain wapiti (*Cervus canadensis asiaticus*) being more numerous and much easier to secure. Their habitat is the whole of the jungle-covered country from just east of the Manas River to the south-east of Ebi Nor.

Bactrian Wapiti; Turkestan Deer; Bokhara Deer

CERVUS BACTRIANUS Lydekker

Cervus bactrianus Lydekker, Ann. Mag. Nat. Hist., ser. 7, vol. 5, p. 196, 1900. (Based upon a captive specimen in Moscow from "Russian Turkestan." Later (Lydekker, 1915, vol. 4, p. 138) the type locality was said to be "probably Bokhara.")

SYNONYM: *Cervus hagenbeckii* Shitkow (1904).

FIGS.: Lydekker, 1898*b*, p. 109, fig. 28, and 1901, p. 228, fig. 54; Shitkow, 1904, pp. 94-103, figs.

This is a rare and little-known animal, existing in small numbers in certain parts of Russian Turkestan. The available descriptions are based upon captive specimens.

The general color at all seasons is ashy gray, with a light yellowish sheen; rump patch sandy white; an obscure vertebral stripe extending forward to the crown; whole margin of upper lip light-colored; lower lip and chin sandy white; antlers glossy white, normally four-tined; bez tine absent; fourth tine better developed than the third; length of antlers on outside curve, 40 inches. Height of male at shoulder, 46 inches; of female, about 44 inches. (Lydekker, 1898*b*, p. 109; Shitkow, 1904, pp. 92-102; Ward, 1935, p. 3.)

Several specimens are said to have come from Tashkent and Chenkend [=Chimkent?] (Lydekker, 1901, p. 228, and 1902, p. 79).

Carruthers writes (1915, p. 149):

The stag of the Oxus [Amu Darya] Valley is confined to the jungles which margin the river, its habits and environment corresponding to those of the Yarkand stag I know this stag to be numerous on the course of the

river east of the point where the Vaksh enters it. . . . It is a wild locality, uninhabited, and impenetrable for the greater portion of the year. Further up the valley the stags roam as far as Kulab; beyond this the mountains hem in the river and allow no suitable ground. Whether or not these deer extend the whole length of the Oxus as far as the Sea of Aral I cannot say. Severtzoff mentions finding such a beast on the lower course of the Syr Daria, which I imagine must have been of this variety.

Nazároff (1932, p. 208) refers to the occurrence of a large deer in the steppes about Lake Balkash, which is quite distinct from the Siberian Maral. Possibly this is *bactrianus*.

W. G. Heptner writes (*in litt.*, December, 1936) that this animal has a very limited distribution. It is met with near the sources of the Amu Darya, along the Vaksh, on the delta of the Amu Darya and the adjacent part of the desert, and about the mouth of the Syr Darya. The total number is very inconsiderable, but along the upper Amu Darya it is common at certain places. Hunting is strictly forbidden.

White-lipped Deer; Thorold's Deer. Weisslippenhirsch (Ger.)

CERVUS ALBIROSTRIS Przewalski

Cervus albirostris Przewalski, Third Journey in Central Asia [St. Petersburg], p. 124, 1883 (in Russian), and Reisen in Tibet [Jena], pp. 73, 76, fig., 1884. (River Koko-su, left tributary of River Dan-kho, in the western ramifications of the Humboldt Mountains, Nan Shan, near the Kansu-Tibet boundary.)

SYNONYM: *Cervus thoroldi* Blanford (1893).

FIGS.: Przewalski, 1883, pl. facing p. 124; Prschewalski, 1884, p. 76, fig.; Sclater, Jour. Asiatic Soc. Bengal, vol. 58, pt. 2, pl. 11, 1889; Blanford, Proc. Zool. Soc. London 1893, pl. 34; Lydekker, 1898b, pl. 5, and 1915, vol. 4, p. 150, fig. 28; China Jour., vol. 25, no. 5, pls. following p. 288, 1936; Schäfer, 1937, pls. facing pp. 160, 161; Engelmann, 1938, pls. 21, 22.

This little-known and much persecuted deer, inhabiting high mountain areas from the Nan Shan to eastern Tibet and western Szechwan, is considered in danger of extinction.

It is a large species, standing 51 inches high at the shoulder, and with a length of about 7 feet from the tip of the muzzle to the base of the tail. The general color is snuff brown (Ridgway) in summer, wood brown in winter; abdomen lighter than pinkish buff; a large, sharply defined rump patch, near sayal brown; area about nose, lips, chin, and throat white; facial area darker than the general color; coarse hair of the withers directed forward, forming a kind of hump. Antlers much flattened, nearly white, with a single brow tine; bending suddenly backward at origin of third tine; length round the outside curve, 38 inches. Female grayer than the male, and lacking the dark facial area. (Flerov, 1930, pp. 116-120; Lydekker, 1915, vol. 4, p. 149; Schäfer, 1937, pls. facing pp. 160, 161.) G. M. Allen

(1939, p. 282) records an antler measuring $41\frac{1}{8}$ inches "on the chord from the anterior base of the burr to the tip of the most distant point."

This is one of the rarest of deer in museum collections. Flerov (1930, pp. 115-116) lists six specimens (four in Leningrad, one in London, one in Calcutta) from the following localities: Nan Shan; southern Koko Nor mountains; River Di-chu, eastern Tibet; and 200 miles northeast of Lhasa. Rowland Ward (1935, p. 11) mentions two specimens from central Tibet in Lord Rothschild's collection. Besides these, Schäfer (1937, p. 208) secured three specimens in the vicinity of Batang, near the Szechwan-Tibet boundary.

Przewalski's party obtained the first two specimens in the western portion of the Nan Shan in 1879 (Przewalski, 1884, p. 76). Dr. W. G. Thorold obtained two more (the types of "*Cervus thoroldi*") in 1891 about 200 miles northeast of Lhasa. Bower, who was Thorold's companion, writes as follows (1894, pp. 290-291):

"This grand stag . . . is found in Eastern Tibet from the neighbourhood of Tsuk Sun Dong Gong [about lat. $31^{\circ} 40'$ N., long. $93^{\circ} 30'$ E.] to Garthok [south of Batang], but does not appear to be numerous anywhere. It is found in the scrub jungle just above the forest line at elevations of about 14,000 feet. The herd of which Dr. Thorold got two, consisted of six, all males. According to the natives they wander about a great deal, being found in different parts of the country according to the time of year."

Wilson (1913, p. 163) writes as follows concerning the "Hung Lutze" (Red Deer) of the Chinese (which is doubtless the present species) on the eastern borders of Tibet: "Perhaps the commonest of the three [deer] found in these regions. It ranges from the Yunnan border northward to south-western Kansu and possibly beyond."

He also contributes (pp. 161-163) the following account of the Chinese trade in deer horns:

[The three deer species (*Cervus albirostris*, *C. macneilli*, and *Rusa unicolor dejeani*) of the Chino-Tibetan borderland] are sadly persecuted for their horns when in velvet. Fortunately, it is the males only that are so keenly sought after, otherwise they must have become extinct ere this. The full extent of this trade it is impossible to determine, but . . . speaking of the trade of Tachienlu . . . Sir Alexander Hosie says: "Deer horns in velvet, to the value of Tls. 30,000, are exported annually."

Mr. W. C. Haines-Watson gives 1500 cattles of Deer horns in velvet, valued at Tls. 30,000, as the annual export from Kuan Hsien. . . . He puts the annual export . . . from Sungpan at Tls. 15,000. There are other places like Chungpa, Kiung Chou, and Sui Fu where a large annual export of Deer horns in velvet obtains, but no figures are obtainable. However, the above is sufficient to indicate how great a slaughter of stags there must be annually in these regions. At the lowest estimate at least a thousand stags are killed every year for their horns in the velvet.

The Chinese consider these horns . . . an extraordinarily valuable medi-

cine, possessing wonderful tonic and aphrodisiac properties. This is evidenced by the almost fabulous prices they will pay for them. . . . Western pharmacologists may say there is no virtue or medicinal value in these horns, but John Chinaman believes otherwise, and is willing to pay the price, high and extortionate as it may be.

The leg sinews of these Deer are also of considerable medicinal value and are exported in quantity from the far west. Shed horns are valued for making medicinal glue, used in mixing pills, etc. There is a large trade in these, the annual exports from Tachienlu alone being estimated at 30,000 catties, valued at Tls. 8500.

In every medicine shop of note, in every village and town throughout the length and breadth of China, Deer horns are in evidence. In Szechuan and other wealthy regions they are abundantly so. If one inquires in the east and central parts of China where they come from, the answer received is invariably Chungking and Yunnan. At Chungking it is always Yunnan and Thibet. West of the Min River one begins to close up to the question pretty quickly. Coolies laden with Deer horns are frequently met with on all the roads leading from the far west of Szechuan. Tachienlu, Sungpan, and other towns mentioned . . . are all trade entrepôts, and are fed from the surrounding country.

The highlands of Thibet proper probably contribute to this trade, but the headquarters is the wild, almost unknown, region lying between the Upper Min River, the Chiench'ang Valley, and the frontier of eastern Thibet. This is a region of high mountain ranges where virgin forests of great size still remain. The upper limits of these forests are the home of these Deer. These haunts are very difficult of access, and very few foreigners have had opportunity of shooting these Deer, consequently information is most meagre.

Schäfer (1937, pp. 143-212) describes an extremely difficult and exhausting hunt for this deer in the mountains about Litang and Batang, western Szechwan. It proved to be rare in the forested country of Molachi south of Litang, where one animal was seen and the tracks of a doe and a fawn were noted—the latter followed by a Wolf. The species is pursued by many native hunters, who are considered chiefly responsible for its threatened extinction. According to the superstition of the Chinese and the Tibetans, the antlers in the velvet have a rejuvenating power, and a set costs more than two good riding horses. All bones and flesh are prized for their healing power, and the fresh blood and heart are consumed for courage-giving qualities. In the vicinity of Batang Schäfer finally secured three specimens out of a small herd.

Brooke Dolan, II (MS., 1938; *cf.* also Dolan, in G. M. Allen, 1939*a*, p. 282) contributes the following account:

A more widely distributed animal than McNeill's deer, still occurring all the way from the Tachienlu mountains westward into central Tibet and northward probably to the grasslands around the Amnye Machen. They were seen by us to the south of Litang, around Batang, and to the northwest of Jyekundo, and tracks were found in the Tachienlu mountains. They have been, however, so persecuted that the stand is down to nothing in many localities. Four or five years ago they were said to be extremely plentiful around Batang, but a brigade of Tibetan troops with British military rifles had so far reduced them

in a season or two, that we had great difficulty in finding them. They range from mid-spruce forest up through rhododendron and dwarf rhododendron to the grasslands just below the peaks, i. e. from about 12,000 to 16,000 ft. They occur on the fringes of the high steppes along the scarps of the upper Yangtze River in dwarf rhododendron forest. These animals are also probably protected by native chiefs and lamaseries in the interior of Tibet, for of 13 full yak loads of antlers observed by us when they were brought to the market at Jyekundo about 90% were shed antlers. The antlers are said to be retained well through the month of March.

The herds generally consist of 5 to 20 animals, and occasionally of as many as 40 (Schäfer, in Engelmann, 1938, p. 36).

Père David's Deer. Mi-lu; Ssu-pu-hsiang (Chinese)

ELAPHURUS DAVIDIANUS Milne Edwards

Elaphurus Davidianus A. Milne Edwards, C. R. Acad. Sci. [Paris], vol. 62, p. 1091, 1866. (Imperial Park at some distance from [a league south of] Peking, China.)

Figs.: *Nouv. Arch. Mus. Hist. Nat. Paris*, vol. 2, Bull., pl. 4, 1866; *Trans. Zool. Soc. London*, vol. 7, pl. 28, 1871; *Hunting in Many Lands* (Book Boone and Crockett Club), pl. facing p. 271, 1895; Lydekker, 1898*b*, pl. 19, and p. 234, fig. 63; Lydekker, 1901, pl. 5, fig. 1, and p. 261, fig. 62; Lydekker, 1903*b*, pl. facing p. 274; Bridges, 1935, p. 42, fig. 10; Pocock, 1937, p. 702, fig.

This remarkable deer is unknown in the wild state. It was originally brought to the attention of zoölogists in 1865 through the presence of a herd in the Imperial Hunting Park south of Peking. In 1935 it was reported as "apparently now represented only by the herd at Woburn Abbey, Bedfordshire," England (Ward, 1935, p. 12).

The general carriage is unlike that of a Red Deer; the gait is donkeylike; the bushy tail is donkeylike and longer than that of any other deer, reaching the hocks; the stags have the unique habit of shedding the antlers twice a year. The general color is reddish tawny, verging toward gray; lower part of the limbs paler; muzzle, area about eyes, inside of ears, buttocks, and under parts whitish; tip of tail blackish brown; a blackish brown longitudinal stripe on neck, fore part of back, and chest. Height at shoulder, about 45 inches. Antlers about 28 to 35 inches along the outside curve; forking at a short distance above the burr; the front prong dividing again, the hind prong long and straight. Young at first profusely spotted with white. (Lydekker, 1901, p. 265, and 1915, vol. 4, p. 153; Ward, 1935, p. 12.)

"Its original home was probably the plains of Chihli before they became settled up, where it lived in swamps covered with reeds and willows; and . . . as the whole of these plains were brought under cultivation the animal disappeared, with the exception of a few that were kept by the Emperors in large parks and hunting grounds" (Sowerby, 1923, p. 112).

In former times the Chinese emperors maintained a hunting park south of Peking, known as the Non Hai-tzu. It was strictly guarded, and no Europeans were allowed entrance. In 1865, however, the French missionary Père Armand David managed to look over the surrounding brick wall and to obtain a view of the remarkable deer that was eventually named for him. In 1866 several



FIG. 47.—Père David's Deer (*Elaphurus davidianus*)

specimens were procured by diplomatic and other means and sent to Paris, where Milne Edwards described them as *Elaphurus davidianus*. In subsequent years a number of living specimens were shipped to Europe, and their descendants were distributed in various zoölogical gardens. (Lydekker, 1903, pp. 273-276.)

Meanwhile disaster overtook the herds in China, as recorded by Bushell (1899, pp. 588-589): "I am well acquainted with the habits of the *Cervus (Elaphurus) davidianus*, and used often to ride among the herds which formerly swarmed in the Non Hai-tzū, the Imperial Hunting Park south of Peking, which is enclosed by a wall forty-five miles in circuit. But four years ago the brick wall was breached in many places by the waters of the Hun Ho, as they flooded the

adjoining country, and the deer escaped, to be devoured by the famine-stricken peasantry. I fear that none are left; but will make further inquiry when I return to my post next year."

Although Bushell apparently made no further report, some remnants of the species must have survived in China for a time longer. "The Imperial Hunting Park . . . was thrown open in 1900 and all the deer in it killed by the International troops" (Sowerby, 1914, p. 14). On this subject Jean Delacour writes (*in litt.*, 1935): "The herd in Peking was destroyed in 1900 by the . . . soldiers who were stationed in the park. They shot several hundreds and sold the meat to the Chinese! About 15 years ago, one *female* still existed in Peking. None since."

Lydekker writes (1901, pp. 260-261): "Of late years the Duke of Bedford has been forming a herd at Woburn Abbey, which now (June 1901) includes over twenty head. So far as is known, with the exception of a very few specimens in continental menageries, the Woburn herd comprises all the individuals of this species now surviving."

Phillips reports (1925, p. 284) that in 1922 the Woburn herd included 47 adults, and that 17 fawns had been born that spring. "The herd seems to be holding its own and the animals look in good condition, and on casual inspection show no ill effects from inbreeding, with the possible exception of albinism [in two specimens]."

According to Jean Delacour (*in litt.*, 1935), the Woburn herd has now increased to well over 200.

Scandinavian Reindeer; Lapland Reindeer. Renne (Fr.). Rentier (Ger.). Severnyi Olenj (Russ.)

RANGIFER TARANDUS TARANDUS (Linnaeus)

[*Cervus*] *Tarandus* Linnaeus, Syst. Nat., ed. 10, vol. 1, p. 67, 1758. (Alpine region of Swedish Lapland.)

FIGS.: Lydekker, 1898*b*, pl. 1; Lydekker, 1901, pl. 1, fig. 5; Wollebaek, 1926, p. 45, fig. 16; Jacobi, 1931, pl. 1, figs. 1, 2; Flerov, 1933, p. 330, fig. 2.

This account is concerned primarily with the wild Scandinavian Reindeer. The domesticated animals of the Lapps, although derived from the same stock and bearing the same name, appear to have become somewhat modified through countless generations of domestication (*cf.* Jacobi, 1931, p. 51). The wild representatives of the present subspecies now appear to be restricted to Norway; the limits of its former range to the eastward are not exactly known.

The general color is grayish or drab brown above, buffy whitish beneath and on the muzzle; brown of back well distinguished from the whitish neck; a darker longitudinal area on the flanks; tail buffy white, with dark median line; a white ring above the hoofs.

Antlers approximating those of the Barren Ground Caribou, but less elongated, and with a distinct back-tine in the male. Height of male at shoulder, about 1,150 mm. (Lydekker, 1898*b*, p. 38; Miller, 1912, p. 981; Flerov, 1933, p. 331.)

Norway.—The original range extended over the entire mountain system of Scandinavia, almost from the Skagerrack to the North Cape (Jacobi, 1931, p. 154).

"In Norway, wild reindeer inhabit the high fjelds At the present day the numbers of the wild Norwegian reindeer are greatly reduced. But it appears from Mr. J. Lloyd's *Scandinavian Adventures* that in the early part of the century these animals were as abundant as blesbok in Africa. In that work it is stated that one day in June 1826 the fjeld, for a breadth of seven miles, was covered with reindeer as thickly as an English field by sheep when feeding; the herd extending so far that the eye could not embrace the whole at once." (Lydekker, 1898, p. 40.)

"Unfortunately the introduction, a few years ago, of the Krag-Jorgansen rifle among the peasantry has meant the doom of the wild Reindeer, and now only a few are left in the above-mentioned district [between the Laerdal and the Hallingdal], Gudbrandsdal, the Dovrefjeld, on the mountains above the Hardanger Fjord, and in Telemarken. A close time has been decreed by the Government until the year 1907, but this is, like all Norwegian game laws, only a dead letter and a thing to be scoffed at." (Millais, 1906, vol. 3, p. 79.)

In southern Norway the animals "still exist, although not so numerous as formerly, and also partly mixed with runaway tame Reindeer which have been introduced from the north" (Lönningberg, 1909, p. 3).

Miller (1912, p. 981) gives the range as follows: "Formerly the entire alpine region of the Scandinavian Peninsula; now confined in the wild state to two widely separated districts in Norway; west Finmarken in the north, and the main high mountain region in the south."

Hj. Broch writes (*in litt.*, December, 1936) that in earlier times the Reindeer was the chief game of all Norwegian mountains and adjacent mountain forests, but by 1800 Wolves and excessive hunting had decimated the stock. During the last century the numbers went down rapidly and the range diminished. Total protection from 1902 to 1906 resulted in a great increase, but subsequent decimation has been so great that there is danger of the extinction of wild Reindeer in Norway. At present only some small herds are left in the high mountains of southern Norway, especially in the southern part of the Hardangervidda. The Norwegian mountain

people hunt the wild Reindeer both legally and illegally, and, furthermore, the keeping of domestic Reindeer herds is a constant danger to the wild herds, for the herdsmen shoot every wild Reindeer that approaches. Thus, although the law theoretically protects the wild Reindeer, it will be difficult to save it from extinction in Norway. Inspection is almost impossible in the remote mountain districts where wild herds are still left.

According to the Norwegian Director of Forestry (*in litt.*, January, 1937), the wild stock in Norway has greatly decreased, except in the very latest years. At present the animals occur in several separate mountain districts, from Snehetta in the north to the Sirdal ridges in the south. The largest stock is no doubt to be found on the Sirdal ridges and in the adjacent mountainous areas. Here there are no doubt several thousand animals. In the Snehetta districts there are about 600 animals, while the stock in the other districts must be considerably smaller. The decrease is primarily attributable to the keeping of tame Reindeer. In some places there has perhaps been too much hunting. Finally, the wild Reindeer seem to have some difficulty in getting accustomed to the increased traffic in the mountains. They have been carefully protected for a long time, and only a fixed number may be shot each year.

"Efforts are being made to set aside an area near the city of Stavanger . . . in the central parts of Suldals and Bykleheiene for the protection of wild reindeer which are being exterminated there and elsewhere in Norway" (Julius Wadsworth, *in litt.*, May 9, 1933).

Sweden.—"This animal is now . . . extinct in Sweden but at the time of Linnaeus and still during the first half of the last century it was fairly numerous in the southern parts of its former area of distribution, that is in Northern Dalecarlia Särna and Idre. . . .

"*Rangifer tarandus* Lin. comprises thus the now extinct Reindeer of the Swedish fells formerly distributed southward to Dalecarlia, the still existing wild Norwegian Reindeer, and the tame Mountain Reindeer of Swedish Lapland and adjoining parts of Norway and probably northern Finland as well." (Lönnerberg, 1909, pp. 2-3.)

"About the year 1850 . . . the wild Reindeer occurred in great flocks in the neighbourhood of Idre [northwestern part of the present Province of Kopparberg]. They came down then into the forests quite near to Idre church-village and were eagerly hunted there. By the moving in of new settlers and even Lapps the shy Reindeer were driven away to the least accessible places and they grew more and more scarce within the Swedish boundaries. I know with certainty that residents shot wild Reindeer in the year 1860." (Wählberg, in Lönnerberg, 1909, p. 2.)

"When the Lapps were allowed to extend their wanderings with their herds of 'domesticated' reindeer into the district mentioned

[northernmost Dalecarlia], the wild reindeer were soon exterminated. They mixed, especially during the rutting season, with the 'tame' herds and could then be approached by the Lapps within shooting distance and were thus killed. The extermination took place within a comparatively short time, so that probably the last wild reindeer in Sweden was killed soon after 1860." (E. Lönnberg, *in litt.*, 1937.)

Great Britain.—The ancient occurrence of Reindeer in Great Britain may be briefly mentioned here, although the subspecific status of the British animal does not appear to have been satisfactorily determined. According to Harting (1880, pp. 62-75), the abundance of its remains in British postglacial deposits is very remarkable. It gradually became extinct during the prehistoric period, although there is a "tradition that the jarls of Orkney in the twelfth century were in the habit of crossing the Pentland Firth for the purpose of hunting the Red-deer and the Reindeer in the wilds of Caithness." There is, however, some dispute as to the authenticity of this tradition. Jacobi (1931, p. 161) evidently accepts it, for he remarks that the extreme north of Scotland was still in the Middle Ages a refuge for the Reindeer of the Glacial Period. The same author (1931, p. 102) refers the European Pleistocene Reindeer to *R. arcticus*.

Enemies.—In his discussion of the enemies of Reindeer and Caribou in general, Jacobi's remarks (1931, pp. 154-158, 218, 240-247) apply in part to both the wild and the domestic stock of *R. t. tarandus*. The range limits of the Reindeer have been considerably pushed back by Europeans and even by primitive peoples who sell the products of the chase to Europeans. With few exceptions, it is always the hand of man (and especially civilized man) that has had a disastrous effect upon these animals.

The original and ever-menacing enemy is the Wolf. The Reindeer transfers its well-grounded fear of this animal to the tame Wolf, the domestic dog; consequently, among peoples whose reindeer-keeping is less ancient, such as the Chukchis, no shepherd dog can be kept. Where the domestication is ancient and advanced, as among the Soyots, the Samoyeds, and the Lapps, both behave as with a flock of sheep.

During its whole life the Reindeer is threatened by numerous dangers. Snowstorms and recurrence of winter cold take toll of young fawns. Individuals and even whole bands fall into glacier crevices. Still larger numbers are sometimes destroyed by snow avalanches. This happened to 300 in Norway in the winter of 1910-11.

The Lapps and the Samoyeds have to be on guard day and night to protect their herds from the Wolf. The attempted establish-

ment of a Reindeer industry in the southern mountains of Norway had to be given up on account of this beast of prey. The Reindeer can protect itself to some extent against the Wolf, less with its antlers than with blows of its forefeet.

The Wolverine stands next to the Wolf as a Reindeer enemy. It creeps up on its prey or lies in ambush for it. At calving time it is extremely dangerous to the doe and its offspring.

In summer Reindeer suffer greatly from plagues of flies and mosquitoes (Tabanidae and Culicidae) and even succumb to their attacks. Both wild and domestic stock suffer. Warbles of Oestridae also are serious pests, rendering meat and hides more or less unfit for human use. *Cephenomyia nasalis* deposits its living larvae in the nostrils of the Reindeer; this is a very serious pest, sometimes causing death. Reindeer are also infested with various cestodes and nematodes. Domestic animals are sometimes decimated by a disease called "Siberian plague."

Domestication and acclimatization.—The domestication of the Scandinavian Reindeer by the Lapps is too familiar and too lengthy a theme to require discussion here. (Cf. Laufer, 1917.) The various successful and unsuccessful acclimatization experiments in other countries (chiefly with this domesticated form) may, however, be briefly mentioned here. The information is derived mainly from Jacobi (1931, pp. 158-165).

Between 1771 and 1787, a hundred Reindeer were brought to Iceland from Finnmark and released in two different areas. By the beginning of the nineteenth century they had so greatly increased that they caused great damage by overgrazing. In 1817 hunting was permitted, and this greatly reduced the number on the Reikjan Peninsula. In the hard winter of 1880-81 the greater part of these perished. By the end of the century only 15-20 were left. On the other hand, the herds in the interior flourished, and about 1888 their numbers were estimated at 700-1,000. After 1860 the fine stand was decimated by English hunters. By 1902 they were reduced again to about 150. According to Laufer (1917, p. 144), the Norwegian Reindeer introduced into Iceland were wild stock; they are now almost exterminated.

In 1816 three Reindeer of the Samoyed race were imported from Archangel and released in the Orkneys, but they did not survive. About 1820 Bullock introduced about 200 animals from time to time in the Pentland Highlands of Scotland, but they gradually succumbed. Various other unsuccessful efforts in Great Britain are mentioned by Millais (1906, vol. 3, pp. 78-79).

In 1910 and later about 400 Reindeer were introduced from Norway into Jutland, Denmark, but the experiment failed in a few years.

From the sixteenth to the twentieth centuries various attempts were made to introduce Reindeer into northern Germany, but all came to naught.

During the last century efforts were made on a small scale to acclimatize Reindeer in the Alps of Austria and Switzerland, but they proved abortive. The same is true of the Gran Paradiso National Park in Italy (Laboratorio di Zoologia Applicata a Caccia, *in litt.*, September, 1936).

On the subantarctic island of South Georgia a dozen Lapland Reindeer were introduced in 1908 by Capt. C. A. Larsen, subsequently increasing to 400 or 500. They have also grown to exceptional size, and have reversed their breeding season to fit the Antipodes.

In 1908 and 1909 Dr. Grenfell introduced 300 Lapland Reindeer, in two herds, into Labrador.

We learn from Dr. N. von Transehe (*in litt.*, February, 1937) and from the Latvian Forest Department (*in litt.*, March, 1937) that in 1935 four Reindeer were introduced from Norway and set free in Kolkasrags in Kurland, Latvia. The two bucks soon died, but the two does each had a fawn. A further attempt at acclimatization is planned.

Sakhalin Reindeer

RANGIFER TARANDUS SETONI Flerov

Rangifer tarandus setoni Flerov, Jour. Mammalogy, vol. 14, no. 4, p. 337, fig. 7, 1933. ("Saghalien.")

FIG.: Flerov, 1933, p. 332, fig. 7.

This endemic subspecies of Sakhalin is "threatened with destruction" (Miyoshi, in Skottsberg, 1934, p. 411).

It is "closely allied to the *R. tarandus phylarchus* by its cranial characters but well distinguished from all Palaearctic wild reindeer by the dark brown color of the belly without whitish area" (Flerov, 1933, p. 337).

Schrenck (1859, pp. 167-168) speaks of the northern part of Sakhalin as one of the places in the Amur region where the Reindeer occurs in largest numbers; it extends also in the mountains to the southern end of the island, where it is frequently killed by the Ainus.

Kuroda (1928, p. 228) records antlers from Chirie, Sakhalin.

[The domesticated Reindeer of Sakhalin are apparently derived from some mainland stock. According to Schrenck (1859, pp. 169-170), the Oroks on the east coast, from about latitude 49° 30' to 52° 30' N., have a Reindeer culture, using the animals for draft

purposes. In Schrenck's time the Oroks, with their Reindeer, were in the habit of crossing the narrow strait between the island and the mainland each winter on the ice.

"A very large reindeer exists on the island of Saghalien and is used for ploughing by the Japanese. It is probably of the foregoing sub-species [*R. t. phylarchus*], having been imported long ago, as ancient Japanese pictures give representations." (Millais, 1915, p. 223.)]

Novaya Zemlya Reindeer

RANGIFER TARANDUS PEARSONI Lydekker

Rangifer tarandus pearsoni Lydekker, Proc. Zool. Soc. London 1902, vol. 2, pt. 2, p. 361, 1903. ("Novaia Zemlia.")

FIGS.: Pearson, 1899, pl. 14; Lydekker, 1903, p. 362, fig. 77, and 1915, vol. 4, p. 245, fig. 41; Flerov, 1933, p. 330, fig. 3.

This Reindeer has become so greatly reduced in numbers that its status is distinctly precarious. The presence of domesticated Reindeer aggravates the situation.

It was originally "distinguished from other Old World forms of Reindeer by the symmetry of the antlers and the excessive palmaria of both their brow- and bez-tines and their summits" (Lydekker, 1903, p. 361). "Coloring in winter very light, almost white. The light rose-brown color is present only on the upper surface of the head and back. This color but lighter is found also on the outer side of the limbs. No trace of a longitudinal dark area is present on the sides of the body. Fur very long, especially on the lower side of the neck." (Flerov, 1933, p. 335.)

This Reindeer seems to be more or less restricted to Novaya Zemlya. According to Heuglin (1874, p. 35), it occurs commonly in herds in the more southerly parts of this territory. On the North Island its range extends about to Cape Nassau, and occasionally tracks are found farther east. Matotchkin Strait and the southern and southwestern coasts of the South Island are more favored areas, though the animals are much hunted there. It is reported that "Tundra Reindeer" [presumably *R. t. sibiricus*] occasionally cross Waigatch Island on their way to Novaya Zemlya.

Pearson writes (1899, pp. 53, 119, 124-125) that Samoyeds are brought to Novaya Zemlya by Russian merchants and left there during the winter to hunt Reindeer and other animals. Each of several Samoyed settlements killed, or was expected to kill, 100 or more Reindeer during the year. "I feel convinced this destruction is considerably in excess of the natural increase, so that reindeer must soon cease to exist in this country" (p. 125). "The crew of a Norwegian ship, . . . some twenty years ago, had shot over a hundred during their short stay" (p. 127).

According to Økland (1928, pp. 45-46, 53), there are various records, dating from about 1871 to 1887, of herds numbering from about 5 to 500 individuals. Doubtless the stand was subject to great variation. As long ago as 1839 v. Baer reported the animals to have become rare, at least on the west coast, on account of the frequent wintering of walrus-hunters. Nearly 50 years later Kriwoscheja stated that Reindeer had become rarer since Samoyeds had established permanent quarters in Novaya Zemlya in 1877, but that about 1870 one could obtain Reindeer flesh everywhere. In 1881-82, 800 animals were killed in the vicinity of Möller Bay. But in 1882-83 the Samoyeds killed altogether few more than 100. The number of Reindeer killed by colonists on Novaya Zemlya between 1891 and 1906 is said to have been 2,610.

The Samoyeds appear to have brought domesticated Reindeer with them from the mainland to Novaya Zemlya (*cf.* Wollebaek, 1926, pp. 58-60). If, as has happened elsewhere, there has resulted here a certain mixture of the tame and the wild stock (which belong to two different races), the wild Novaya Zemlya Reindeer would tend to become extinct through dilution, even if they escaped direct slaughter.

The latest information at hand is the following account by Zubkov (1935, p. 61):

During a fairly long period the catch of reindeer occupied a prominent place in the hunting on Novaya Zemlya, not only covering the need of meat and skins of the hunting and fishing population, but forming also an object of export. From 1891 to 1923, for instance, about 8000 reindeer skins were brought out of Novaya Zemlya.

Since the foundation of hunting settlements on Novaya Zemlya and up to the present time, reindeer-hunting knew no restrictions. The hunting was carried on through all seasons and especially at the periods of glazed frosts there used to be wholesale killing of reindeer, the catch attaining a hundred heads and more to every hunter. Owing to such rapacious hunting and the consequent driving back of the herds from the rich pasture lands, the wild reindeer has nearly wholly disappeared: a small herd only inhabits now the still inappropriated coasts of the Northern island and a few groups are met with on the Southern island. For the past ten years the catch amounted to a few dozen heads per annum for the entire archipelago.

The author deems it necessary to raise the question of an absolute interdiction of wild reindeer hunting, inasmuch as the hunting, as practiced at present, may lead to the complete extinction of the reindeer on Novaya Zemlya.

Finland Reindeer

RANGIFER TARANDUS FENNICUS Lönnberg

Rangifer tarandus fennicus Lönnberg, Arkiv f. Zoologi, vol. 6, no. 4, p. 10, 1909. ("Torne Lappmark (thus probably in Enontekis)," northwestern Finland.)

SYNONYM?: *Rangifer tarandus silvicola* Hilzheimer (1936).

FIG.: Jacobi, 1931, pl. 5, fig. 35.

Taxonomically, this Reindeer is variously rated: as a subspecies of *Rangifer tarandus* by Lönnberg (1909, p. 10) and by Lydekker (1915, vol. 4, p. 243); as a species by Miller (1912, p. 981) and by Jacobi (1931, p. 125); and as identical with *R. t. tarandus* by Flerov (1933, p. 331). Its former range is quite uncertain, especially toward the east, but may be considered provisionally as covering the forested portions of northern Sweden, northern and eastern Finland, and northern Russia, possibly east to the Urals. It is now extinct over the greater part of this region.

This animal is larger than the Scandinavian Reindeer, the height of the male at the shoulder being about 1,200 mm. It is also distinguished by cranial and dental characters. The antlers are strong and heavy, the beam rather flattened, the bez-tines flat and palmated, both brow-tines palmated and converging. A set of antlers from Karelia is 910 mm. in length; one from Olonetz, 940 mm. (Lönnberg, 1909, pp. 4-10; Jacobi, 1931, p. 126.) No description of the skin seems to be available, unless that of one from the central Urals applies to the present form (Jacobi, 1931, p. 125).

Lönnberg (1909, pp. 3-14) furnishes the following information:

To the east of the Scandinavian peninsula wild Reindeer are, or were to be found in northern Finland and their distribution extended towards the north into the peninsula of Kola and southwards along the Finnish-Russian frontier through Carelia, and at least during the winter their wanderings carried them even to the south of Lake Ladoga. . . .

In the present time its habitat is very much restricted from what it used to be. . . .

From this report [by Pleske, on the Kola Peninsula, 1884] it may be seen that wild Reindeer have, at least formerly, been distributed over the greater part of the peninsula but that their number had been greatly diminished by wolves and men. How it is at present is uncertain. Wild Reindeer are still to be found on the Kola Peninsula but it is unknown to the present author whether they are numerous or scarce. Ramsay mentions [1892] that he observed a flock of 11 wild Reindeer in the upper Kunjok-valley east of Lake Imandra, and on the Umptek-tundra he saw such animals too. In the year 1870 Mr. K. Hildén . . . wrote that wild Reindeer were to be found in Northern Finland within an area extending 220 verst in length and with an average width of 120 verst. This area consisted of "the forest-clad wilderness which is situated between the inhabited country of the parochial districts Enontekis, Kittilä, Sodankylä and the eastern part of Kuolajärvi, and the Norwegian frontier towards the east along Vaskonjoki over Padar Lake, along Joenjoki and Enare Lake down Patsjoki to the Russian frontier." In the year 1900 Mr. Granit states that in northern Finland wild Reindeer were to be found "only in Enontekis (very little) and in Sodankylä and Enare parochial districts within the great wildernesses which form the watershed between the affluents to the Arctic Ocean and those to the Gulf of Bothnia." From this district and towards the south the same author did not believe that there existed any wild Reindeer nearer than at Ilomants and thence along the Russian frontier towards Ladoga. Quite lately, however, Dr. Alex Luther kindly has communicated that it appears certain that the wild Reindeer now are exterminated in the southern parts of the present Finland even if now and then some stragglers from Russian

Carelia are seen near the frontier. But "in Ladoga-Carelia wild Reindeer have been observed even during the last years, principally on the grounds belonging to the monastery of Valamo, where they must not be molested."

The Finland Reindeer is thus very nearly exterminated in the greatest part of its former habitat and it looks almost as a bitter irony of fate that it should not be recognized and discerned as a separate race before it was in so imminent danger of becoming entirely extinct. . . .

The forest-clad area of Finland, which was the principal habitat of this animal, is or was fully continuous with that of Northern Sweden, and it must . . . be probable that the Finlandic woodland Reindeer also extended its distribution into the latter country. . . . It is a fully established fact that in former days wild Reindeer occurred in the forests of Northern Sweden, and it is also well known that these were larger than the Reindeer of the mountains, even the wild ones. [From an account by Hollsten in 1774] it is apparent that still during the later part of the eighteenth century a race of very large wild Reindeer lived in the wildernesses, wide moors and forests, below the haunts of the Lapland Reindeer, thus to the east of and below the mountains and fells that form the watershed of the peninsula. These Reindeer lived thus in other districts and had different biological habits than the Lapland Reindeer, with which they did not mix, or only accidentally did so during the rutting season. There can hardly be any doubt that this large Woodland Reindeer was identical with the one described above as *Rangifer tarandus fennicus* It has already been mentioned above that the tame Reindeer of the Laps belong to the latter race [*R. t. tarandus*], but there exists still in some parts of Northern Sweden a smaller number of tame Reindeer, that all the time live in the woodland and on the moors, never ascending the mountains. [These Reindeer are larger than the others, and it may be assumed that they] have descended from the formerly existing wild Woodland Reindeer, or more probable still have originated as products from crossing the tame Reindeer (the typical *R. tarandus*) with wild stags of the Woodland race.

Miller writes (1912, p. 985) of this Reindeer: "Now probably confined to the wooded portions of Finland, east to the Kola Peninsula, and nearly extinct."

Schulman [1910] has shown that the Reindeer must have once occurred throughout Finland but that it had disappeared in western and central Finland by the end of the eighteenth century (Jacobi, 1931, p. 147).

In Russia the range extends across Karelia to the White Sea, Lake Ladoga, and Lake Ilmen, and through the Dvina Basin. The former southern limit extended from Lake Ilmen across the Valdai Hills through the Governments of Tver and Vladimir to the Kiasma, Volga, Kama, and Bielaia Rivers, and in the Urals as far south as latitude 52° N., northeast of Orenburg. (Jacobi, 1931, pp. 128, 148-149.) This author would even refer to *fennicus* the Reindeer of the Irtysh and the Ob Basins in western Siberia.

Pallas (1776, pt. 3, p. 597) recorded Reindeer from as far south as the Caucasus Mountains.

The Reindeer is now rare in European Russia, and its range has been greatly reduced. In the middle of the last century it extended

as far south as the latitude of Gorky, in the vicinity of Smolensk. The animal is now found only in the northernmost part of Russia, where hunting is forbidden. Great reserves have been established in [Russian?] Lapland, with the principal aim of giving protection to the Reindeer. Owing to the natural increase of the stock and to the introduction of specimens from neighboring territories, the number in the herds has doubled during three years (1929-32). (W. G. Heptner, *in litt.*, December, 1936.) [Does the foregoing statement concerning recent numbers possibly refer to domesticated Reindeer?]

[Hilzheimer (1936, p. 156, fig. 1) describes *Rangifer tarandus dichotomus* from Seitowski Possad, near Orenburg in the southern Ural region. The name is apparently based upon a single Recent antler, without skull or skin, and a fossil antler. In this connection we may recall Flerov's remark (1933, p. 328): "The deer antlers generally are very variable and give no satisfactory constant characters for the classification of small groups." Hilzheimer considers that this Reindeer of southern Russia is now extinct. On zoögeographical grounds one might expect the type locality of *dichotomus* to be occupied by a Reindeer more or less intermediate between *R. t. fennicus* Lönnerberg and *R. t. buskensis* (Millais).]

Spitsbergen Reindeer

RANGIFER PLATYRHYNCHUS (Vrolik)

Cervus (Tarandus) platyrhynchus Vrolik, Nieuwe Verhandel. Kron. Nederl. Inst., Eerste Klasse, pt. 2, p. 160, 1829. ("Spitsbergen, see Vrolik, l. c., p. 239" (Miller, 1912, p. 985).)

SYNONYM: *Cervus tarandus* forma *spetsbergensis* Andersén (1862).

FIG.: Wollebaek, 1926, p. 44, fig. 15.

This Reindeer, which is confined to Spitsbergen, had become very seriously reduced in numbers by 1925, when Norway assumed sovereignty over this territory. The protective measures then adopted probably saved the species from extermination, and have enabled it to make a good recovery.

This is the smallest of the Palearctic Reindeer. In winter the pelage is long, woolly, and whitish; in summer it is dark brown on back and rump, with a mixture of white hairs; antlers similar to those of *R. t. tarandus*. Height of male at shoulder, 829-940 mm. (Wollebaek, 1926, pp. 46-48.)

The following account is contributed by Wollebaek (1926, pp. 50-53):

Up to a short time ago, the reindeer occurred over practically the whole of the ice-free parts of Spitsbergen, and it has undoubtedly been far more

numerous in earlier times than now. First the Dutch and the English, and later on the Russians and Norwegians, hunted reindeer in Spitsbergen.

[In the 1860's, according to Johan Hagerup,] reindeer swarmed in Sassen Bay, Advent Bay, and Green Harbour, and it did not take long to kill a hundred reindeer or so. In the seventies, cod-fishing began in those waters. For several years about 30 fishing vessels lay in Isfjorden and other places, and each of these vessels took yearly 25 to 50 reindeer. Later on tourists came, who shot a great many; they took the heads as hunting trophies, and left the carcasses. . . .



FIG. 48.—Spitsbergen Reindeer (*Rangifer platyrhynchus*). After Wollebaek.

Norwegian hunters have shot reindeer both on Kong Karls Land and on the north coast of North-East Land, and on islands lying still farther away to the north (Castréns, Parrys, Martens and Phipps Øyer), the reindeer, according to A. E. Nordenskiöld [1880], . . . has been fairly common.

Capt. Hans Johannesen . . . has informed me that Edge Øy was the best hunting ground for reindeer in Spitsbergen. . . . Some hunters could, in former years, when reindeer were far more numerous in Spitsbergen than now, return with up to 150 animals. . . . Other Arctic travellers have stated as the best hunting-grounds: the north side of Bellsund, round Isfjorden and Wijde Bay, on the coasts of Hinlopenstredet and at Heleysund. . . .

"That the Spitsbergen reindeer, which are [=is] killed yearly in great numbers by Arctic hunters, is not exterminated, seems a proof," says Kolthoff [1903], "that it is found in greater numbers in the valleys which stretch into the country, where these hunters never go." Besides, it may be men-

tioned as an indirect reason, that the polar wolf does not occur in Spitsbergen. . . .

Extensive hunting of the reindeer during recent years has driven it from the easily accessible west coast of Spitsbergen. On the other hand, it is still, according to Hoel (1916), abundant on the north coast (west of Wood Bay and eastward), on the east side of the main island, as well as in Barents Land and Edge Øy.

At this point Wollebaek (1926, pp. 53-55) quotes at length from a manuscript of Hoel's, dated 1921:

Until 50 or 60 years ago the reindeer was distributed over the whole of Spitsbergen. To the end of last century the Spitsbergen reindeer was hunted chiefly by sealers, who occasionally went ashore and also by hunting expeditions wintering there. . . . Hunting took place in summer, and the hunters had to carry the reindeer on their backs to the coast, which in itself limited their invasion inland.

Reindeer-hunting has lately, however, completely changed as the wintering Arctic hunters have added polar-sledges and dogs to their equipment, and by these means of transport they can cover almost unlimited distances and search out and kill reindeer in their most secluded places of refuge. Furthermore, on account of shortage of meat and the high prices ruling in Norway during the war, sealing vessels have in increasing numbers visited the coasts of Spitsbergen, where they have killed reindeer in hundreds, partly for their own requirements and partly for sale in Norway.

In addition, there is the growing exploitation of Spitsbergen's coal deposits and the resultant increase of population just in the best reindeer district, between Isfjorden and Bellsund. . . . These [mining] companies keep also dogs and polar-sledges, with which they can make extensive hunting expeditions and load up on one sledge 8-10 reindeer. Some of these companies have spared the reindeer as much as possible, whilst other[s] have hunted extensively. . . .

Statistics for the last few years show that the Spitsbergen reindeer is taxed too heavily. At the Tromsø Custom House the following numbers of Reindeer were registered during the years 1915-1925:

1915	1916	1917	1918	1919	1920	1921	1922	1923	1924	1925
159	499	535	993	268	293	61	115	55	68	90

But besides the reindeer which have been brought to ports in the north of Norway, a considerable number have been shot for local consumption,—one may reckon at least a couple of hundred a year up to 1920.

There is only a single year in all the time Norwegians have hunted on Spitsbergen, i. e. for over a hundred years, that so many reindeer have been shot as in 1918; this was in the year 1878, when 1491 animals were killed.

These numbers prove that the Spitsbergen reindeer has until lately been quite numerous. . . . But . . . it is clear that the reindeer stock in that region cannot bear such heavy inroads upon their numbers. . . . The reindeer has been heavily decimated everywhere in Spitsbergen during the last few years. If this is continued for 3 or 4 years more the reindeer will be entirely exterminated, in any case in the Isfjorden and Bellsund districts.

Wollebaek then continues (1926, pp. 55-65):

In the same proposal Hoel mentions the following places in Spitsbergen where the reindeer is found at present:

1. On the north and west coast of the Nordostland.

2. A part of the north coast of Spitsbergen:—Rensdyrlandet, Liefde Bay and Wood Bay districts, peninsula between Wood Bay and Wijde Bay, Wijde Bay's vicinity.

3. District between Isfjorden and Van Mijen Bay and the valleys running up from these fjords eastward to Storfjorden.

4. The islands Edge Øy and Barents Land.

Daniel Nøis (April 1923) has given me the following particulars . . . :—
 "Far more are being shot than ever come into existence. . . . The reindeer stock has been reduced in an alarming degree both on the north and east coast. . . .

"On the south side of Isfjorden, Green Harbour and Sassendalen included, no less than about 400 reindeer were shot in 1905 and 1906 by hunters wintering there and by coal-mining companies. . . .

"The Spitsbergen reindeer does not generally roam far, and it therefore has difficulty in re-establishing itself in a place in which it has once been exterminated."

[When Norway assumed sovereignty over Spitsbergen in 1925,] the first administrative step taken . . . was to prohibit the killing of reindeer for a period of ten years. [In that summer only 23 of the animals were seen by four government parties that crossed the best reindeer grounds of West Spitsbergen in every direction. Only 55 had been shot by about 40 hunters in that territory during the previous winter.]

The number of reindeer still left in the remote parts of these islands is believed to be sufficient for the renewal of the stock by immigration throughout the archipelago.

The annual reports of the National Association for Nature Protection in Norway furnish additional information. In the report for 1931 Adolf Hoel states that the total protection granted has had a most successful effect upon the Reindeer stock. In the Advent Valley, where no Reindeer existed before the protection, larger and smaller herds are seen all the time.

In the report for 1934 E. Sverdrup states that the animals are seen in herds of 5 to 20 head. Wintering hunters still kill a good many illegally, but this hunting most probably does no harm. The poaching carried on from sealing ships in summer is, however, more serious. The sealers are able to do much more harm than the relatively few fox-hunters (25-30 men) who kill only for their own use.

In 1934 total protection was extended to cover a new period of ten years.

On a number of occasions marked Reindeer have been killed in Spitsbergen, and this is apparently accepted by Gordon (1922, p. 11), Wollebaek (1926, pp. 58-61), and others as evidence of the immigration of tame Samoyed Reindeer from Novaya Zemlya over the polar ice, perhaps by way of Franz Josef Land. This, however, would be an amazingly long and foodless migration—380 km. from Novaya Zemlya to Franz Josef Land, and 340 km. more from Franz Josef Land to Spitsbergen. Jacobi (1931, p. 76) discredits the evidence adduced in support of the migration theory.

Other Eurasian Reindeer

The remaining forms of wild Reindeer in northern Europe and Asia may be very briefly noticed here. Their numerical status is evidently more satisfactory than that of the forms already discussed. Yet all seem to show an inevitable tendency toward reduction in numbers and restriction of range. There is considerable disagreement among various zoölogists as to the taxonomic status of some of these forms, and the following arrangement is merely provisional:

Rangifer tarandus sibiricus (Schreber) (Säugethiere, vol. 5, pl. 248c, 1784; type locality restricted by Hollister (1912, p. 7) to "the Obi, in the neighborhood of the Beresov Mountains"). Range: "Siberian and east European tundra zone; islands of Asiatic Arctic Sea" (Flerov, 1933, p. 336). *Tarandus rangifer lenensis* Millais (1915, p. 219) and *Rangifer arcticus asiaticus* Jacobi (1931, p. 85) are perhaps synonyms.

Rangifer tarandus buskensis (Millais) (The Gun at Home and Abroad, vol. 4, p. 222, 1915; type locality, "the Busk Mountains near Semipalatinsk"). A probable synonym is *R. t. valentinae* Flerov (1933, p. 336; p. 329, fig. 1; p. 331, fig. 5), whose range is shown as extending through the forested zone of Siberia, from the Urals in the west to the Stanovoi Mountains in the east, and south to the Altai. Hilzheimer (1936, p. 155) apparently overlooks the two foregoing names in proposing *R. t. transuralensis* for the animal of the Konda River, western Siberia.

Rangifer tarandus phylarchus Hollister (Smithsonian Misc. Coll., vol. 56, no. 35, p. 6, 1912; type locality, "southeastern Kamchatka"). Range: "Kamchatka, coast of Okhotsk Sea, Amurland" (Flerov, 1933, p. 337).

Rangifer angustirostris Flerov (Arbeit. Ausschusses Erforschung Naturschätze, Yakutsk ser., no. 4, publ. by Acad. Sci. URSS, p. 8, 1932; type locality, Bargusin Mountains, northeastern coast of Lake Baikal). Range: "Highlands of Transbaikalia" (Flerov, 1933, p. 337).

Two additional names (*Tarandus rangifer chukchensis* Millais (1915, p. 220) and *T. r. yakutskensis* Millais (1915, p. 222)) were based upon domesticated Reindeer, and so need not be considered here.

Wild Reindeer (*R. t. sibiricus*) have long since disappeared from the tundra along the Arctic coast of Russia, including the Kanin Peninsula and Kolguev Island, and likewise from the extensive mainland tundra on the Urals (Jacobi, 1931, pp. 67, 155).

W. G. Heptner writes (*in litt.*, December, 1936) that in Siberia Reindeer are quite widely distributed in the taiga zone and very

common in certain areas; in other places they are quite rare. Hunting is forbidden in different regions.

For additional information on the range and status of wild Reindeer in Siberia, see Schrenck (1859, pp. 167-170), Miller, in Carruthers (1913, p. 234), Millais (1915, pp. 218-223), Sowerby (1923, pp. 112-113), Jacobi (1931, pp. 67-69, 131-133, 149, 188-190), Scaloni (1931, p. 224), and Salesski (1934, pp. 372-373).

Many of the Siberian natives keep domesticated Reindeer. On this subject consult Carruthers (1913, pp. 127-128), Millais (1915, p. 217), and Laufer (1917). The present Reindeer industry of Alaska and northwestern Canada had its origin in domesticated stock imported from eastern Siberia (*cf.* Hadwen and Palmer, 1922; also Proc. North American Wildlife Conference 1936, pp. 424-427, 1936).

Family GIRAFFIDAE: Giraffes and Okapi

This family consists of two Recent species: *Giraffa camelopardalis*, divisible into 12 subspecies, and *Okapia johnstoni*. The entire family is now restricted to Africa south of the Sahara.

All Giraffes are accorded protection under Schedule B of the London Convention of 1933. Therefore all subspecies are included in the following accounts, although some of them are still fairly common. The Okapi is placed in Schedule A by the London Convention.

"The giraffe is surely as impressive and wonderful a form of life as any that has ever been evolved on this planet. . . . To me, at any rate, whenever I have watched them feeding on the tall feathery-leaved acacias, to which they are very partial, or stalking slowly and majestically through the park-like country they very commonly frequent, giraffes have always appeared to be amongst the most graceful and beautiful of all wild creatures." (Selous, 1914, p. 40.)

An inoffensive animal, ornament of the mimosa savannas, the Giraffe is perhaps the most worthy of protection of all the animals of Africa (Lavauden, 1933, p. 27).

Sennar Giraffe; Nubian Giraffe. Girafe (Fr.). Giraffe (Ger.)

GIRAFFA CAMELOPARDALIS CAMELOPARDALIS (Linnaeus)

[*Cervus*] *Camelopardalis* Linnaeus, Syst. Nat., ed. 10, vol. 1, p. 66, 1758.

("Aethiopia and Sennar"; type locality restricted by Harper (1940, p. 322) to "Sennar," Anglo-Egyptian Sudan.)

FIGS.: Gervais, Hist. Nat. Mammif., pt. 2, pl. 42, 1855; Lydekker, 1904, pls. 9, 10, and 1905, pp. 340-341, figs. 85-86; Lydekker and Blaine, 1914, vol. 3, p. 243, fig. 41; Selous, 1914, pl. 6, right-hand fig.; Zammarrano, 1930, p. 89, fig.

A century ago this Giraffe was abundant, and today it is fortunately still common, in the southeast of the Anglo-Egyptian Sudan.

The general pattern of coloration is the same in both sexes; spots large, sandy or chestnut in color, more or less distinctly quadrangular in form, and divided by a coarse network of comparatively narrow lines, which are buffish white in immature bulls and nearly white in immature cows; front of face in bulls somewhat spotted, and sides of face fully spotted; large spots on shoulders and upper part of forelegs; shanks white, the hind pair more or less spotted superiorly; under parts and inner surfaces of limbs comparatively free from spots; anterior horn well developed, but no occipital horns (Lydekker, 1904, p. 205; Lydekker and Blaine, 1914, vol. 3, p. 242). Height probably about 16 feet.

The Sennar Giraffe apparently occurs more or less throughout that portion of the Anglo-Egyptian Sudan lying east of the Nile and south of the latitude of Khartum. Its range also seems to extend into adjacent parts of Eritrea and Ethiopia, exclusive of the mountains (Rüppell, 1835, p. 24). There is, however, a certain vagueness in regard to its distribution, as indicated by the following remarks of Lydekker and Blaine (1914, vol. 3, pp. 242-243): "Two types of colour-pattern occur in the giraffes of the Eastern Sudan, namely, that just described [*G. c. camelopardalis*] and the one recorded under the next heading [*G. c. antiquorum*], but which represents the typical *C. giraffa* [= *camelopardalis*] of Linnaeus, it is impossible to decide. Neither is there any definite information with regard to the precise habitat of the form here identified with the typical race."

The combined ranges of *G. c. camelopardalis* and *G. c. antiquorum* correspond roughly to the eastern portion of the Sudanese Savanna District of Bowen (1933, pp. 256, 258).

"In the mountains of Dendor, a district towards the Atbara, and six or eight journeys south-east of Shendi, the Giraffe is found It is hunted by the Arabs, Shukorein and Kowahel, and is highly prized for its skin, of which the strongest buckles are made." (Burekhardt, Travels in Nubia, p. 282, 1819, as quoted in Anderson and de Winton, 1902, p. 352.)

In 1861 Baker (1867, pp. 175-202) encountered large herds of Giraffes, numbering up to more than 150 individuals, along the Atbara River in the vicinity of Sofi, above the mouth of the Setit.

"It is still found in small numbers on the Settiti, and in larger numbers throughout the uninhabited tracts on both sides of the Dinder, between the Rahad and the Blue Nile" (W. B. Cotton, 1912, p. 46).

"On the frontier of Abyssinia on the Dinder River, a few are killed annually by poachers.

"In 1927 they were considerably depleted in this area by a form of rinderpest, and many were found dead and dying in the river-bed." (Brocklehurst, 1931, p. 65.)

"Giraffes are fairly numerous on the Setit, and on the Dinder, but are not allowed to be shot" (Butler, in Maydon, 1932, p. 148).

Up-to-date information on the distribution of the Sennar Giraffe in Eritrea and Ethiopia is lacking.

According to Heuglin (1877, vol. 2, p. 134), it occurs in the steppes of the Atbara, the Gash, and the Barka, northward at least to lat. 18° N.; likewise on the Abyssinian Mareb and on the lower Anseba. (The Gash and the Barka cross the Sudan-Eritrean boundary; the Mareb extends along the Ethiopian-Eritrean boundary at about long. 38° E.; and the Anseba is an easterly tributary of the Barka in extreme northern Eritrea.)

"During the last year or so, 1897-98, they have been encountered within a few hours of Kassala [near the Sudan-Eritrean border] by officers of the recent Italian garrison" (Bryden, 1899, p. 501).

Lydekker and Blaine (1914, vol. 3, p. 243) record a specimen from "Dembelas, Abyssinia." This is apparently in the northwestern part of the country.

The live specimens imported by Menges were shipped from Massaua, Eritrea, and were derived from the hinterland, probably from the vicinity of Kassala in British territory (Schwarz, 1920, p. 899).

Kordofan Giraffe

GIRAFFA CAMELOPARDALIS ANTIQUORUM (Swainson).

Camelopardalis antiquorum Swainson, Geography and Classification of Animals, p. 95, 1835. (Based upon the Giraffe of Rüppell (*i. e.*, the "*Camelopardalis Giraffa* (Linné)" of Cretzschmar, 1826, p. 23, pls. 8-9); type locality said by Schwarz (1920, p. 898, footnote) to be "Baggara el Homr," southern Kordofan (lat. 10° N., long. 28° E.?; *cf.* Harper, 1940, pp. 322-323).)

FIGS.: Cretzschmar, 1826, pls. 8-9; Jardine, Nat. Libr., Mammalia, vol. 3, Ruminantia, pt. 1, pl. 21, 1835; Lydekker, 1904, pl. 11, p. 206, fig. 24; Lankester, 1907, p. 120, figs. 42-43; Lydekker and Blaine, 1914, vol. 3, p. 245, fig. 42.

This Giraffe is still common in the Anglo-Egyptian Sudan west of the Nile.

It is closely allied to the Sennar Giraffe, but distinguished by having the spots on the upper part of the limbs—from just above the line of the abdomen downward—broken up into a number of very small and irregular ones, which contrast strongly with the

larger ones above; similar spots also occur on the under parts and the inner surfaces of the limbs. Horns as in the Sennar Giraffe. (Lydekker, 1904, p. 206.) Height about 16 feet (Cretzschmar, 1826, p. 23). This subspecies is said by Schwarz (1920, p. 898) to differ from *G. c. peralta* only in its brighter, more reddish coloration.

The range may be tentatively considered to include Kordofan and Darfur in the Anglo-Egyptian Sudan. The areas where this subspecies presumably intergrades with *G. c. peralta* on the west and with *G. c. congoënsis* on the south have not been determined.

According to Cretzschmar (1826, p. 25), Rüppell obtained five specimens on his journeys in Nubia and Kordofan. The species lives in small companies in all deserts south of Simrie [about lat. 17° N., long. 30° 45' E.], and is common in the deserts of Darfur.

Rüppell (1829, pp. 69, 70, 123) speaks of the Arabs of the Dongola region hunting Giraffes from horseback, their hides being especially prized for leather work. He also mentions tracks seen at the Wadi Serafe, near latitude 16° N., along the caravan route from Debba to El Obeid. He remarks later (1835, p. 24) that the animal occurs pretty commonly in small families of four to six individuals in the scrubby steppes and valley lowlands south of latitude 17°.

"The Giraffe is found in great numbers on the road from El Debbeh (on the Nile) to Kordofan, between Sabrian and Jebel el Arazi, and behind Kordofan, on the Bahr el Abiad, in the territory of the Baggara" (Hoskins, Travels in Ethiopia, p. 187, 1835, as quoted in Anderson and de Winton, 1902, p. 353).

Brocklehurst (1931, pp. 64-65) gives the following account:

Giraffes are common throughout the Sudan on both banks of the Nile, and during the rainy season extend as far north as the Wadi Howar in north-western Darfur, approximately lat. 16° N. . . .

Giraffes generally run in herds of ten or fifteen Quite close to the mouth of the Bahr-el-Ghazal there is a herd of several hundred Giraffes, which never seem to move away from this one particular place.

In parts of southern Kordofan they are still hunted by the Arabs on horseback with the sword

It is very rarely that any visitors to the Sudan ever want to kill one of these beautiful, harmless creatures; but I remember the case of one lady whose sole ambition was to kill a Giraffe in order to have a coat made from its hide!

Nigerian Giraffe

GIRAFFA CAMELOPARDALIS PERALTA Thomas

G[iraffa] c[amelopardalis] peralta Thomas, Proc. Zool. Soc. London 1898, p. 40, 1898. ("To the south-east of the junction of the Benue and Niger Approximately 8° E., and 7° N.")

Figs.: Lydekker, 1905*b*, pl. 12, figs. 1-2; Mitchell, 1905, pp. 245, 247, figs. 50, 51; Duke of Mecklenburg, From the Congo to the Nile, vol. 1, fig. 56, 1913; Schwarz, 1920, pl. 37; Antonius, 1929*b*, pp. 376-378, figs. 4-6; Lavauden, 1934, pl. 11, fig. 35; Malbrant, 1936, pl. 15.

The Nigerian Giraffe appears to have decreased practically everywhere throughout its wide range, and it is scarcely to be regarded as common anywhere unless in certain parts of French Equatorial Africa.

"Allied to the Nubian race [*G. c. camelopardalis*], but distinguished by its paler coloration—especially on the head—and its more numerous and differently arranged spots, a characteristic feature being the white, sparsely spotted occipital region, and the presence of a large fawn-coloured patch below the ears, covering an area which is white in the Nubian race, and in other races marked with small spots" (Lydekker and Blaine, 1914, vol. 3, p. 246). "On the neck the blotches are of a somewhat darker fawn on a white-brown ground. These blotches are very large, few in number, and separated by very wide interspaces The spots on the back are pale chestnut-brown, with trefoil-shaped dark brown centres. . . . A constant distinction between the two forms would appear to be the much greater number of the spots on the back and flanks of *peralta*, these spots becoming much broken up on the thighs." (Lydekker, 1905*b*, p. 120.)

The range limits of this subspecies have not been exactly determined (especially toward the east), but all Giraffes from Senegal on the west to French Equatorial Africa on the east will be included in the present account. The range appears to correspond roughly to the western portion of the Sudanese Arid District of Bowen (1933, pp. 256, 258).

French Equatorial Africa.—Despite eager hunting by the natives, the Giraffe is still a rather common animal. It is particularly abundant in the middle and southern parts of the Chad Territory, north to Kanem and Manga; also north of Wadai some large herds are found at Kobé (about 15° N.) near the Sudan frontier, and the species even ranges in the Dar Zaghera to the wells of Orba and the Wadi Howa (16° N.). Except for the real desert regions, there are few places in Chad where the Giraffe is not found, but it becomes really common only in sparsely populated regions where there are thick growths of mimosa trees, the leaves of which are its principal food. Its range changes according to the seasons and also according to the hunting by the Arabs on horseback. Among the areas where it is found most frequently are Baguirmi (along the lower Shari) and Salamat and Dar Sila (south of Wadai). More to the south it is also common between the Bahr Salamat and the Aouk, east of Fort Archambault. It becomes rarer in Dar Kouti, south of the Aouk. (Malbrant, 1936, pp. 100-101.)

The Giraffe occurs in small numbers in the Ubangi-Shari district northward from about latitude 8° N. (or even 7° on the frontier of Anglo-Egyptian Sudan). These numbers increase to-

ward the north. Depletion is due to the utilization of the flesh, hides, and tails by the natives and to hunting on horseback by the Arabs. The hides are used in the manufacture of native sandals. The species has been partly protected since 1916. A few occur in the north of the Parc du Bamingui-Bangoran and in the game reserve of Ouanda-Djalé as well as in the east of the reserve of Zemango, along the Sudan frontier. The existence of the Giraffe is not now threatened in the Chad, though its numbers have certainly diminished since the occupation of the country. (L. Blancou, *in litt.*, December, 1936.)

French Cameroons.—Schwarz (1920, pp. 893-894) mentions earlier records from Ndokulla, south of Marua, by Passarge, and from the southern base of the Mandara Mountains, northern Adamawa, by Schultze.

The Giraffe inhabits the Chad Basin, but its numbers can scarcely exceed a hundred head. It is partially protected by law. (Ministry of Colonies, Paris, *in litt.*, November 7, 1936.)

This is one of the animals that are decreasing in numbers but are not threatened with extermination. Depletion is due to native hunting for food and to the advance of cultivation in areas formerly uninhabited. It is protected in the game reserve of Wassa. (Inspection of Waters and Forests, Yaounde, *in litt.*, January 12, 1937.)

Nigeria.—In the present Province of Bornu, Barth (1857, vol. 2, p. 359) found "many footprints of the giraffe" at about latitude 12° N., longitude 13° E. Referring to the district of Wolóje (about lat. 11° 30' N., long 14° E.), he says (1857, vol. 3, p. 162): "It is not at all rare in the wildernesses which alternate with the densely populated regions of these districts."

Oakley writes (1931, p. 34) of the Yola Province: "The giraffe also frequents this bush, an animal absolutely protected, but still a prey to the native hunter and trapper."

"Reported as fairly plentiful in the Ruma Bush of Zaria Province. 'Few' or 'Scarce' in parts of Sokoto, Bornu, Bauchi, Benue, and Adamawa. . . . It is prohibited to kill Giraffe in the old Chad Reserve and in the Katsena Division of Zaria Province." Total prohibition as well as a sanctuary are urged. (Haywood, 1932, pp. 32-33.)

French West Africa.—Barth (1857, vol. 1, pp. 520-521) places the northern limit of the Giraffe at about latitude 17° 15' N. on the southern borders of Air. A little south of this point he found "numerous footprints." He likewise reports (1858, vol. 5, p. 199) footprints near Bourem on the Niger.

Buchanan (1921, pp. 86, 113) reports a small band some 30-40 miles north of Zinder and tracks between Tanout Fort and Agades.

In 1925 a military detachment on its way from Chad to Zinder

opened fire on a band of 11 Giraffes, killing every one and leaving their bodies to the hyenas and vultures (Lavauden, 1933, pp. 27-28).

In many parts of French Africa, where the Tuaregs and the southern Arabs hunt it from horseback, the Giraffe has almost disappeared. Its speedy gait permits it to escape the large carnivores, which rarely capture it. (Lavauden, 1934, p. 412.)

The Giraffe is found in the Ferlo district of Senegal; in the region about Niore and Bassikoune between the Senegal and the Niger; and northward from the Niger as far as the southern part of Timetrine (about lat. 19° N., long. 1° W.). It is also met with near the Niger between Bamba and Bourem. Between the Niger and Chad it occurs in the region north of Tahoua (about lat. 15° N., long. 5° E.), in Damergou, Tegama (north of Damergou), and Manga. It is found, accidentally, in the region of Labbezzenga (on the Niger at about 0° 40' E.), in the sands of Menaka (northeast of the last point), and south of Kidal (about lat. 18° 30' N., long. 1° 20' E.). (General Government of French West Africa, *in litt.*, November, 1936.)

Senegal and Gambia.—The Giraffe lives in small bands in the Ferlo desert country of Senegal, and sometimes ventures as far as the Lac de Guier, a tributary of the Senegal River. The natives love to hunt it for the sake of its hide, of which they make amulets and sandals that are reputedly indestructible; they are convinced that, shod in these sandals, they have nothing to fear from the Lion. (Cligny, 1900, p. 291.)

Near the middle course of the Gambia River Giraffes "appear to be extremely rare" (Budgett, 1900, p. 933).

"It seems agreed" that Giraffes "do not now exist in the Gambia" (Haywood, 1933, p. 36).

Along the Gambia River "a young Giraffe was captured a few miles from Kontaour (150 miles up) some years ago We are still wondering how this animal got into the Gambia." (E. Johnson, 1937, p. 64.)

Congo Giraffe. Girafe du Congo (Fr.)

GIRAFFA CAMELOPARDALIS CONGOËNSIS Lydekker

Giraffa camelopardalis congoënsis Lydekker, in Hutchinson's *Animal Life*, vol. 2, p. 83, 1903. ("Katanga" = Dungu, in the northeast of the Uelle district, Belgian Congo (*vide* Schoutedden, 1912, p. 135).)

FIGS.: Lydekker, 1904, p. 220, fig. 33; Leplae, 1925, p. 102, fig.

This Giraffe is seriously reduced in numbers in its range in the northeastern corner of the Belgian Congo. Presumably the same subspecies extends over the Sudan frontier into the Bahr el Ghazal and the western part of Mongalla Province, where the animals are

perhaps better protected. It may likewise be this form which occurs in the extreme eastern part of the Ubangi-Shari district of French Equatorial Africa (*cf.* the account of *G. c. peralta*). If there is any correspondence between its distribution and the Ubangi-Uelle Savanna District of Chapin (1932, p. 90) or the Ubangi Savanna District of Bowen (1933, pp. 256, 258), this subspecies may extend considerably farther to the westward toward the Cameroon border.

The Congo Giraffe is closely allied to the northern and eastern subspecies. It is "characterised by the well-developed frontal horn," by "the full spotting of the lower portion of the limbs," and by "the large size and subquadrangular form of the body-spots, which show no tendency to split up into stars." The sides of the head are well spotted, and the terminal tuft of the tail is unusually large. (Lydekker, 1904*a*, pp. 219-220.)

Up to 1912 this Giraffe was known only from the type locality. Then information became available indicating that its range extended into the province of Lado [now Mongalla] along the left bank of the Nile. Dungu, the type locality, is probably one of the extreme points in its range. (Schouteden, 1912, pp. 134-137.)

"The race occurring on the west bank of the Nile may be *congoensis* . . . Giraffes were seen near Rejaf by Colonel Roosevelt, at Lado Station by Major Powell-Cotton, and they have also been reported in the vicinity of Mahaji west of the Albert Nyanza by sportsmen. What race occurs in the Lado Enclave district is at present unknown." (Roosevelt and Heller, 1914, vol. 1, p. 316.)

The range of this animal in the Belgian Congo was exactly that of the Northern White Rhino. Its rarity has remained as great. There may not be more than four or five very small groups of Giraffes in the northeast of the colony. For several years none have been shot except a few under special authorization given to naturalists. But the natives continue to hunt the few survivors. Only the establishment of a national park here will save the last Giraffes of the Belgian Congo. (A. J. Jobaert, *in litt.*, November 10, 1936.)

Baringo Giraffe; Uganda Giraffe. Girafe du Baringo (Fr.)

GIRAFFA CAMELOPARDALIS ROTHSCHILDI Lydekker

Giraffa camelopardalis rothschildi Lydekker, in Hutchinson's Animal Life, vol. 2, p. 122, 1903. ("Guasin-gisha Plateau, to the south-east of Mount Elgon and west of Lake Baringo, B. E. Africa, nearly 1° north of the equator" (Lydekker and Blaine, 1914, vol. 3, p. 248).)

SYNONYM: *Giraffa camelopardalis cottoni* Lydekker (1904).

FIGS.: Bryden, 1899, pl. 14, fig. 2; Johnston, 1902, vol. 1, pl. facing p. 25 and pp. 376-379, figs. 231-233; Lydekker, 1904*a*, pls. 12-13 and pp. 211-213, figs. 26-27; Powell-Cotton, 1904, pls. facing pp. 194, 387; Lydekker, 1905*b*, pl. 12, fig. 3; Lankester, 1907, p. 121, fig. 44; Lydekker, 1908, pl. 14, fig.

2, and pp. 359-360, figs. 69-70; Lydekker and Blaine, 1914, vol. 3, pp. 239, 249, figs. 40A, 44; Roosevelt and Heller, 1914, vol. 1, pl. facing p. 302, middle fig., pl. facing p. 306, bottom fig.

In its main range in Uganda this Giraffe was probably never very plentiful, but at least several hundreds still remain (Game Warden, Uganda, *in litt.*, December, 1936).

"Adult bulls have a height of 17 or 18 feet. The body is marked by large, regular spots separated by narrow reticulations as in the reticulated, but the neck may be either reticulated or blotched similarly to the Masai giraffe. The legs below the hocks and knees are uniform cream-buff, without darker markings . . . The bulls are not consistently darker than the cows, but vary from seal-brown to tawny in coloration, independent of age." (Roosevelt and Heller, 1914, vol. 1, pp. 315-316.) "Skull with front horn strongly developed, and a pair of occipital horns behind the main pair" (Lydekker and Blaine, 1914, vol. 3, p. 248).

The range extends "from the Uasin Gishu Plateau and Lake Baringo northwestward over the highland and desert region of Uganda to the latitude of Gondokoro; east probably as far as the west shores of Lake Rudolf and west as far at least as the east bank of the Nile; limits of range not known" (Roosevelt and Heller, 1914, vol. 1, p. 314, map, p. 319). This range corresponds roughly to the Uganda Savanna District of Bowen (1933, pp. 256, 258) or to the northernmost portion of the East African Highland District of Chapin (1932, p. 90).

"These animals go about in large herds, and the old ones, males or females, seem to stand sentry whilst the rest of the herd browses unconcernedly on the branches and leaves of trees. . . . I have never seen a more impressive sight in Africa than a large herd of these animals moving about unconcernedly, taking little or no notice of our presence amongst them; for in this country round Mount Elgon they had evidently been unattacked by man for a long period. . . . We passed through subsequent herds containing hundreds of these animals." (Johnston, 1902, vol. 1, p. 377.)

"Mr. John Jay White . . . found giraffes in good numbers on the Guas Ngishu Plateau in 1908. Herds numbering up to a dozen or fifteen animals were frequently seen, and one herd of about 75 was noted." (Hollister, 1924, p. 58.)

"*G. c. rothschildi* occurs in the Mongalla Province" of the Anglo-Egyptian Sudan (Brocklehurst, 1931, p. 64).

The Game Warden of Uganda (*in litt.*, December, 1936) contributes the following account: "This Giraffe was formerly widespread in the Northern and Eastern Provinces, where it probably numbered about a thousand individuals but was never plentiful. It is still wide-spread in Gulu, Chua, parts of western Lango, and in Karamoja and Sebei (at the northern foot of Mount Elgon).

Native hunting, until absolutely prohibited, was the chief cause of depletion. Also rinderpest is periodically responsible for considerable mortality. Luckily for the Giraffe in most of the areas in which it roams, native settlement is sparse or absent. The species is of considerable sentimental importance. It can be hunted only under a Special Licence costing £15. During the twelve years I have been Game Warden of Uganda, no licence to hunt a Giraffe has been granted. The species is steadily increasing throughout its range."

Reticulated Giraffe; "Somali" Giraffe. *Girafe réticulée* (Fr.)

GIRAFFA CAMELOPARDALIS RETICULATA de Winton

Giraffa camelopardalis reticulata de Winton, Ann. Mag. Nat. Hist., ser. 7, vol. 4, p. 212, 1899. ("A little to the east of the Loroghi Mountains," Northern Guaso Nyiro district, Kenya (de Winton, 1897, p. 279; cf. also Roosevelt and Heller, 1914, vol. 1, p. 305).)

SYNONYMS: *Giraffa reticulata nigrescens* Lydekker (1911); *Giraffa camelopardalis nigricans* Roosevelt and Heller (1914) (lapsus for *nigrescens*).

FIGS.: de Winton, 1897, p. 280, fig. 1; Bryden, 1899, pl. 14, fig. 1, and pp. 497, 501, figs. 46-47; Lankester, 1907, p. 124, fig. 47; Lydekker, 1908, pl. 14, fig. 1, and p. 373, figs. 76-77; Rothschild and Neuville, 1911, pl. 2, fig. 2, pp. 9-33, figs. 1-9; Lönnberg, 1912, pl. 7, fig. 3; Lydekker and Blaine, 1914, vol. 3, p. 239, fig. 40 B; Roosevelt and Heller, 1914, vol. 1, pl. facing p. 302, bottom fig., pls. facing pp. 310, 316; Zammarano, 1930, p. 174, fig.; Am. Mus. Nat. Hist. Sci. Guide 118, ed. 2, p. 108, 1943.

The Reticulated Giraffe was formerly abundant, and apparently still exists in considerable numbers.

"Excepting for the white ears and legs below the knees and hocks, and the spotted head and upper neck, this Somaliland giraffe might be described as a liver-red animal with a coarse network of narrow white lines dividing the body-colour into large sharply defined patches" (de Winton, 1899, p. 212). "On the head the red areas change to rounded chestnut spots on a fawn ground Anterior horn well developed." (Lydekker and Blaine, 1914, vol. 3, p. 237.) "The legs from the knees and hocks downward nearly as far as the fetlocks are reticulated by buffy-whitish ground-color and tawny blotches. . . . The height of the bull seldom or never exceeds sixteen feet." (Roosevelt and Heller, 1914, vol. 1, pp. 312-313.)

The range comprises the "desert region from the northern slopes of Mount Kenia and the north bank of the Tana River northward to southern Abyssinia and west as far as the east shore of Lake Rudolf. . . . The southeastern and southern limits of the race in the Tana district are not yet known." (Roosevelt and Heller, 1914, vol. 1, pp. 304, 314, map, p. 319.) This range corresponds approximately to the North Kenya Savanna District of Bowen (1933, pp. 256, 258).

A. D. Smith (1897, pp. 163, 179, 212, 213, 291, 354, 355) found many Giraffes from the lower Dawa River (about lat. 4° N., long. 42° E.) westward through southern Ethiopia to the north end of Lake Rudolf, and southeast of that lake toward the Guaso Nyiro.

Ffinch (in Bryden, 1899, pp. 508-509) reports small numbers in or near the Karanleh country not far from the Webbi Shebeyli (about lat. 6° N., long. 43° E.). This locality is probably close to the northern limit of the Reticulated Giraffe.

Neumann (in Bryden, 1899, pp. 491-495) writes of this Giraffe:

It is particularly plentiful in the neighbourhood of the Gwaso Nyiro River, a little north of Kenia . . . ; and I have there seen very large herds (containing forty or fifty or more individuals) on both sides of the river. . . .

The cows sometimes get very fat, and then their meat is unsurpassed by that of any African animal, and none will keep so long. . . .

The Ndorobo natives are very rarely able to shoot giraffes with the bow and poisoned arrow, owing to the difficulty of getting near them. But they occasionally catch them in their fall traps, set in places where they are in the habit of crossing gullies or in paths through thick patches of bush. . . .

They are such strangely beautiful, such grotesquely graceful creatures, and withal so harmless, that one feels some hesitation in slaying them except for urgent needs. It is a particularly lovely sight to see from an eminence or opposing slope the lofty necks of a herd towering above a sea of bush, with the early morning sun full upon them. . . .

I do not think that lions very often succeed in killing these animals, defenceless though they be.

Lönnerberg (1912, pp. 143-148) says:

When we had crossed to the northern side of the Guaso Nyiri . . . the Giraffes became more numerous. . . .

Around the water-place of the Rendiles called Njoro Giraffes were not uncommon. . . . When we . . . were camping some distance below Chanler Falls, the Giraffes were found to be still more common and less shy. [Aside from Lions] I suppose that the fullgrown Giraffes have hardly any other enemies than man. The hide-hunting has been successfully stopped, I believe, by the regulation that 5 £ must be paid for the license permitting one Giraffe to be killed. . . . I hope that these beautiful and interesting animals shall be able to live long in the arid thorn-bush country, north of Guaso Nyiri where certainly no settlers can expect to raise any crops on the gravel. . . . It does not therefore appear to be any reasonable cause for that they should be exterminated, and for the present the stock is good, I am glad to say. . . .

This Giraffe was infested by a great number of ticks They proved to belong to the species *Hyalomma aegyptium* (L.).

"The Somali giraffe is found in astonishing numbers throughout Jubaland, for the character of the country in the interior is especially adapted to their habits. . . . I saw about 280 in all, of which the greater number were in the districts of Joreh, Arroga and Rama Gudi; and in the thorn country to the west of Marti Mountain they were also exceedingly plentiful." (Dracopoli, 1914, p. 250.)

In the Northern Game Reserve of Kenya there are fair numbers, but the animals have suffered considerably during recent troubles, many being killed by Abyssinians and Turkana (Percival, 1923, p. 70).

Masai Giraffe; Kilimanjaro Giraffe

GIRAFFA CAMELOPARDALIS TIPPELSKIRCHI Matschie

Giraffa tippelskirchi Matschie, Sitz.-ber. Ges. naturf. Freunde Berlin 1898, p. 78, 1898. (Steppe not far from Lake Eyasi, Tanganyika Territory (about lat. 3° 30' S., long. 35° E.).)

SYNONYM: *Giraffa schillingsi* Matschie (1898).

FIGS.: Lydekker, 1904a, pp. 214-218, figs. 28-32; Lydekker, 1905b, pl. 11; Rothschild and Neuville, 1911, pl. 2, fig. 1, pp. 106-107, 131-133, figs. 31-35 (as "*rothschildi*"); Roosevelt and Heller, 1914, vol. 1, pl. facing p. 302, upper fig., pl. facing p. 306, 3 upper figs.; Maxwell, 1924, pls. facing pp. 117, 121, 123, 124, 126; Zool. Garten, n. s., vol. 1, nos. 10-12, p. 408, fig., 1929.

Thanks to the good protection it receives over most of its range, the Masai Giraffe still exists in satisfactory numbers.

Forehead black; temples strongly spotted; legs dark gray, with dark spots down nearly to the hoofs; dark brown spots on the body and neck strongly dissected (Matschie, 1898, p. 78). "This race is indeed the most beautiful of all the Giraffes, and is especially characterised by the fullness of its spotting" (Lydekker, 1905, p. 121). Frontal horn smaller than in *G. c. rothschildi*; coloration of the legs subject to much individual variation; height of male up to 17 feet 2 inches (Roosevelt and Heller, 1914, vol. 1, pp. 317, 320).

The range comprises "British East Africa from the south bank of the Tana River, the southern slopes of Mount Kenia, Lake Nakuru, the Loita Plains, and Amala River drainage southward to central German East Africa at least; limits of range unknown" (Roosevelt and Heller, 1914, vol. 1, pp. 316-317).

Kenya.—Of this Giraffe in Kenya Colony, Roosevelt and Heller (1914, vol. 1, pp. 318, 320) have written:

They are found in small parties, or herds of twenty or thirty individuals, or singly. They are usually the most wary of game; and yet at times show foolish tameness. . . .

Giraffes are such strange, picturesque creatures, and so harmless that they ought to be killed only when absolutely needed for scientific purposes. . . .

In the field herds have been seen near the railroad stations of Voi, Simba, Makindu, Kui, and Ulu, in the Rift Valley, near Mount Suswa, and on the Loita Plains. They occur practically everywhere throughout the desert nyika of the coast and inland through the bush country to the edge of the grassy plains up to an altitude of 7,000 feet.

"Curiously enough, it [public opinion] is not 'flabby' where giraffe is concerned. The general public like to see their giraffe; and anybody who kills giraffe, unless he does so very quietly, will be reported straight away. That is why you can find many giraffe in the settled areas." (Caldwell, 1924, p. 50.)

"Governor's permits for the capture of eighteen giraffe on Trans Nzoia were issued during the year. If it is necessary for the numbers of these fine beasts to be reduced in the heart of a settled area—and it is necessary, unfortunately, in parts of the Trans Nzoia—it is obviously better that zoological societies rather than the hyenas, should reap any incidental benefit. I am sorry to say that misfortune attended the catching and subsequent operations." (Ann. Rept. Kenya Game Dept., 1931.)

"Over the remainder of the Colony [outside of the north and the northwest], in suitable areas, *Tippelskirchi* is common and widely distributed. Except in part of the thorn country, where they are persecuted by the bush folk—a malediction on those elusive gentlemen!—their freedom from molestation makes them as tame as the deer in Richmond Park; and they form an ideal subject for the cameras of Sunday snapshot enthusiasts." (Ritchie, in Maydon, 1932, p. 253.)

Giraffes are "on the increase throughout Kenya" (Game Warden, Kenya, *in litt.*, November, 1936).

Tanganyika Territory.—Matschie (1895, p. 103) gives records for numerous localities in this country. Several cases are mentioned of Giraffes breaking telegraph wires with their long necks.

The Giraffe "is particularly abundant down to and within the central districts, as Tabora, Kilimatinde, Irangi, Morogoro and Bagamoyo, though more sparsely present in Kondoa-Irangi. It occurs elsewhere also, fairly abundantly, for example, at Namnyere, less freely in Bukoba and Mbeya." (Jour. Soc. Preservation Fauna Empire, pt. 2, p. 49, 1922.)

During World War I, "in certain districts [of East Africa] the giraffes had to be shot owing to the damage they did to the telegraph wires" (Miss Buxton, 1921, p. 50).

The British and Indian troops made a great slaughter of Giraffes during the late war (Leplae, 1925, p. 104).

"The trade in wildebeeste and giraffe tails amongst natives, for making bangles, has to some extent dwindled" (Ann. Rept. Game Dept., Tanganyika Territory, 1932).

Giraffes are very numerous in the northern half of the territory. They are also often seen in the southern half but not in the same numbers. There is no danger of extinction. (Game Preservation Department, Tanganyika Territory, *in litt.*, December, 1936.)

Thornicroft's Giraffe; North Rhodesian Giraffe

GIRAFFA CAMELOPARDALIS THORNICROFTI Lydekker.

G[iraffa] camelopardalis thornicrofti Lydekker, Nature, vol. 87, no. 2189, p. 484, 1911. ("North-eastern Rhodesia"; type locality restricted by Lydekker (1912c, p. 771) to the Petauke district, which lies in the Luangwa Valley in the eastern part of Northern Rhodesia.)

FIG.: Lydekker, 1912c, pl. 86.

During recent years this Giraffe has shown a very gratifying increase in numbers from about 70 to some 300 or 400.

"Characterised by the low and conical frontal horn, the grey colour and scattered spotting of the sides of the face, the chestnut-brown forehead, deepening into black on the tips of the horns, the absence of a distinctly stellate pattern in the neck and body spots, which are light brown on a yellowish-fawn ground" (Lydekker, 1911, p. 484). Shanks "rufous-fawn with very faint traces of spotting nearly down to the fetlocks." Height "close on 18 feet, or possibly rather more." (Lydekker, 1912c, pp. 771, 773.)

Thornicroft's Giraffe has a decidedly restricted range, chiefly on the east side of the Luangwa River in the northern part of the Petauke district. Here it is isolated from all other Giraffes by a distance of several hundred miles. (Pitman, 1934, map F.)

Lydekker refers (1912c, p. 771) to "the single herd in this part of Rhodesia."

"A few herds exist in the Petauke area of the Luangwa Valley. They are strictly preserved and can be shot only under a Governor's Licence." (Hingston, 1930, p. 26.)

"There is only one herd in Northern Rhodesia which is usually found in the country between Petauke and Mzazas on the east side of the Loangwa River" (Lyell, in Maydon, 1932, p. 332).

"Captain Pitman remarked that some years ago there were only about 70 specimens, whereas now they had increased to some 300 or 400. They do not go about in one mob but in parties of not more than fifteen and usually less than six." (Jour. Soc. Preservation Fauna Empire, n. s., pt. 19, p. 9, 1933.)

Pitman (1934, pp. 83, 377) also gives the following account:

Thornicroft's giraffe is one of the outstanding examples [of pronounced increase], as well as Cookson's wildebeest, both inhabitants of East Luangwa, and both, as far as is known, the remaining representatives of their particular races.

I cannot help feeling that the whole-hearted co-operation of the local Native Authorities is mainly responsible for such a satisfactory state of affairs. . . .

The opportunity was taken of visiting a portion of the giraffe habitat in the Petauke District on the left bank of the Luangwa, between the village of Chirongozi and the Lusangazi confluence. None of these animals were actually seen, though some of the carriers returning by a different route to

myself came across a small party, but recent spoor and droppings were plentiful, and freshly browsed trees and bushes observed. It was noticeable that the giraffe habitat is confined to localities where certain species of acacias—on which this creature appears primarily to feed—are plentiful. These same conditions are found in the vicinity of the Kapamba River on the Mpika-Serenje side of the Luangwa, and it is reported that when the river is low, giraffes occasionally stray across to the right bank, but so far have always returned whence they came

It is well-known that during the past 30 years the giraffe has enjoyed almost complete immunity from molestation with a resultant very gratifying increase, its numbers being more than quadrupled, but I have reason to believe that giraffe meat . . . is sometimes included in the bill of fare of the local natives.

Barotse Giraffe. Sambesi-Giraffe (Ger.)

GIRAFFA CAMELOPARDALIS INFUMATA Noack

Giraffa infumata Noack, Zool. Anz., vol. 33, no. 11, p. 356, 1908. (Barotse region north and south of the "middle" [=upper] Zambesi.)

Comparatively little information is available concerning the Barotse Giraffe, but its numbers appear to be rather few.

Frontal horn rather large; no occipital horns evident; ears longer and broader than in other Giraffes. General color pattern resembling that of *G. c. capensis*; spots large, more or less regularly 3-, 4-, or 5-cornered, and arranged especially on the neck in pretty regular rows; on the hind legs (especially in the male) spots in rosettes, broken up with many irregular indentations, and extending halfway from the knees and hocks to the fetlocks; ground color smoky brown; a small black band in front of the forehead; ocular area whitish, with a fuscous border, the latter extending as a stripe to the nose; cheeks with small spots; body and neck spots madder-colored, darker in the middle; a slight mane foxy red, extending to the withers; lower parts of limbs brownish ochraceous; whitish under parts with small reddish spots. Height up to 19 feet. (Noack, 1908, pp. 354-355.)

Pitman (1934, pp. 50-51, map F) indicates the range of this Giraffe as being comprised between the Zambesi and Kwando Rivers, in the Sesheke and Nalolo districts in the extreme southwest of Northern Rhodesia. There is no present evidence of its occurrence on the north or left bank of the Zambesi, whence Noack's male cotype (a living captive) was alleged to have come. It occupies a very small portion of the Rhodesian Highland District of Chapin (1932, p. 90) or the Rhodesian Savanna District of Bowen (1933, pp. 256, 259).

Cambell (in Pitman, 1934, pp. 46-54) contributes the following information concerning the Barotse animal:

"Giraffe . . . are restricted to the west of the Zambezi. . . .

"Giraffe have always been protected as far as white men are concerned, but at one time when they were valuable dozens of giraffe-tails were sold to stores by the natives. I am happy to say one does not see many offered now."

In the Kalabo district "giraffe are occasionally found along the southern border."

At the Ngwesi Pan, in the Sesheke district, "it is . . . reported that there are about a hundred giraffe left."

The Giraffes of the Caprivi, or of at least that portion of it lying east of the Kwando, doubtless belong to the present subspecies. The remaining accounts refer to this region.

"In the country between the Chobe and the Zambesi the giraffe is also found, in the neighbourhood of Linyanti; but it is not nearly so numerous there as on the other side of the former river. Immediately north of the Zambesi it is unknown." (Selous, 1890, p. 230.)

According to Wilhelm (1933, p. 58), it occurs on the north side of the Okavango River, between the Kwito and the Kwando.

"In the Central Caprivi—between the Okavango and the Chobe—Giraffe are fairly plentiful; in the Eastern Caprivi they are present on the northern border, but there are not many there to-day" (Balme, in Shortridge, 1934a, vol. 2, p. 621).

Angola Giraffe. Girafe d'Angola (Fr.)

GIRAFFA CAMELOPARDALIS ANGOLENSIS Lydekker

Giraffa camelopardalis angolensis Lydekker, in Hutchinson's Animal Life, vol. 2, p. 121, 1903. ("Cuneni Valley, 150 miles south-west of Humbé, Angola" (Lydekker and Blaine, 1914, vol. 3, p. 254).)

FIGS.: Lydekker, 1904a, pl. 14; Lydekker, 1908, p. 365, fig. 72; Wilhelm, 1933, p. 58, fig.; Shortridge, 1934, vol. 2, pls. facing pp. 619, 624, 628.

This Giraffe is very rare in Angola, and occurs in limited numbers in South-West Africa.

"Allied to *capensis* . . . , but with the brown markings of the sub-quadrangular type of those of *congoënsis*, and separated from one another by a network of lighter lines. Spots on face restricted to an area below a line connecting the lower border of eye with angle of mouth; . . . body-spots large, brown, with ill-defined margins; a sudden break into smaller spots at middle of thighs and on the corresponding part of fore-legs"; under parts abundantly spotted; "ground-colour white or whitish; shanks tawny, profusely spotted to the hoofs. Anterior horn represented by a low tuberosity." (Lydekker and Blaine, 1914, vol. 3, p. 254.) Height of a bull from Angola, 18 feet 4 inches (Ward, 1935, p. 40).

While the range of this subspecies has not been definitely determined, the Giraffes of Angola and northern South-West Africa will

be included in the present account. The animals range from southern Angola to about the latitude of Windhoek in South-West Africa. This range corresponds roughly to the northern half or two-thirds of the Damara Arid District of Bowen (1933, pp. 256, 259).

Angola.—Records from extreme southeastern Angola (between the Kwito and the Kwando Rivers) and from the adjoining central Caprivi, quoted in the account of *G. c. infumata*, may refer actually to the present subspecies.

"Here [in Angola], especially in the country behind Benguela, it is fairly common" (Bryden, 1899, p. 501).

"Giraffe . . . is probably found from the South-West Angolan coast to the Kwando river, though the distribution is patchy. . . .

"Giraffe spoor was plentiful between the Kubango, Loengi and Kwando, and I saw three troops without hunting for these animals." (Statham, 1924, pp. 265-266.)

This animal is very rare in Angola. It is reported in the Kafima region; and in the country between the Kuvelaï and the Kului Rivers, to the northwest of Mupa, there is still a small herd, which will be promptly decimated if not strictly protected. (Monard, 1935, pp. 296-297.)

South-West Africa.—Shortridge (1934, vol. 2, pp. 620-622, map facing p. 612) furnishes the following information:

In this country the Giraffe ranges from the Kaokoveld (in the northwest) to the Grootfontein District (in the northeast), and also in the Caprivi. The plains of Ovamboland and about the Etosha Pan may represent a region where extermination has taken place comparatively recently. In the Kaokoveld the number is estimated at about 200 head; the coastal part of this region is not occupied by Giraffes. Small parties trek through western Ovamboland fairly regularly, but, perhaps owing to Ovambo hunters, they seldom seem to remain long. In the Grootfontein District, though their numbers may be no greater than in the Kaokoveld, they have a wider, far more scattered distribution. Toward the Bechuanaland border they are reported to be seen occasionally on the sand plains far east of the Waterberg, and to range sparsely as far south as latitude 22° S. Giraffes are extinct as far south as the Gobabis District, though a solitary bull is said to have been killed in this latitude as recently as 1920. The animals are still remembered by certain native tribes inhabiting the southern parts of South-West Africa; but these probably belonged to the subspecies *capensis*.

North Transvaal Giraffe. "Kameel" (Boer)

GIRAFFA CAMELOPARDALIS WARDI Lydekker

Giraffa camelopardalis wardi Lydekker, Proc. Zool. Soc. London 1904, vol. 1, p. 221, 1904. ("Northern Transvaal.")

FIGS.: Harris, 1839, pl. facing p. 239; Millais, 1895, p. 161, fig.; Lydekker, 1904, pl. 15, fig. 2, pp. 222-223, figs. 34-35; Lankester, 1907, p. 122, fig. 45; Lydekker, 1908, p. 367, fig. 73; Lydekker and Blaine, 1914, vol. 3, p. 255, fig. 45 B, Nat. Hist. Mag., vol. 2, no. 10, p. 65, fig., 1929 (subsp.?).

This Giraffe (if the provisional range here assigned to it is more or less correct) survives in fair numbers in the Kruger National Park; there are likewise some in the southeast and the northwest of Southern Rhodesia.

"A large and dark chocolate-coloured Giraffe, with the frontal horn in old bulls represented by a low irregular boss, the posterior, or occipital, horns enormously developed, and the body-spots broken up into irregular stars." It is also characterized "by the great length and massiveness of the main horns," which are 7 inches long. "The general colour and arrangement of the spots on the head and neck are much the same as on the body. Compared with the Cape Giraffe the spots are much more irregularly formed and star-like, there is more white in the neighbourhood of the ear, and the occipital horns" are each "capped by a black patch." (Lydekker, 1904a, pp. 221-224.)

The ranges of *G. c. wardi* and *G. c. capensis* do not appear to have been delimited with any particular degree of definiteness. The Giraffes of the Transvaal, of the adjacent part of Portuguese East Africa, and of Southern Rhodesia will be treated provisionally under the former name in the present account. This range corresponds somewhat to the Southeast Veldt District of Bowen (1933, pp. 256, 260).

Transvaal.—In 1836 Harris met with the Giraffe "in what are now the Marico and Rustenburg districts of the Transvaal" (W. L. Sclater, 1900, vol. 1, p. 261). "The giraffe is by no means a common animal, even at its head-quarters. We seldom found them without having followed the trail, and never saw more than five-and-thirty in a day." (Harris, 1839, p. 240.)

"In South Africa it is not now to be encountered until the traveller reaches the north-eastern border of the Transvaal. In the country there adjacent, Portuguese South-East Africa, Mashunaland, Matabeleland, . . . it is still found more or less abundantly." (Bryden, 1899, pp. 501-502.)

"Up to a year or two ago there were plenty of giraffes in the Sabi River district of the eastern Transvaal If any are still surviving there now, they are strictly preserved; in Portuguese

East Africa and further south in Zululand there are also said to be some." (W. L. Selater, 1900, vol. 1, p. 263.)

"In South Africa some 120 years ago the giraffe . . . ranged . . . throughout the wooded country in the north and east of the Transvaal, and from thence eastwards as far as the Lundi river, and northwards through Western Matabeleland to the neighbourhood of the Victoria Falls" (Selous, 1914, p. 41).

"In 1873 Giraffe were found in great numbers in the low-veld of the Transvaal" (Sanderson, as quoted in Shortridge, 1934, vol. 2, p. 623).

"Giraffe have increased considerably in the Kruger National Park of recent years. They are found sparingly in Portuguese East Africa." (S. Hamilton, as quoted in Shortridge, 1934, vol. 2, p. 622.)

"Stevenson-Hamilton records one or two authenticated cases of giraffe being killed by lion in the Transvaal Game Reserves" (Shortridge, 1934, vol. 2, p. 625).

"Giraffes . . . were soon exterminated" in "northern and western Transvaal. It survives now in fair numbers in Kruger National Park." (A. Roberts, *in litt.*, November, 1936.)

Southern Rhodesia.—"In some parts of the Matabele country it is also common, but until within the last few years was never found eastwards of the river Gwelo, though it was always very plentiful in the sand-belts to the westward of that river. . . . During the last three or four years a few giraffe have extended their range farther eastwards, and in 1880 there were a few on the upper Gwenia, and in the vicinity of Jomani. Up till then, however, none appeared to have crossed the Se-who-who river [about long. 30° E]." (Selous, 1890, p. 230.)

"From the Limpopo northwards, in many districts of Western Matabeleland, . . . giraffes are still to be found in fair numbers" (Selous, 1914, p. 42).

"In Southern Rhodesia, a year or two ago, Giraffe were plentiful between Nuanetsi and the Limpopo" (Fleming (1930), as quoted in Shortridge, 1934, vol. 2, p. 622).

"Giraffe have never frequented a great portion of the Colony as most of the country is unsuitable. They confined themselves to the Kalahari sand areas in the west and a few were found in the south eastern corner, where they still exist. Their numbers have not been greatly depleted and they have not been affected by the drought. They are well established in the Wankie Game Reserve and are increasing steadily. Legally considered as 'Royal Game.'" (Game Warden, Wankie Game Reserve, *in litt.*, March, 1937.)

Southern Giraffe

GIRAFFA CAMELOPARDALIS CAPENSIS (Lesson)

Camelopardalis Capensis Lesson, *Nouv. Tabl. Règne Animal, Mammif.*, p. 168, 1842. (Based upon "la giraffe" of Le Vaillant, *Voyage Intérieur Afrique*, vol. 2, pls. 8-9, 1790; type locality, Löwen Fluss, South-West Africa (approximately lat. 27° S., long. 18° E.); cf. Harper, 1940, pp. 323-324.)

FIGS.: Le Vaillant, 1790, vol. 2, pls. 8-9, and 1795, vol. 2, pl. 8; Harris, 1840, pl. 11; de Winton, 1897, p. 281, fig. 3; Bryden, 1899, pl. 14, fig. 3; W. L. Sclater, 1900, vol. 1, p. 262, fig. 66; Lydekker, 1904*a*, vol. 1, pl. 16, and 1908, pl. 14, fig. 3.

Although this Giraffe is extinct in its type locality, what is presumably the same subspecies survives in some numbers in the Kalahari Desert region.

"Colour-pattern of the 'blotched type,' that is to say, large, sub-quadrangular, evenly bordered blotches or spots, which in old males are chocolate-brown or blackish, on a tawny ground; shanks deep tawny and fully spotted down to the hoofs; anterior horn reduced to a low boss, and occipital horns wanting" (Lydekker and Blaine, 1914, vol. 3, p. 256). Height nearly 19 feet (Bryden, 1899, p. 499).

The range of the Southern Giraffe will be provisionally considered to include Great Namaqualand in South-West Africa, British Bechuanaland, and the Bechuanaland Protectorate. This corresponds somewhat to the Kalahari Arid District of Bowen (1933, pp. 256, 259).

South-West Africa.—Le Vaillant (1795, vol. 2, pp. 293-315) found a fair number of Giraffes at the type locality in the vicinity of the River of Lions or the Löwen Fluss in Great Namaqualand. W. L. Sclater (1900, vol. 1, p. 263) says:

The Southern giraffe was formerly found throughout the country north of the Orange River up to the Zambesi. Brink, le Vaillant, Colonel Gordon and Paterson, at the end of the last century, all found giraffes immediately after crossing the Orange River into Great Namaqualand . . . There does not seem to be any evidence of the occurrence of this animal south of the Orange River; Bryden, who discusses the matter, can find no better argument than the bushman pictures in some caves near Graaff Reinet, but there is no doubt that bushmen illustrated animals seen during their devious wanderings over the country, and by no means confined themselves to those in the immediate neighbourhood.

"Giraffe are still remembered and spoken of by the ||K'au||en and Naron Bushmen and other native tribes inhabiting the southern parts of South-West Africa" (Shortridge, 1934, vol. 2, p. 622).

British Bechuanaland and Bechuanaland Protectorate.—"This animal, though its range has been sadly reduced since the days of Gordon Cumming, is nevertheless still to be found in considerable numbers over a vast extent of country to the south of the Zambesi

river. In parts of the Kalahari desert it is said to abound, and in all the dry sandy district between Bamangwato and Lake Ngami, and thence to the Mābābe, Chobe, and Zambesi rivers, it is also



FIG. 49.—Southern Giraffe (*Giraffa camelopardalis capensis*). After Brehm, Lydekker, etc.

very numerous. Along portions of the Botletlie river, and in the waterless but forest-clad sand-belts on the southern bank of the Chobe, it is particularly plentiful." (Selous, 1890, p. 230.)

Bryden (1899, pp. 500, 502-505) writes:

The flesh of a fat cow giraffe . . . is excellent, tender, well tasted, and resembles young beef, with a game-like flavour of its own. The marrow bones . . . are delicious, and are one of the prime *bonnes bouches* of African hunters. . . .

Its most favourite country at the present day south of the Zambesi is undoubtedly in the vast, waterless, giraffe-acacia forests of the North Kalahari. Here, far from permanent water, in country where even native hunters can scarcely penetrate, large troops of giraffes still roam. In this, the most waterless portion of South Africa, giraffes have the faculty of being able to exist for long periods—six or seven months at a time—without drinking. . . . Since firearms and hunting horses were introduced—especially the latter—the destruction of these magnificent creatures has proceeded much more rapidly than of old. . . .

The Dutch and native hunters of South Africa . . . slaughter mercilessly whenever opportunity occurs. Dutch hunters have, of course, used horses for hunting for some generations past. In more recent years the Griquas and the various Bechuana tribes have become possessed also of horse-flesh They penetrate even into the waterless deserts after the periodical rains; and . . . they are enabled, by the use of horses, to pursue and slay large numbers of giraffe and eland in the very heart of the Kalahari Thirstland itself.

The value of the hide of a full-grown giraffe is from £4 to £6, the skin being largely employed for making native sandals and colonial whips, known universally in South Africa as *sjamboks*. There is a constant commercial demand for these hides. As a consequence, Boer and native hunters are to be found shooting giraffes in large numbers, and, for the miserable value of their skins, these noble and unique creatures are, year by year, and month by month, persecuted and pursued until they threaten, at no very distant period, to become extinct south of the Zambesi. . . . Seven or eight years ago the number of giraffes slain during two seasons by native hunters round Lake Ngami, a famous headquarter of these tall beasts, amounted to more than 300 head of those animals. . . .

In the farthest recesses of the Kalahari . . . seventy or eighty may occasionally be seen during the day, according to reports of the Masarwa bushmen.

Selous (1914, pp. 41-42) says of this animal:

In South Africa some 120 years ago the giraffe was still plentiful immediately north of the Orange River, in Great Namaqualand, and from there it ranged without a break northwards through Bechuanaland and the Kalahari Many decades of hunting . . . have very much curtailed the range of the giraffe in this part of the continent; but it is quite a mistake to think that the indiscriminate slaughter of these most interesting animals is still going on in those regions, and that the species in that part of Africa is in immediate danger of extinction. . . . Throughout most of the Bechuanaland Protectorate, the Northern Kalahari, and from thence to the Province of Angola, giraffes are still to be found in fair numbers. . . . Few animals will be less affected by the advance of European settlement in Africa than giraffes, as, although they may be found in certain well-watered districts, they are more often met with in semi-desert tracts, where no European settlement can ever take place, and in which only a very sparse native population can live.

“Giraffes occurred at one time in Namaqualand south of the Orange River, but were soon exterminated there when settlers advanced; the same may be said of Griqualand West” and “southern Bechuanaland.” They survive “precariously in parts of Bechuanaland, where the natives are allowed to hunt them with but little restraint.” (A. Roberts, *in litt.*, November, 1936.)

Okapi (Eng., Fr., Ger.)

OKAPIA JOHNSTONI (P. L. Sclater)

Equus(?) *johnstoni* P. L. Sclater, Proc. Zool. Soc. London 1901, vol. 1, p. 50, 1901. ("In sylvis fluvio Semliki adjacentibus," presumably in the vicinity of Mbéni (or Beni), northeastern Belgian Congo.)

SYNONYMS: *Helladotherium tigrinum* Johnston (1901); *Okapia liebrechtsi* Major (1902); *Okapia erikssoni* Lankester (1902).

FIGS.: P. L. Sclater, 1901, pl. 1; Cornish, 1901, vol. 1, pp. 269-270, figs.; Johnston, 1902, vol. 1, frontisp. and p. 381, fig. 234; Lankester, 1902, pl. 30; Fraipont, Annales Mus. Congo, zool., ser. 2, vol. 1, pls. 1-2^{ter}, and pp. 7-19, 23-32, 96, figs. 1-13, 22-42, 77, 1907; Lydekker, 1908, pp. 377, 383, figs. 78, 80; Rothschild and Neuville, Annales Sci. Nat., zool., ser. 9, vol. 10, pl. 1, and p. 6, fig. 1, 1909; Lankester and Ridewood, 1910, pls. 1, 29-47; Ber. Senckenb. Naturf. Gesell., vol. 43, pl. 5, pp. 290-291, figs.; Lydekker and Blaine, 1914, vol. 3, p. 262, fig. 49; Selous, 1914, pl. 7; Lang, 1918, pp. 1600-1611, figs.; Christy, 1924, figs. 31-38; Leplae, 1925, p. 108, figs.; Rev. Zool. Bot. Africaine, vol. 16, suppl.: Bull. Cercle Zool. Congolais, vol. 5, fasc. 3, pp. [71]-[73], figs., 1928; Rev. Zool. Bot. Africaine, vol. 29, suppl.: Bull. Cercle Zool. Congolais, vol. 13, fasc. 1, p. (14), fig., 1936; Pocock, 1937, p. 691, fig.; Reed and Lucas, 1937, p. 185, fig. 65.

The Okapi leads such an extremely secretive life in the equatorial rain forest of the Upper Congo that estimates of its numerical strength are very difficult to make. These estimates vary from 500-600 (Leplae, 1925, p. 109) to "some thousands" (J. P. Chapin, oral communication, February, 1938). Attilio Gatti (MS., 1936) believes that about a thousand are killed each year but that the animal is largely safeguarded by the fact that a very considerable proportion of its range in the forest depths is not penetrated even by the natives.

"Size much smaller than in *Giraffa*, and neck and limbs much less elongated; females larger than males, which alone carry a pair of frontal horns, capped with knobs of bare bone; ears broad; . . . tail shorter than in typical genus [*Giraffa*], with a smaller tuft." "Sides of face pale puce; crown, backs of ears, neck, and greater part of body plum-colour; sides of buttocks and upper portion of limbs transversely barred with black and white stripes of varying width; shanks mainly white, with black fetlock rings, and a vertical black stripe on anterior surfaces of front pair." "Shoulder-height in females about 5 feet 4 inches." (Lydekker and Blaine, 1914, vol. 3, pp. 258-259.)

The first fragment of an Okapi's skin was made known to science only in 1900. Such a recent discovery of so large and striking a creature constitutes one of the chief romances of modern mammalogy.

Information in regard to its total range has accumulated rather

slowly, although Lönnerberg (1906, p. 309) long ago had the main facts from "Lieutenant Karl Eriksson, who delivered to Sir Harry Johnston the first skull and skin of the Okapi. . . ."

He believed it to be distributed practically over the whole of the "equatorial forest" of the Congo Free State. He showed me . . . the approximate limits of this area of distribution. If we begin at the River Ubangi in the west about midway between Mobena and Jmese, from there the limit extends north-

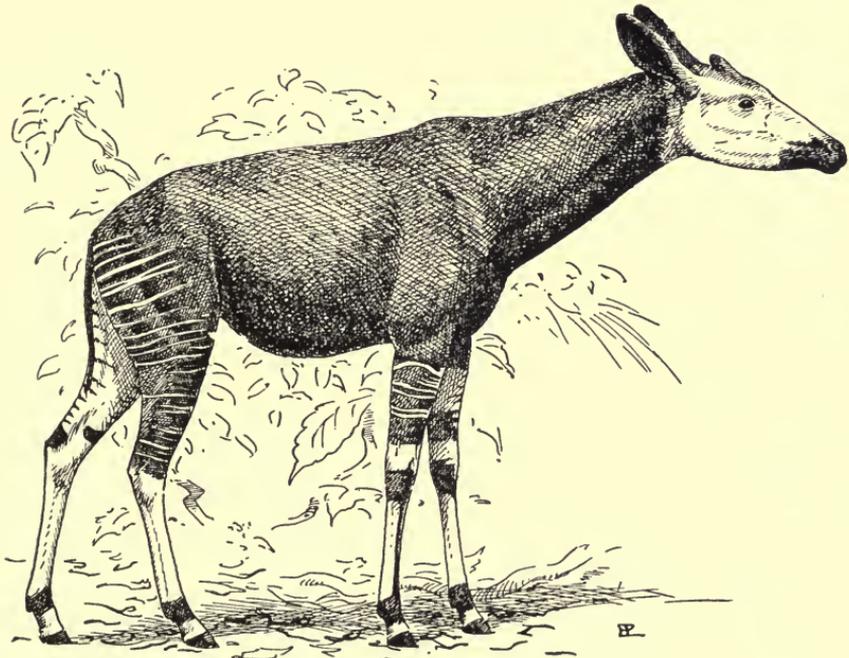


FIG. 50.—Okapi (*Okapia johnstoni*)

east towards Businga at the River Likame or somewhat north of that place, and then more east to the River Uele just before it joins the River Ubangi. From that place and eastward the River Uele is the northern limit to a point about midway between Amadi and Suruaugo. From there it turns south-east, passing somewhat east of Mawambi, and continuing to a point a little west of Karimi. Not much south of this, the most eastern point of the great forest, the boundary-line turns westward again and crosses the great Congo River at Ponthierville, and continues westward a little south of Tschuapa River, but bends by-and-by a little north, so that it passes on the northern side of Bolondo towards Coquilhatville. It is evident that this is only a rough outline of the area of distribution of the Okapi, but it may hold good in a general way.

Lang (1918, p. 1602, map), despite his first-hand knowledge of the Okapi, limits its range to the north of the equator, between the rivers Ubangi and Uele on the north and the Congo on the south.

Some years ago it was reported in the region of Lodja. Now two pieces of skin have been brought from the region south of Moma. There are also reports from the region of Opala. (Schouteden, 1935, pp. 9-10.) These localities are between latitude 1° and 4° S., and longitude 23° and 25° E.; or between the Lomami and Lukenie Rivers.

Now a specimen is recorded as taken in a native trap in the vicinity of Lomela, toward latitude 2° S. This confirms a previous report from Lomami. Its distributional area seems to coincide with the contour of 500 m. M. Guilmot says the animal is not common on the left bank, yet is not rare. Its presence there is known to all the Europeans of the region. (Schouteden, 1936, pp. 14-15.)

Although there had been vague previous reports of this animal by Stanley, Junker, Marchand, and Stuhlmann, it was Sir Harry Johnston who really brought the Okapi to scientific attention by sending to P. L. Selater in 1900 two strips of skin, in the form of bandoliers, which he had purchased from natives at the post of Mbéni on the Semliki River. Selater, in the belief that these fragments represented some unknown species of Zebra, proposed for them the name *Equus(?) johnstoni*. When a complete skin and two skulls were received from Sir Harry Johnston in 1901, the relationship of the Okapi to the Giraffes became evident, and Lankester established for it the genus *Okapia*, in the family Giraffidae.

"The defenceless okapi . . . survived by slinking into the densest parts of the Congo Forest, where the lion never penetrates, and where the leopard takes to a tree life and lives on monkeys. The only human enemies of the okapi hitherto have been the Congo Dwarfs and a few Bantu negroes who dwell on the fringe of the Congo Forest. How much longer the okapi will survive now that the natives possess guns and collectors are on the search for this extraordinary animal, it is impossible to say." (Johnston, 1902, vol. 1, p. 383.)

"There are certainly many thousand individuals of it inhabiting the forest of this region. . . . The natives are extremely reluctant to penetrate far into the forest, and hence it is that the Okapi is but seldom seen and is known chiefly to the Wambutti or Akka, the dwarf race who, like the Okapi itself, seek the recesses of the forest as a protection against light-loving enemies." (Lankester, 1902, pp. 282-283.)

"The Okapi is extremely wary and shy, and nocturnal in its habits. It lives singly or perhaps in pairs, never in herds. The negroes know very little about it, and, as a rule, it is only the Wambutti dwarfs who are able to kill it. . . .

"I am glad to be able to add that the Okapi is protected by law, so that it is forbidden to kill it without special permission. The

Wambutti-dwarfs and the leopards do not, however, respect any laws, and therein lies the danger for the existence of this animal." (Lönnerberg, 1906, p. 310.)

Lang (1918) has furnished a very interesting account, from which the following excerpts are taken:

Having walked more than a thousand miles in the tracks of the Okapi, I unhesitatingly state that a great wariness and nocturnal habits efficiently protect it from being successfully stalked by white men (p. 1605).

The Okapi's one great enemy is man. The wariness of the game is but an added stimulus to the cunning Pygmy hunter who, like the Okapi, claims the forest jungle as his home. A quarry so large provides coveted meat for days of feasting. The more powerful Bantu negro, living in villages and owning plantations, with a craving for meat that had made him a cannibal, also trapped the Okapi in well-concealed snares and pitfalls, and the Pygmy would gladly exchange the product of his chase for vegetables. These negroes . . . used the quaintly striped portions of the hide . . . for adornment, especially belts. So highly were they prized that in some regions to sit upon a skin or wear portions of it became the privilege of chieftains and their families. (Pp. 1608-1609.)

Okapi are caught by various methods . . . Strong nets, in sections, are hung loosely from the trees, barring the trails of the Okapi whose whereabouts are previously known to the hunters. So rapidly are they driven towards the nets by small dogs with wooden clappers and followed by men shouting at the top of their lungs that they usually try to break through. But the net instantly falls, completely entangling them, when they are quickly dispatched by natives in ambush. This, however, calls for hundreds of drivers and only powerful chiefs can afford to catch big game in this manner. Pitfalls ten feet long, eight feet deep, but less than three feet wide near the surface also claim many victims. [Many traps in the form of foot snares, set in the Okapi's narrow trails, are also employed.] (P. 1609.)

Since the Belgian government has undertaken to stamp out cannibalism, hunger for meat has driven these [Azande] negroes to seek the game of the forest. Though hunting Okapi is legally forbidden, many chiefs have stationed in special camps hunters, who are forbidden by superstition to eat Okapi meat. In course of time one section after another is thus depleted of the Okapi. Some years ago the great Mangbetu chief, Zebandra, with the aid of eight hundred drivers, caught eleven within a week. (P. 1610.)

Christy (1924, pp. 52-72) gives a detailed and very interesting account of hunting the Okapi with the help of Pygmies.

The rarity of the animal has raised its price, up to the time of the war, to 25,000 francs for a well-preserved specimen. Despite legal protection, the natives continue to kill a rather large number each year. (Leplae, 1925, p. 109.)

The Okapi is included in Schedule A by the London Convention of 1933.

Family BOVIDAE: Cattle, Sheep, Goats, and Antelopes

About 60 genera are recognized in this family. Lydekker (1913c) and Lydekker and Blaine (1914) list approximately 485 species and subspecies in their catalogues. The family is nearly worldwide in distribution, but the West Indies, South America, Madagascar, and the Papuan and Australian regions are lacking in indigenous species. In the preceding volume Dr. Allen (1942) discusses 17 New World forms. In the present volume there are full accounts of about 102 forms, with remarks on a number of additional forms. Thus the total number of extinct or vanishing forms is considerably greater in the Bovidae than in any other family of mammals. Man has required the grazing grounds of many species for his domestic flocks or his cultivated fields, and he has destroyed other species for their flesh and hides. Since man has raised himself from savagery to civilization primarily with the help of domesticated animals, his debt to certain members of the present family (cattle, sheep, and goats) is immense.

Cambodian Wild Ox; Indo-chinese Forest Ox. Boeuf sauvage cambodgien (Fr.). Kou Prey (Cambodian)

NOVIBOS SAUVELI (Urbain)

*Bos (Bibos) Sauveli*¹ Urbain, Bull. Soc. Zool. France, vol. 62, p. 307, 2 fig., 1937. ("Aux environs de Tchep, Nord Cambodge" (Urbain, 1939, p. 1007).)
 Figs.: Urbain, 1937a, pp. 305, 306, figs.; Urbain, 1937b, pl. 10; Mammalia, vol. 3, nos. 3-4, pl. 10, fig. 4, 1939; Urbain, 1940, p. 519, fig.; Coolidge, 1940, pls. 1-8.

The very recent discovery of this wild ox in Cambodia is comparable to that of the Okapi in the Belgian Congo a generation previously. Its present population is estimated "at about a thousand head." (Coolidge, 1940, pp. 424, 521.)

The Kou Prey differs from both the Gaur and the Banteng. It attains a shoulder height of 1.9 m. (6 feet 3 inches). The old bulls are black, with whitish patches on shoulders and rump; the cows and calves are gray; lower part of the limbs white; dewlap pronounced; tail long; slender legs longer than in the Banteng; feet also very slender. The horns are cylindrical, widely separated, recurved in front in the bull and lyre-shaped in the cow; in some old males they are curiously frayed near their tips. (Urbain, 1937a.) Greatest spread of horns, 840 mm.; tip to tip, 460; length on outside curve, 810 (Coolidge, 1940, p. 442).

¹This name is perhaps antedated by one or more of the numerous names proposed by Heude (Mém. Hist. Nat. Empire Chinois, vol. 5, pt. 1, pp. 2-11, pls. 3-11, 1901) for the wild cattle of Indo-China.

The Kou Prey is a very rare animal of the forest glades of northern Cambodia, where it has been seen by very few hunters (Urbain, 1937a). The holotype is a male captured as a young animal in 1936 and brought in 1937 to the Zoological Park at Vincennes (Urbain, 1939).

It is probably this same species to which P. Vitry refers (*in litt.*, December, 1936) under the native name of "Ngoua po." It is particularly a northern Cambodian animal, but apparently a few cross the frontier into Laos in the vicinity of the Mekong River. It is ashy gray in color, and its hoofs and horns differ from those of the "Red Banteng," which is a far commoner animal.

In a circular for hunting parties, privately printed in 1930, Defosse referred to this species. It was informally described three years later by R. Vittoz. At about this time a bull was secured by A. V. Pietri "in Cambodia about 200 kilometers north of Saigon near or not far from the Saigon-Kratie highway." In 1939 another specimen was killed, probably in the same locality, by Ezra B. Cornell. (Coolidge, 1940, pp. 515-521.)

An adult male, secured in 1939 near Samrong in eastern Cambodia by F. Edmond-Blanc and A. V. Pietri, has been utilized as the main basis for Coolidge's monograph (1940).

"It is . . . most essential that the Government of French Indo-China should immediately recognize the importance of making every effort to preserve this interesting and rare primitive wild bovid, and especially to protect it against meat or trophy hunters and live-animal dealers" (Coolidge, 1940, p. 423).

Aurochs; European Wild Ox. Aurochs; Ur (Ger.)

BOS PRIMIGENIUS Bojanus

Bos primigenius Bojanus, Nova Acta Acad. Caes. Leop.-Car., vol. 13, pt. 2, p. 422, 1827. (Based upon the Pleistocene animal of northern Europe; more particularly, according to Mertens (1906, p. 104), upon the nearly complete skeleton excavated near Hassleben, north of Erfurt, Germany, and preserved in the Jena Museum. It is questionable whether the name *primigenius* is applicable to the Aurochs of historical times. It is perhaps also debatable whether "*Bos primigenius* Bojanus" is a valid example of binominal nomenclature, and not merely a descriptive term; Bojanus does not seem to use it in the nominative case or to capitalize *Bos*.)

FIGS.: Bojanus, *op. cit.*, pl. 24; Griffith's Anim. Kingdom, vol. 4, pl. facing p. 410, 1827; Lydekker, 1898, p. 10, fig. 1; Keller, 1902, pp. 128-140, figs. 44-47; Mertens, 1906, pp. 110-111, figs. 3, 5, 6, 8, 9; Lydekker, 1912, pl. 3; Natur und Volk, vol. 66, no. 10, p. 511, fig. 1, p. 518, fig. 3, 1936; Schmidt, 1938, pl. 6.

A special interest attaches to the Aurochs as a wild relative of our domestic cattle. It has been extinct in its former European range for more than three centuries.

Szalay (1930) concludes that the color of the north European animal was deep blackish brown in the bull, more or less dark brown in the cow, and reddish brown in the calf. "It must have been a huge animal, probably standing at least six feet high at the shoulders, and with horns not very unlike those of the modern Chillingham cattle, only very much larger. The horns usually have an outward and forward curvature at first, after which they bend somewhat upwards and inwards." (Lydekker, 1898, p. 13.)

Pleistocene remains of *Bos primigenius* are known from France, Great Britain, Germany, The Netherlands, Switzerland, Austria, Hungary, Denmark, southern Sweden, and Russia as far as Siberia (Mertens, 1906, p. 48). Here, however, we are concerned only with the animal's status during historical times. The following account is derived mainly from Mertens (1906) and from Lydekker (1912, pp. 37-67).

Julius Caesar, writing about 65 B. C. (De Bello Gallico, bk. 6, chap. 29), describes the "Ur" in the forests of Germany. It was captured in pitfalls, and the horns were used for drinking vessels. It also appeared from time to time in the Roman arena (Jennison, 1937, p. 167).

In the sixth century the poet Fortunatus and Gregorius, Bishop of Tours, refer to the hunting of these animals in the "Wasgenwald" (Vosges Mountains). At the same period wild bulls were said to be found in the Province of Maine, in France; and during the ninth century Charlemagne hunted the Aurochs near Aix-la-Chapelle. At the close of the tenth century the flesh of this animal is mentioned as an article of food at an abbey in Switzerland. The Aurochs was met with by Crusaders passing through Germany in the eleventh century. According to the Niebelungenlied, Siegfried slaughtered four of the animals in the vicinity of Worms during the twelfth century. In 1170 their occurrence in the Rhine district is mentioned by Von Aue. Aurochs horns mounted as drinking-cups were formerly preserved in many inns, churches, and castles in South Germany and Alsace-Lorraine. An old account book shows that the species still occurred up to about 1409, though perhaps rarely, in East Prussia and Lithuania. At this period, however, it had disappeared in the remainder of Germany and in Western Europe, and even its name became gradually confused with that of the Wisent. Doubtless its disappearance was due largely to the clearing of the extensive primeval forests in which it lived, while hunting also contributed to its extermination.

After about 1409 Poland seems to have been the sole remaining refuge for the Aurochs. In 1298 Duke Boleslaus of Masovia had prohibited its hunting, and in 1359 Duke Ziemovit of Masovia

had taken similar action. It survived longest in the Jaktorowka Forest in Masovia, western Poland. An account and figure of the Aurochs in this area are given by Herberstein (1557). In 1596 the species was still maintained in the Jaktorowka Forest and also in a royal preserve near Warsaw. The Jaktorowka herd numbered 30 individuals in 1564, 24 in 1599, and 4 in 1602. By 1620 the sole survivor was a cow, and it died in 1627. This was apparently the last wild Aurochs.

"Towards the end of the 14th century King Wladislaus Jagiello [of Poland] established laws, which in high degree restricted the persecution of the aurochs In the 16th century the Polish King Sigismund III Vasa, seeing the imminent danger of a quick and total extermination of the aurochs, proclaimed orders with the object of protecting the feeding grounds of these animals, the number of which at this time did not amount to more than some ten pieces. Unluckily the enactment of those orders came too late and in consequence the aurochs disappeared in the lands belonging to the Republic as soon as the next century (XVII, 1627)." (Benedyct Fuliński, MS., 1933.)

The species had little to fear from natural enemies. According to Swiecicki (1634), a solitary bull was a match for several wolves.

During Biblical times the range of the Aurochs extended to Syria; it is referred to in the Bible as the rēēm. "On the Assyrian monuments its chase is represented as the greatest feat of hunting in the time of the earliest dynasties of Nineveh; but does not appear in those of the later period of the Assyrian monarchy at Kuyonjik. . . . I obtained its teeth in bone-breccia in Lebanon, proving its co-existence there with man." (Tristram, 1884, p. 8.)

Domestication.—In Keller's opinion (1902, p. 141), the Aurochs was first tamed and domesticated in southeastern Europe by the oldest Grecian peoples in pre-Homeric times—perhaps about 2000 B. C. Thence the culture spread to the Baltic lowlands, Switzerland, England, and southern Sweden. Keller lists (p. 217) the following domestic breeds as derivatives from the Aurochs: English park cattle, North German lowland cattle, Dutch cattle, steppe cattle, Simmenthal and Freiburg spotted cattle.

"The black Spanish fighting bulls also claim descent from the aurochs. They have a light-colored line along the spine, which was characteristic of the aurochs." (Lydekker, 1910, vol. 2, p. 927.)

Indian Gaur; Indian Bison

BIBOS GAURUS GAURUS (Hamilton Smith)

B[os] Gaurus Hamilton Smith, Griffith's Animal Kingdom, vol. 4, p. 399, 1827. (Based upon the "Gaour" of Geoffroy-Saint-Hilaire, Mém. Mus. Hist. Nat. [Paris], vol. 9, p. 71, 1822; type locality, Mainpat, in the Sarguja Tributary States, India, at approximately lat. 23° N., long. 83° E. Cf. Harper, 1940, p. 324.)

FIGS.: Lydekker, 1898c, pl. 1; Lydekker, 1900, pl. 2, figs. 1, 1a, p. 41, fig. 3, p. 45, fig. 4; Lydekker, 1912, pl. 21, fig. 1; Lydekker, 1913c, vol. 1, pp. 14, 16, figs. 8, 9; Van der Byl, 1915, pl. 31; Jour. Bombay Nat. Hist. Soc., vol. 36, no. 4, suppl., pls. 1, 5, 1933.

The Indian Gaur has declined seriously in numbers and has lost considerable ground in parts of its range.

Adult bulls reach a shoulder height of 6 feet 4 inches; the build is massive, with deep body and relatively short limbs; dorsal ridge pronounced, ending suddenly behind the withers; horns flattened at base, strongly curved, with inwardly inclined black tips, elsewhere pale greenish; tail reaching hocks; generally little or no dewlap; hair short, olive-brown to black, paler on under parts; upper part of forehead to nape ashy gray to dirty white; lower part of legs whitish; cows and immature bulls less dark in color. (Blanford, 1891, pp. 484-485; Lydekker, 1913c, vol. 1, pp. 15-17.) The horns attain a length, on the outside curve, of about 34 inches (Ward, 1935, p. 315).

According to Blanford (1891, pp. 485-486), this animal inhabits "all the great hilly forest-tracts of the Indian Peninsula." There are some uncertain former records from Ceylon. "In India at present its extreme north-western habitat is probably the Rajpipla hills, near Broach; and west of long. 80° East the river Nerbudda forms approximately, though not absolutely, the northern boundary of its range. It does not inhabit the grass-jungles of the Gangetic plain, except close to the Himalayas; but it is found in the forests at the foot of those mountains as far west as Nepal. South of the Ganges it exists in suitable tracts in Chutia Nágpur, Orissa, and the northern Circars, the Central Provinces, Hyderabad territories, Mysore, and throughout the Western Gháts, wherever it has not been exterminated or driven away." The eastern limits of the subspecies, where it presumably intergrades with the Burmese Gaur, have not been exactly defined.

Richmond writes (1935, pp. 221-223) concerning the Madras Presidency: "In the Godavari . . . the gaur is probably on the increase The Javadi and Salem hills contain gaur which are closely protected and which do some damage to forest works." In the Madura district a well-protected herd has persisted. Gaur are to be found on the "Grassy Hills" in the forest area of South

Coimbatore, at an elevation of 6,000-8,000 feet. "This forest division contains, in one particular part, the white bison which appears to be developing into a distinct variety. . . . The forests of Malabar . . . are for the most part exceedingly well stocked with . . . gaur."

Morris remarks (1935*b*, p. 227): "The new experimental measure for the compulsory inoculation of village cattle in the Kollegal and North Coimbatore Divisions should keep bison comparatively free from rinderpest, and it is a measure that I should like to see carried out in other districts where bison occur."

The Chief Conservator of Forests of Madras writes (*in litt.*, November, 1936): "No immediate danger of extinction. In any numbers only in the Government Reserved Forests. . . . The bag is limited with regard to number, size and sex. Steps against the spread of Rinderpest to Bison are being taken by inoculating domestic animals."

Salim Ali (1935, pp. 231-238) contributes the following information concerning Hyderabad State:

The forests of the Eastern and Western Circles . . . contain some gaur. . . . The shooting of . . . gaur has been totally prohibited for some years past, owing to which they have, for the time being, been saved from extinction. . . .

There were a few herds of gaur in Sirpūr-Tandūr in the 1890's. One whole herd was reported to have perished from foot-and-mouth disease at Mānikgarh. These animals are now very scarce In spite, however, of the total prohibition of the killing of these bovines, I came across more persons than one who boastfully claimed to have shot them in recent years! . . .

Large tracts of game country have been known to be cleared by rinderpest and foot-and-mouth disease contracted from infected cattle left to graze in forests inhabited by wild animals. Measures should be enforced that as soon as the first signs of an outbreak of these epidemics are detected in village cattle, they should be prevented from being let loose in Government forests containing game. One epidemic of this sort, as is well known, will do damage from which it will be difficult for game to regain its position for years afterwards. Often the damage is irreparable, and in many cases the serious diminution, or even complete extinction, of bison and buffalo in certain areas can be traced directly to disease contracted in this way from domestic cattle.

The Chief Conservator of Forests of Mysore writes (*in litt.*, May, 1937): "Former and present range: in all the high forests in the Districts of Mysore, Kassar, Kadur and Shimoga. Seems to be no diminution in numbers. Economic use: skin, horn and flesh. Protected by the Game Regulations."

Traill refers (1824, p. 340) to the Gaur's former abundance at the type locality in the Sarguja Tributary States: "So numerous are they on Myn Pât, that, in one day, the hunting party computed that not less than 80 gours had passed through the stations occupied by the sportsmen."

The Chief Conservator of Forests of the Central Provinces gives the following information (*in litt.*, July, 1937):

"This animal . . . has undoubtedly lost ground considerably in the past. Its former range was what it is at present, but the numbers of the herds and of the individuals in the herds have become very much less. There are less undisturbed areas and stretches of unbroken forest now than formerly, and this animal is peculiarly liable to epidemic diseases. The distribution formerly was the hilly forest tracts of Nimar, the Melghat, Hoshangabad, Betul, Chindwara, Seoni, Chanda, Balaghat, Mandla, Bilaspur, Raipur, Yeotmal and Damoh Districts. . . . In Damoh it is now extinct It is probable that there has been disappearance from many privately owned and non-reserved forests Reduction in the number of Bison occurs periodically from epidemic disease (the main cause of the decline of the species) and herds take several years to recover. Frequently such attacks are so severe as to result in enfeeblement of the stock or even total destruction of local herds. In the Melghat Forest Division, to take one example only, however, the present population of Gaur must run into well over a thousand, and of recent years the number has increased rapidly.

"Practically no economic use. The animal is so obviously related to the sacred cow of India that poaching is not common Even a few of the forest tribes are averse to eating the meat. The hide is usually too heavy for local demand and being rarely met with is not popular.

"Protection of this species in the Government Forests has been rigid in the past and still is. In some districts total prohibition has been in force for several years. . . . Inoculation of cattle resorting to grazing has been undertaken for the first time this year in the Banjar Reserve of Mandla which is a game sanctuary."

Edward Thompson writes (*in London Times*, August 19, 1932?): "The Indian bison is safe in South India. Indore, in Central India, still has a tiny herd, which the Maharajah protects, and told me he had every intention of continuing to protect. He had taken note of what had happened in the neighbouring state of Gwalior, whose last bison, a herd of 30, were surrounded and shot down 15 years ago by 'temporary gentlemen' (I am quoting a seditious Englishman in Gwalior), who had taken the trouble to come over 20 miles to achieve this feat."

The Government of Bihar reports (*in litt.*, December, 1936): "This animal is nowhere common. Its numbers have been greatly reduced at times through rinderpest. It is found in the Palamau district, where there are two or three herds of about 8 in each herd, and in parts of the Singhbhum district where there is perhaps the same number. Its habitat was formerly somewhat more exten-

sive, but within the last 100 years it has never been common outside the areas mentioned. Females are protected by law."

According to the Conservator of Forests of Orissa (*in litt.*, January, 1937), the Gaur is not rare. The destruction of forests is regarded as the reason for the decline in numbers of the Cervidae and Bovidae. In Government Forests in North Orissa there are game sanctuaries and all shooting is regulated. In South Orissa there are no measures for the preservation of game.

For Bengal the Senior Conservator of Forests gives the following information (*in litt.*, September, 1937): "Former range: Jalpaiguri, Buxa and Chittagong Forests (common in the last). Present range: Upper-Tondu Forests of Jalpaiguri (30-40), Buxa Forests (50), extreme northern and southern blocks of the Chittagong forests (100). Causes of depletion: rinderpest and poaching in Jalpaiguri, rinderpest infection from cattle in Buxa and poaching in Chittagong forests. Economic use: meat. In Jalpaiguri shooting is closed for the whole year. In Buxa Forests a game sanctuary to an extent of 26 sq. miles is being maintained; grazing of domestic cattle has been prohibited. In Chittagong forests restriction has been made with respect to numbers to be shot in any year."

Burmese Gaur; Burmese Bison

BIBOS GAURUS READEI (Lydekker)

Bos gaurus readei Lydekker, Zoologist, ser. 4, vol. 7, p. 266, 1903. ("Myitekyina, in Upper Burma.")

FIGS.: De Barthélemy, 1930, pl. 2; Field Mus. News, vol. 4, no. 5, p. 1, fig., 1933; Peacock, 1933, pls. 10-13; Thom, 1934, pl. 2.

The numerical status of the Burmese Gaur varies considerably according to locality, and consequently the accounts of different observers vary likewise. In general, however, there is evidently need of better protection for this animal, which is certainly one of the finest of existing bovines.

"Characterized by the tall stature, dark, nearly black, body-colouring, thickly haired, fringed ears, the presence of a dewlap furnished with a fringe or tuft of hair in adult bulls, the downward extension of the tawny grey area on the forehead, and in some cases by a tawny band round the lower part of the jaw just above the muzzle" (Lydekker, 1913, vol. 1, p. 20). The body color is jet black in old bulls; black, with a sprinkling of chestnut-brown hairs, in young bulls and cows; and light brown to chestnut in calves. The "stockings" vary from white to light golden yellow. (Peacock, 1933, p. 100.) The record length of horn on the outside curve is 33½ inches (Ward, 1935, p. 315).

The range of this subspecies, while not thoroughly worked out,

may be provisionally considered to include Assam, Burma, Siam, and French Indo-China.

Assam.—"Just as the buffalo is having a bad time from everyone wanting to grow rice where it wants to live, so the gaur, though safe from the Hindu and living in hills in which shifting cultivation alone is practised, is suffering from the hillmen, who sit up at night over saltlicks and plug everything that comes along; consequently it is already only a tradition in many hills where formerly numerous" (Milroy, 1934, p. 103).

"Bison . . . are destroyed everywhere and at all times over saltlicks and pools, and their meat, skins, and horns often sold in the market places" (Hanson, 1931, p. 37).

In Manipur "this animal is now very rare. It is said to have been found all over the hills until it was almost exterminated by foot and mouth disease in 1896. No special measures are taken for its protection." (Political Agent in Manipur and J. C. Higgins, *in litt.*, March, 1937.)

Blanford refers (1891, p. 484) to specimens from the Mishmi Hills, on the northeastern border of Assam.

Burma.—Of this Bison in Burma, Peacock (1933, pp. 102, 109) says:

Bison delight in forest-clad hills. The encroachment of permanent cultivation and the extension of communications hardly affect their main habitat, and *Bibos gaurus* is still found in very fair numbers in most of the hill systems of Burma.

Statistics show that only about twenty-five to thirty bison are shot annually under sporting licenses. This is a negligible number, and the casualties from epidemic disease and poachers are main considerations.

Anthrax has been responsible for the devastation of many good grounds. Some of the best grounds on the flats and in the valleys of Northern Burma . . . are subject to epidemic disease. The Homalin *kwins*, in which Evans mentions having seen a herd of 100 bison, have been ravaged by anthrax, as also many another fine bison and *saing* ground in Northern and Central Burma. . . .

The Pidaung Game Sanctuary still contains herds numbering from forty to fifty bison. This sanctuary has been reasonably well protected during the past five years. As a result, epidemic disease and poachers have been excluded There is many another spot in Burma where bison are still as plentiful as they are in the Pidaung Sanctuary

On the whole, bison are very fairly plentiful throughout Burma and will continue so, without prejudice to human interests, if given an ordinarily decent measure of protection. . . .

Bison are "protected game" and may not be shot either in reserved or unclassified forests without a game license. . . .

Only two bison bulls of the prescribed standard may be shot by any one person in any one year.

There were 188 Bison in the Pidaung Sanctuary in 1928-29, and 197 in 1929-30 (Peacock, 1931, p. 53).

Siam.—Flower (1900, p. 369) recorded a pair of horns from near Raheng, but very little further information concerning the Gaur in Siam seemed to be available at that time.

“The Burmese race of the Gaur probably inhabits Northern and North-western Siam, where it seems to be fairly common in the mountain regions. Southern limit of range not definitely known. Gaur are, however, not rare on the Siam-Tenasserim boundary.” (Gyldenstolpe, 1919, p. 174.)

“Practically all Siamese specimens have been obtained in the north or west” (Kloss, 1919, p. 391).

Gairdner (1914, p. 37) mentions the animal's occurrence in the Ratburi and Petchaburi districts.

Protection of the female only throughout the year was recommended by the Siam Society in 1931.

French Indo-China.—In Cambodia the Gaur is in no danger of extermination. It is found especially in the Province of Kratié, Stung-Treng, Kompong-Thom, Siemréap, Battambang, and Kampot. Only adult males, in limited number and at certain seasons, may be killed. (Résident Supérieur of Cambodia, *in litt.*, November 20, 1936.)

In Cochin China the former range was more extensive and more densely populated than the present range. The Gaur now occurs in the north of the Provinces of Tayninh and Thudaumot, and in the east of the Provinces of Bienhoa and Baria. The numbers are difficult to estimate, but may amount to a thousand. The horns are sometimes used in Chinese pharmacy. The hunting is regulated. (Roche, *in litt.*, 1937.)

In the region where Cochin China, Cambodia, and Annam meet, depletion of the herds is more pronounced in the case of the Gaur than in the case of the Banteng. The central plateau of Indo-China was formerly noted for its Gaurs. There are still many today, but the herds under observation for 15 years melt away little by little. Fully mature individuals are rarer and rarer. The decrease is not due to epizootics; those which strike the Bovidae are manifested in Indo-China with a remarkable periodicity. They have always existed. Thus they could not account for the progressively accelerated diminution that everybody has noticed during the past 15 years. The existence of the Gaur and the Banteng is seriously threatened, regardless of favorable appearances at certain points, but a few protective measures seriously applied would remove the danger. (André Kieffer, *in litt.*, November 21, 1936.)

James L. Clark (*in litt.*, June 26, 1936) reports the species on the Lagna River, 125 miles northeast of Saigon. “The gaur are apparently plentiful, but their ranges are spotty and limited.”

The Gaur inhabits the whole of Laos, from the Chinese frontier to that of Cambodia. In spite of the refuge afforded by the great mountains, it has decreased in numbers since 1910, and relatively more so than the Banteng. Like the latter, it has been depleted by repeated epizootics (rinderpest), by night hunting with firearms, and by hunting both day and night with great crossbows and poisoned arrows. In a territory 20 km. by 8-10 km., which is well known to the writer and which could support about 100 Gaurs and 200 Bantengs, there are practically no Gaurs left but still about 70-80 Bantengs. Wherever the domestic stock has suffered from the rinderpest, the Gaurs of adjacent areas have paid a heavy toll. The meat is utilized and there is a trade in horns. The hide is without any value, except that the natives appreciate it, no less than the meat, as food. Protective measures that ought to be adopted include the prohibition of night hunting and of any poisoned weapon. (P. Vitry, *in litt.*, December, 1936.)

Enemies.—"Bison have only two enemies to fear, viz. tiger, and man, but the former is no match for a full-grown bull and it is only when a bison feels his end is approaching through old age, disease or wounds, that he succumbs to the repeated attacks of a tiger" (Thom, 1934, p. 111).

Domestication.—The Gayal or Mythun (*Bibos frontalis* (Lambert)) has long been an outstanding puzzle to taxonomists. Early writers reported it as occurring in the wild as well as the domesticated state in eastern Bengal and in Assam. Lydekker (1913, vol. 1, p. 15) refers to it as "the domesticated, or semi-domesticated, representative of the gaur."

More recently, however, a somewhat different and perhaps more plausible explanation has been offered. "The Gyal or Mythun . . . is the product of interbreeding between a bull Gaur and domestic cattle. At the fourth generation the true stage of mythun is reached—an animal of lesser stature than the Gaur, shorter limbs and usually a well developed dewlap. . . . The horns show a slight upward curve without the terminal inward sweep. . . . Mythun are found in the mountainous tracts from North Cachar, through Manipur, to the Lushai and Chin Hills. They are the peculiar and characteristic possession of the hill tribes inhabiting this region." (Anonymous, 1933, p. 28.)

On the other hand, Peacock (1933, p. 119) considers the Mythun simply the domesticated Gaur. He has never heard of any cross between the Gaur and domestic cattle except on the northern frontiers of Burma.

Malayan Gaur; Malayan Bison. Seladang (Malayan)

BIBOS GAURUS HUBBACKI (Lydekker)

Bos gaurus hubbacki Lydekker, Game Animals of India, Burma, Malaya, and Tibet, p. 64, 1907. (Pahang, Malay Peninsula.)

FIGS.: Lydekker, 1913c, vol. 1, p. 17, fig. 10; Hubback, 1932, vol. 2, frontisp., and 1936, frontisp., pls. on pp. 7, 8, 18; Hubback, 1937, figs. 1-4; Leister, 1935, p. 58, fig.

The status of the Seladang has become quite precarious. It is "on the danger list despite protection" (Comyn-Platt, 1937b, p. 48).

"No dewlap, lower segments of legs dirty yellow, and the intercornual arch but slightly developed . . . , being altogether absent in the type specimen, which in this respect closely resembles a gayer. Compared with the typical Indian race, there is a greater extent of the tawny grey area on the forehead; and there is also a distinct whitish band above the muzzle." (Lydekker, 1913c, vol. 1, p. 20.) Hubback states (1937, p. 268) that some mature animals have a very pronounced dewlap, and that the mature bull measures up to 6 feet 3½ inches at the shoulder.

"The range of this race includes the Malay Peninsula, and may extend northwards to Tenasserim" (Lydekker, 1913c, vol. 1, p. 20).

Its former abundance is attested by Ridley (1895, p. 163): "The Sēladang usually inhabits the denser hill-jungles, where its tracks may be often seen; but it is also abundant in the more open, grassy spots, such as the banks of the Pahang river."

"In the Museum at Taiping there are horns from Batang Padang, Perak, and many fine heads from Pahang In the Museum at Kuala Lumpur there are a stuffed bull and numerous heads shot . . . in Selangor. The Raffles Museum contains a skull from Ulu Pahang." (Flower, 1900, p. 369.)

Hubback (1923, pp. 21-22) gives the following account of native persecution:

Here is an instance of what has been going on during the last few years in one of the more remote places of Pahang. An entire herd of seladang, probably averaging twenty head at least, has been wiped out from an area of about four hundred square miles over which they used to wander. This work was probably done by Malays, most of whom would certainly not have had licences to shoot big game. The last seen of this herd, as far as I can ascertain, was some three years ago, when a Malay came across the remaining survivors. They were three bulls. What a picture! The cows and young calves killed off to the last pound of meat—yes, that is what counts—and the more dangerous and less palatable bulls left to take care of themselves. These bulls would eventually separate and become solitary, which they have probably done by now if still alive; but the herd? Gone, never to be replaced. This herd was not rounded up and wiped out that way . . . but they were gradually potted at and potted at for meat, and from what I know of the native hunter, probably for every one actually secured at least two died in the jungle from wounds inflicted with inadequate weapons in the hands of unskilled hunters.

This district lies in the Ulu Tanum and its tributaries—. . . the mouth of the Tanum being about fifteen miles up-stream from Kuala Lipis, the capital of the State of Pahang.

The following additional information on the recent status of the Seladang is also given by Hubback (1932, vol. 2):

Careful conservation during the last five or six years in the Gunong Tahan Game Reserve [in Pahang, Trengganu, and Kelantan] has saved the seladang from what would, by this time, have been a dangerous decrease, and they are gradually returning to old haunts which have not seen them for some years.

The seladang in the Ulu Sat, which at times come into the Gunong Tahan Game Reserve, at other times into the Ulu Spia, are I believe on the increase. When one gets across to the west side of the reserve, the few remaining head of seladang and rhinoceros which were left after years of poaching are beginning to benefit from conservation and are also on the increase. The seladang in the Ulu Tanum had been reduced to three head in 1924. (P. 139.)

The Serting Game Reserve in Negri Sembilan, which was created in October, 1923, was rescinded in September, 1929, which enabled part of the area . . . to be alienated immediately for rubber cultivation.

Sungei Lui Game Reserve in Pahang, created in June, 1925, whose southern boundary marched with the northern boundary of the Serting Game Reserve, was also rescinded in September, 1929. . . .

A determined effort was made to revoke the Krau Game Reserve [in Pahang], the most valuable Reserve for seladang in the whole of Malaya, and a most important Sanctuary for all sorts of wild life, including *Sakai*. Fortunately the Krau Game Reserve was saved The latest Reserve to be established is the Sungkai Game Reserve in Perak, a small Reserve, which is chiefly a Sanctuary for one of the last remaining herds of seladang in Perak. (P. 195.)

The seladang in the Serting Valley had been badly poached and the large number of seladang there—I have seen as many as thirty in one padang—had been reduced to about twelve head in 1923. The effect of the conservation that had taken place for six years in the Serting Game Reserve had increased those seladang to probably double that number. (P. 198.)

The Sungkai Game Reserve [in Perak], which contains a small herd of seladang, is only 4,460 acres in extent and is therefore small as a permanent home for these seladang (p. 208).

The seladang of Perak have nearly disappeared, and these seladang will disappear too unless adequate steps are taken to protect them. I was informed when we were sitting in Tapah that seladang poaching is not yet a forgotten art, and when a stage has been reached whereby the seladang have been reduced to two or three herds in a large state like Perak, then surely it is time to make serious effort to prevent them disappearing altogether. (P. 209.)

Page writes (1934, pp. 39-40):

"The rescission of the Serting Game Reserve in 1929 was the death knell for the seladang in that portion of Negri Sembilan. There are none elsewhere in Negri Sembilan in sufficient numbers to enable them to breed or thrive. . . .

"This animal is decreasing and . . . when the decrease reaches a certain point it becomes geometrical decrease."

F. N. Chasen remarks (*in litt.*, May 5, 1937) that the Seladang needs rigid protection if its numbers are to be maintained.

Javan Banteng

BIBOS SONDAICUS SONDAICUS (Schlegel and Müller)

Bos sondaicus Schlegel and Müller, in Temminck's Verh. Natuurl. Geschiedenis Nederl. overz. bezittingen, Zool., Mammalia, pls. 35-39, 1840(?) [at least not later than 1844]; accompanying text (pp. 195 ff.) published in 1845. ("Java.") (Cf. Harper, 1940, p. 324.)

SYNONYMS: *Bos banteng* "Raffl." Wagner (1844); *Bos banting* "Raffl." Sundevall (1846).

FIGS.: Schlegel and Müller, *op. cit.*, pls. 35-39; Lydekker, 1898*a*, pl. 25, fig. 2; Lydekker, 1898*c*, pl. 3; Lydekker, 1912*b*, pl. 20, fig. 2 (subsp.?); Lydekker, 1912*d*, p. 903, fig. 123; Lydekker, 1913, vol. 1, p. 24, fig. 11; Tropische Natuur, vol. 14, p. 46, fig., 1925; Dammerman, 1929, p. 35, fig. 9.

This extremely interesting form of wild ox occurs only in Java, where its numbers are now so limited that it is "threatened with extinction" (Dammerman, in Skottsberg, 1934, p. 422).

Size smaller and build lighter than in the Gaur, with the dorsal ridge less developed; head more elongate; horns relatively small and slender, curving upward and outward; tail well tufted and reaching below the hocks; general color (including the face) of adult bulls blackish brown or black; white rump-patch very large and distinct; females reddish chestnut, with very small horns; lower part of legs in adults whitish. Height at shoulder, 5 feet 9½ inches. (Lydekker, 1898*a*, p. 277, and 1913, vol. 1, pp. 22-24.) Length of horn on outside curve up to 26½ inches (Ward, 1935, p. 321).

Presumably the Banteng formerly inhabited Sumatra also, but died out there (De Beaufort, 1926, p. 62). It is not found in the wild state on the Lesser Sunda Islands, although feral domestic Bantengs occur on Bali and Lombok (Mertens, 1936, p. 279). It "will breed freely with domestic cattle, and is itself kept in a more or less domesticated condition by various native tribes of the Malay countries" (Lydekker, 1898*c*, p. 37).

According to Müller (1839, p. 45), it is pretty common in Java in all wooded regions, both lowland and mountainous.

Heynsius-Viruly and Van Heurn (1936, pp. 51-52) give the following account:

In Java the banteng is reported from Oedong Koelan, the Tegal-waroe districts, east of the dessa Dampak on the slopes of Andjasmoro, near the Baloean, in the Nature Monument of the Blambangan Peninsula, and further westward to Poegoer; again in the districts of Karangnoenggal and Pangan-daran. The 40 bantengs of the Krawang district are specially protected. Bantengs are by no means rare in the southern parts of West Indramajoe, where, according to estimates, there are 4 or 5 herds, totalling about 50 head.

In South Bali, bantengs were formerly common in the forests of Sangketan at the foot of the Batoekaoe; but with the deforestation of these areas they have disappeared completely. One finds there, though, Bali cattle gone wild, looking much like banteng. . . .

Already in 1909 partial protection of wild cattle was started. The method used at the time is fully discussed in Koningsberger's "*Java Zoologisch en Biologisch* [1915]." It was partial protection because the Heads of the Regional Administration had the power to revoke the protection either wholly or in part, but temporarily and under conditions to be specified in each case. This authority is at present somewhat limited, nevertheless better protection is much needed, especially outside of Java.

A number of Government foresters in various parts of Java have supplied detailed information (*in litt.*, 1937) on the status of the Banteng, but there is space here only for the following summaries of their reports.

The species occurred over the greater part of Banjoewangi at the beginning of this century and is now found in small numbers in two different areas. From 1933 to 1936 all the forest reserves on the southern coast became wildlife reserves, and in 1937 the forests in North Banjoewangi were to be closed to hunting. But hunters congregate in adjacent areas. It would be advisable to stop all hunting of the Banteng in the whole forest district of Banjoewangi for a ten-year period. The animal does only a little harm, which can be easily prevented.

In the southern forests of Djolosoetro, Serang, Tambak, Soemberboto, and South Toeloengagoeng the herds are estimated to contain respectively 30, 15, 12, 8, and 15 head. A few have been killed illegally, but the numbers remain unchanged.

The Banteng's present distribution includes West Java, South Kederi, South Malang, and the former residency of Besoeki. It is rare, and decreases year by year.

On the south coast of Indramajoe it is still numerous, and a few individuals are left in South Malang and in the northeastern corner of Java. In all its range in West, Middle, and East Java there is a strong decrease.

In Middle Java there are now only about 100 specimens between Madjenang and Noesakembangan in Tjilatjap. The hunting in Middle Java is forbidden for two years from 1936.

The number remaining in East Brantas, in the forest reserve in the southern mountains and vicinity, is estimated at about 200.

In the regency of Garoet the numbers have decreased, but a good many remain, in herds of up to 20 head.

The last Banteng in the forest district of Ngandjoek is said to have been killed in 1921.

The species is still quite common in the primitive forest in the Tjampoerdarat district along the south coast.

In the Banjoemas region the total number remaining is probably 200-250.

In 1920 there were more than 100 animals in the Indramajoe

forest district and vicinity; about 30 are now left. There has probably been crossing with feral domestic cattle.

In the North Bandoeng region the Banteng ought to exist still in Pamanoekan and Tjiasem. In one place 15 animals are reported.

In the Middle Preanger region it is found only on the south coast in Tjipondok, where it is being exterminated through shooting.

In the West Preanger region there are considerable numbers. In the area which will form the Tjikepoech wildlife reserve there are several hundred and possibly a thousand. In two other areas there are about 300. The numbers have increased recently, but they were decreasing rapidly before the introduction of the Game Preservation Ordinance. The good position of the stock in Tjikepoech has been brought about by the "Vereeniging Venatoria," which has organized the hunting. Efforts have been made (but so far in vain) to abolish licenses for shooting game in the other forest reserves where Banteng are found.

In the Djember region the species formerly existed in great numbers in the forests of South Besoeki. Herds of 30-50 animals were seen as late as 1920-25. In 1937 one herd of 6-10 animals was seen. Since the introduction of the Game Preservation Ordinance there has been practically no hunting.

The Banteng is quite numerous in the southern parts of the regency of Tasikmalaja. Various forest reserves in this district have been closed to all hunting.

In these reports there is general agreement on poaching and the advance of cultivation as the chief causes of depletion. The natives like the Banteng's meat very much. The hides are used for leather, and the horns for various articles. There is a good demand for the species on the part of traders in wild animals. It does some harm in paddy, rubber, and fiber plantations.

Domestication.—On a previous page mention has been made of domesticated Bantengs in the Malay countries, and especially in the islands of Bali and Lombok. These apparently bear a close resemblance to the wild Banteng. Keller (1902, pp. 144-154, 217) discusses various other domestic cattle of the Old World (and particularly the Zebu) as descendants or derivatives of the Banteng.

Malay Banteng. Sapi Utan (Malayan)

BIBOS SONDAICUS BUTLERI (Lydekker)

Bos sondaicus butleri Lydekker, Field, vol. 105, p. 151, 1905, and Jour. Fed. Malay States Mus., vol. 1, p. 62, 1905. ("Perak," Malay Peninsula.)

FIG.: Jour. Bombay Nat. Hist. Soc., vol. 13, p. 192, fig., 1900.

So little definite information is available concerning this animal that it almost belongs in the mythical class. The name *butleri* was based upon a skull.

"The bantin found in the Malay Peninsula appears to be very rare and local, and the possibility of its being nothing more than a feral race of the domesticated Bali bantin, which is largely imported into Singapore, should be borne in mind. The colour is stated to be blackish in the bulls and reddish chestnut in the cows, with little or no white on the rump, at least in the latter; the lower portion of the legs varying in colour from dirty white to reddish or blackish. Horns of cows very short, as in typical race, to which this bantin appears closely related." (Lydekker, 1913, vol. 1, p. 29.)

"The Banting is probably very rare in the Malay Peninsula: Mr. H. N. Ridley told me one was killed by Mr. Oxley at Muar [Johore] about fifty years ago" (Flower, 1900, p. 370).

"Notwithstanding Butler's and Lydekker's identification of the female skull of some kind of ox from Perak as a banteng, there is no real proof of the existence of the species in the Malay States: a great number of horns and frontlets obtained by Europeans and Malays have been seen, but all are unquestionably those of gaur or sēladang: undoubtedly if the banteng occurred, trophies of it would have been noticed among them. The distribution is therefore parallel with that of several other animals and some birds, i. e., the species occurs in Indo-China and one or other of the Malay Islands but skips the Peninsula." (Kloss, 1917, p. 317.)

More recent news is furnished by Hubback (1932, pp. 24-27, 213):

I believe that there are still . . . possibly what are known as *Bos banteng* (*sapi utan*) in the Mukim of Sok [Kedah]. . . .

If *sapi utan* . . . are to be found there, then that would be the most southern point in the Malay Peninsula, in which they were to be found

When in Perlis I saw two frontal skull bones, with horns attached, of *sapi utan* which had been shot by the ex-Penghulu of Chuping in 1930 within a few miles of his house, and he informed me that only the week previously a herd of *sapi utan* had been in the same place. The trophies I saw were typical *Bos banteng* and there is no doubt that this species, which is very rare in the Malay Peninsula although common in Burma and Borneo, is still to be found in Perlis and it would be of great interest if it was recorded in Kedah as well, and of still greater interest if its habitat could be set aside as a sanctuary.

This species of wild cattle has never been authentically recorded from the Federated Malay States, Kelantan, Trengganu or Johore. . . .

The ex-Penghulu of Chuping . . . knew that the herd from which he had shot his two head the previous year frequently crossed and recrossed the Perlis-Siam border, stating that there were salt licks both in Perlis and Siam which these animals periodically visited. He volunteered the information that it was his opinion that this herd went as far as the Ulu Telian salt licks in Kedah, and if this surmise is correct it would be reasonable to expect to find *Bos banteng* distributed between the points mentioned. . . .

The ex-Penghulu of Chuping informed me [that these banteng] were sometimes to be found in a herd of as many as fifteen animals.

F. N. Chasen writes (*in litt.*, May 5, 1937): "In the Malay Peninsula is found only in the north. The species has been recorded from as far south as Perak, but I do not believe in this record. In, at least, the southern parts of its range the species certainly needs protection."

Other Bantengs

In addition to the Javan and Malayan Bantengs discussed above, several subspecies on the mainland of southeastern Asia and one in Borneo have been described. While all these have evidently suffered reduction in numbers during recent decades, their status is not yet so unsatisfactory as to require more than passing mention.

The Burmese Banteng, Tsaine, or Saing (*Bibos sondaicus birmanicus*¹ (Lydekker)) is "distributed throughout Burma from Mergui in the extreme south to Myitkyina in the north. . . . There are still thousands of square miles throughout Burma in which *saing* are found in fair numbers." (Peacock, 1933, p. 113.)

Lydekker (1898*c*, p. 43) describes (without naming) a Manipur race of the Banteng. Its distribution is given (p. 45) as "the Kubbu Valley, between Manipur and Northern Burma; perhaps extending to the ranges eastward of Chittagong, where this form may intergrade with the Burmese race." "Large herds" were reported in 1897, and it is still said to be common in the Kabaw Valley (Political Agent in Manipur and J. C. Higgins, *in litt.*, March, 1937).

Lydekker has applied the name *porteri*² to certain Siamese Bantengs with spotted pelage. This, however, is considered by various authors (Gairdner, 1917, p. 250; Kloss, 1917, p. 316; Gyldenstolpe, 1919, p. 174) as merely an individual variation. For the present, therefore, the Siamese Bantengs may be referred to the Burmese form (*Bibos sondaicus birmanicus*). These animals appear to be moderately common as yet in Siam, especially in the northern, central, and western parts (Gyldenstolpe, 1919, p. 174; R. M. de Schauensee, oral communication, April, 1938).

The Banteng of French Indo-China may also be referred provisionally to *birmanicus*; but if it should prove to be distinct, several names applied to the wild cattle of this region by Heude (Mém. Hist. Nat. Empire Chinois, vol. 5, pt. 1, pp. 2-11, pls. 3-11, 1901) are available. While it has decreased decidedly in some localities, a moderate stock seems to remain elsewhere (James L. Clark, *in litt.*, June 26, 1936; André Kieffer, *in litt.*, November 21, 1936; P. Vitry, *in litt.*, December, 1936; Roche, *in litt.*, December, 1936).

¹ *Bos sondaicus birmanicus* Lydekker, Proc. Zool. Soc. London 1898, p. 277, pl. 25, fig. 1, 1898. (Burma.)

² *Bos sondaicus porteri* Lydekker, Proc. Zool. Soc. London 1909, p. 669, 1909. ("Siam.")

The Bornean Banteng (*Bibos sondaicus lowi*¹ (Lydekker)) is confined to that island. It is reported as still common in Dutch Borneo by several Government foresters (*in litt.*, 1937). It also occurs, though not abundantly, in the northern parts of Borneo (Shelford, 1916, p. 46; Mjöberg, 1930, p. 19).

Wild Yak

POËPHAGUS GRUNNIENS MUTUS Przewalski

Poëphagus mutus Przewalski, Third Journey in Central Asia (in Russian), p. 191, pl. facing p. 190, 1883. (Alpine region of the western part of the Nan Shan (approximately lat. 39° 20' N., long. 95° E.) between the Anembar-Ula on the west and the Humboldt Range on the east; *cf.* Harper, 1940, pp. 325-326.)

Figs.: Prejevalsky, 1876, vol. 2, p. 188, fig.; Przewalski, 1883, pl. facing p. 190; Prschewalski, 1884, pl. facing p. 108; Lydekker, 1898c, pl. 4, and 1900, pl. 2, figs. 4, 4a; Hedin, 1899, vol. 2, pp. 1015, 1018, 1021, figs., and 1904, p. 211, fig.; Leche, 1904, p. 12, fig. 8, p. 14, fig. 9, pl. 3; Hedin, Southern Tibet, vol. 4, pl. following p. 72, 1922; Stockley, 1928, pl. facing p. 126; Schäfer, 1938, p. 73, fig. 45; Engelmann, 1938, fig. 112.

The Wild Yak is suffering severely from intensive hunting with modern rifles in a region where game laws are unknown, and its range as well as its numbers have become considerably reduced.

"The body is covered with thick black hair, which in the old males assumes a chestnut colour on the back and upper parts of the sides, and a deep fringe of black hair hangs down from the flanks. The muzzle is partly grey, and the younger males have marks of the same colour on the upper part of the body, whilst a narrow silvery grey stripe runs down the centre of the back." A full-grown bull measures 11 feet in length, exclusive of the bushy tail, which is 3 feet long; height at the hump, 6 feet. The female is much smaller, with shorter and lighter horns; height at the hump, 4 feet 9 inches. (Prejevalsky, 1876, vol. 2, pp. 187-189.) The record length of horns is 38½ inches (Ward, 1935, p. 314).

"Wild yak range from the eastern part of Ladak, in the neighbourhood of Chang-Chenmo (where they now appear to be exterminated) as far east as Kan-su and northwards to the Kuen-lun, at elevations between 14,000 and 20,000 feet." Specimens are recorded from Ladak; Tibet; Tibet north of Sikkim; and Kuen-lun (94° E., 35° N.). (Lydekker, 1913c, vol. 1, pp. 33-34.)

Prejevalsky (1876, vol. 2, pp. 189-200) gives the following account:

In these inhospitable wastes [of northern Tibet], in the midst of a desolate nature, yet far removed from pitiless man, the famous long-haired ox roams

¹ *Bos sondaicus lowi* Lydekker, Proc. Zool. Soc. London 1912, p. 906, 1912. ("Rejang Valley," Sarawak, Borneo.)

in unrestricted freedom. This animal . . . is also found further north, and is said to haunt in considerable numbers the mountain ranges of Kan-su near the headwaters of the Tatung and Etsina, the northernmost limit of its distribution. In Kan-su, however, it is becoming extinct, owing to the way in which it is persecuted by the native hunters. . . .

At all other times, except the rutting season, the old bulls keep single, or in small troops of three or five; younger fully grown bulls . . . are more often found in separate troops of ten or twelve, with one or two old bulls among them. The females, young bulls, and calves assemble in enormous herds of several hundred or a thousand head. In such large numbers they have difficulty in finding sufficient food, but the calves are thus best protected from the attacks of wolves. . . .

We first saw single animals soon after crossing the Burkhan Buddha, but it was not until we came to the Baian-kara-ula . . . that we saw herds of them, and again, in the valley of the Murui-ussu; previously we had seen two small troops near the river Shuga. . . .

Their favourite resorts are thickly strewn with their dung, which is the only fuel in these deserts, and without which the journey across Tibet would be impracticable, for there are no bushes of any kind in this country. . . .

Gifted with enormous physical strength, the yak in its native deserts, far from the haunts of men, has no dangerous enemies, and generally dies of old age. But he is subject to a kind of mange . . . which spreads over the whole body, and causes the hair to fall off. I cannot say whether they ever recover from this complaint, or whether in time it proves fatal. . . .

The Mongols of Tsaidam . . . often hunt the wild yak, their chief inducement being the large quantity of meat which it yields; gluttony overcoming their fears. . . . Besides eating the yak beef, Mongols use the heart and blood of this animal, taken internally, for medicinal purposes; the hides are sent to Tonkir, and ropes are spun from the long hair of the tail and flanks.

Rockhill reports (1891, p. 177) that the hills around a plain south of the Yellow River, in eastern Tibet, were black with Yaks, which were little molested by man. "They could be seen by thousands."

Bower (1894, p. 286) also testifies to their former abundance: "Herds, and occasionally solitary old bulls, are to be seen all over the Chang. Sometimes as many as a hundred were seen in a day, and for days together some were always in sight."

"In Ladak the great district for yak is the Chang-chenmo valley, and the dreary regions between this and the upper Indus; but these animals are yearly becoming scarcer within the territories under the rule of the Maharaja of Kashmir, although reported to be numerous in Tibet proper" (Lydekker, 1900, p. 68).

Hedin (1899, vol. 2, pp. 1019-1021) was told that—

in Charchen, Charkhlik, and Achan (places at the northern foot of the Kwen-lun mountains) there lived . . . hunters, who gained their livelihood almost entirely by hunting the yak. Their hunting grounds are the Arkatagh and Chimen-tagh, in Northern Tibet. Each hunter takes with him two men, and a donkey to carry home the skin. But generally two or more hunters work together, so as to support one another if they are attacked by the yak. . . .

The best leather is obtained from the section off the back It is

employed for making saddles, saddle-girths, bridle-reins, whips, and so on, as well as for the better kind of boots. . . . The tail is generally hung up as a religious offering . . . at some . . . saint's tomb.

The skins are sold to the merchants of Cherchen, Charkhlik, and Achan, and they carry them to Khotan, where they sell them to the . . . tanners and saddlers. The skin of the yak is highly valued because of its extraordinary toughness and durability. It is almost impossible to wear it out. The price for the skin of a full-grown yak bull is about 17s. 9d.

Hedin (1899, vol. 2, p. 1054, and 1904, pp. 168-205) found Yaks, including one herd of 30 and another of over 100, among the mountain ranges between the Altyn-Tagh and the Arka-Tagh.

"The yak is to be found in Changchenmo and thence a long way into Tibet, but owing to the game regulations it is not possible to hunt him in Kashmir territory. The Maharajah of Kashmir, being a Hindu, to whom the cow is a sacred animal, this law has been introduced to avoid hurting his religious susceptibilities. . . .

"The tufted tail of a yak is considered a trophy, and is used in India as a fly whisk on ceremonial occasions." (Van der Byl, 1915, p. 121.)

"They are certainly found on that part of the Ladak Range which lies between the Indus and Sutlej in Tibet, but not on any other part of this mountain system, and they exist in limited numbers on some of the higher mountains which lie between the upper part of the Sutlej in Tibet and the Zaskar Range. In fact they very occasionally cross the crest-line of the Zaskar Range into Kumaon near the Kangri Bingri Pass. (Burrard, 1925?, pp. 244-245.)

Schäfer shows (1938, map) that half a century ago the range of the Wild Yak in eastern Tibet extended south in the steppe country nearly to Jekundo and Seshu, but has now receded to a line running northeast-southwest between Tsaring Nor and Oring Nor, near the southern base of the Marco Polo Range.

Brooke Dolan, II, writes (MS., 1938; *cf.* also Dolan, in G. M. Allen, 1939a, pp. 292-293): "The wild yak of northern Tibet and Kokonor seem to have retreated steadily west and north into northern Tibet, due to unceasing hunting by nomads living on the fringe of the high Tibetan desert. Skulls and bones litter the steppes of the upper Yellow River but the yak have not been common there for a decade so far as we could determine. The nomads in recent years have obtained European rifles and ammunition, chiefly English, through Darjeeling. The military ammunition wounds three animals to every one brought down for food and meat. Schäfer saw yak only three or four times in the course of six weeks' traveling on the steppes of the upper Yellow River and the Yangtze." Dolan also remarks (oral communication, 1937) that the main Yak country is now north-central Tibet.

[The Domestic Yak (*Poëphagus grunniens grunniens* (Linnaeus)) is one of the most important beasts of burden in the high plateaus and mountains of Central Asia. It is even used as a saddle animal.

They "are always much smaller than their wild cousins, with very inferior horns," and "vary much according to locality. . . . At lower levels in various parts of Ladak and the Himalaya pied domestic breeds are common; and it is from the tails of these that the fly-whisks, or chowris, used in India are made. Near Darjiling there exists a very small breed of yak, some individuals of which are black, and others black and white. Of this and other breeds living at comparatively low elevations there is a polled form, which probably keeps true. Domestic yak are freely crossed with the ordinary Indian cattle." (Lydekker, 1898c, pp. 54-55.)

The use of the Domestic Yak has extended far beyond the range of its wild ancestor, as "all over the eastern half of Turkestan" above 6,000 feet (Severtzoff, 1876, p. 336) and in the Russian Altai (Demidoff, 1900, pp. 176-180, 185).]

Lithuanian Bison. Wisent (Ger.). Zubr (Russian)

BISON BONASUS BONASUS (Linnaeus)

Bos bonasus Linnaeus, Syst. Nat., ed. 10, vol. 1, p. 71, 1758. (Type locality probably Bielowitza, Lithuania, *vide* Lydekker, 1913c, vol. 1, p. 35.)

FIGS.: Royal Nat. Hist., vol. 2, frontisp., 1894; Lydekker, 1912b, pl. 22, upper fig.; Jour. Soc. Preservation Fauna Empire, pt. 11, frontisp., 1930; Lundbergh, 1933, p. 132, fig.; Leister, 1935, p. 56, fig.; Mohr, 1935?, 5 figs.; Pocock, 1937, p. 655, fig.

By 1935 the pure-blooded Lithuanian Bison remaining in captivity did not number more than a few dozen individuals; none were left in a wild state.

"Height at shoulder from 6 feet to 6 feet 2 inches; hind-quarters relatively high, pasterns long, tail reaching hocks or below. Horns, black, relatively long and slender, curving upwards, forwards, and inwards Mane of males in summer coat curly, moderately long, and not extending very far back on body, . . . forming a larger and thicker mass on head, neck, throat, and middle line of chest. In females restricted to nape, forehead, middle of lower part of face, and median line of chest. Colour brown, with a tinge of plum-colour." (Lydekker, 1913c, vol. 1, pp. 35-36.)

STATUS OF THE SPECIES UP TO 1800

The Wisent was once "abundant throughout Europe, as proved by the fossil remains of this or a closely allied form. . . . Caesar mentions it as abounding, along with the aurochs, in the forests of Germany and Belgium. It appears to have been occasionally captured and afterwards exhibited alive in the Roman amphitheatres.

At that period, and long after, it seems to have been common throughout central Europe, as we learn from the evidence of Herberstein in the 16th century." (Lydekker, 1910, vol. 4, p. 11.)

"Unfortunately, there is some difficulty in ascertaining the precise limits of the range of the bison, owing to the fact that it was preceded by a closely allied extinct species (*B. priscus*). . . . The wonderful rock-paintings on the walls of the cavern of Altamira, in Spain, prove that bison formerly inhabited that country; and there is likewise evidence that they once existed in Greece." The range of the bison is "known to have extended from western and southern Europe through the intermediate countries to Poland, Russia, and the Caucasus, while there is evidence that it likewise stretched so far north as the valley of the Lena, in Siberia." (Lydekker, 1912, p. 209.)

Brandt mentions (1867, p. 175), as lands where the Bison has existed within historic times, the Caucasus, European Russia, Thrace, Macedonia, Rumania, Hungary, Poland, Germany, Bohemia, and Switzerland; he also mentions, as possible parts of its range, Central Asia, Assyria, Mesopotamia, Persia, France, England, Denmark, and Sweden. Floericke (1930, p. 8) reports it from France as late as the sixth century. In the Carpathians (Rodnaer Gebirge) it survived certainly up to 1762 (Calinescu, 1931, p. 82). In Saxony it was exterminated in 1793 (Krumbiegel, 1930, p. 6).

The existence of the species in the Jaktorowka Forest of Poland about the middle of the sixteenth century is recorded by Herberstein. "The bison was gradually killed off in western Europe as cultivation and civilization advanced, so that the range of the species became restricted to the more eastern and northern parts of the Continent. When it finally disappeared from France and western Germany does not appear to be known; but there is evidence that the last East Prussian bison was killed by a poacher in the year 1755 between Labiau and Tilsit." (Lydekker, 1912, p. 210.)

Economic uses.—In the Middle Ages the animals were taken in pitfalls. In Poland the flesh was considered a delicacy and was utilized as a princely gift. The hide was commonly made into thongs and traces. Horns and hoofs were made into various objects, to which superstition ascribed secret virtues. The horns were ornamented with silver and used as drinking vessels. Although as a rule the animal remains untamable, it is said that in 1740 Count Lazar was driven to a meeting of the diet in Hermannstadt, Transylvania, behind a team of Wisents. For some two centuries at least (say 1550 to 1750), combats between Wisents and Wolves, Bears, and other animals were staged in Germany for the amusement of the populace. (Floericke, 1930, pp. 11, 32.)

Enemies.—The chief enemy was the Wolf. While a compact herd was safe enough, an isolated Wisent would succumb to the combined attack of a pack of Wolves. In a combat with a Bear the Wisent was often enough victor. (Floericke, 1930, p. 32.)

STATUS OF THE LITHUANIAN BISON FROM 1800 TO 1936

In Rumania.—Floericke (1930, p. 10) reports its survival in the mountains of Transylvania at the end of the eighteenth century. A hunting horn used by a Rumanian family, and dated 1808, is offered as evidence of the existence of this species in Bukowina at the beginning of the nineteenth century (Botezat, 1932).

In Russia.—Floericke (1930, p. 10) quotes Dolmatoff as having seen the skins and horns of seven Bison killed in the Semenov district (central Russia) between 1840 and 1848.

In Lithuania.—According to Trouessart (1910, p. 243), the Bison was then found only in Lithuania (forest of Bielowitza in the Government of Grodno), where it was protected by the Russian Government, and in some large private parks.

“The herd [at Bielowitza] has been subject to many vicissitudes, having suffered more or less severely during the various Polish revolts. . . . It attained its maximum in point of numbers between the years 1851 and 1860. . . . In 1857 . . . the total was 1898. In 1892 the number had become reduced to 375. At that time there was . . . living . . . a herd of 101 head in the neighboring forest of Swissloch.” (Lydekker, 1912, pp. 210-211.)

The Bielowitza herd was maintained for many years, up to the time of the World War, as the private property of the imperial family of Russia. Meanwhile a comparatively small number were allowed to be shot by sportsmen, and little harm seems to have been done by poaching except in war times. A certain number were captured alive and presented to zoölogical gardens.

In former years “bears and wolves” were “their deadly enemies, while it is probable that many calves are killed by lynxes.” War was waged upon these four-footed enemies, and before the end of the last century their depredations were no longer of importance. “The herd has suffered much from diseases,” including liver fluke. “The gradual waning of the Lithuanian bison” is attributed by Büchner (1896) “to continuous in-and-in breeding, the slowness of breeding of the cows, and the large percentage of bulls to the latter.” (Lydekker, 1898c, pp. 73-77.)

Overstocking of the Bialowies Forest with Red Deer (*Cervus elaphus*) resulted in a scarcity of food for the Wisents, and feeding was necessary from November through March (Stechow, 1929). This overstocking, together with artificial feeding, and a plague of

caterpillars defoliating the forest, culminated in diseases that decimated the game of Bialowies before the World War (Floericke, 1930, p. 16).

"In 1913, just before the war, there remained but 750 [in this herd]. Prior to the German military occupation of Bialowies, the greater part of the above had perished, yet the Germans succeeded in raising the number of wisents to about 120. But the unfavorable end of the war resulted finally in all of those remaining being killed by poachers and disbanded soldiers.

"Soon after the consolidation of the new Polish State the Forest Administration . . . succeeded in purchasing elsewhere suitable animals, a corral was erected in the Bialowies forest with an area of 240 acres and 5 wisents [were] introduced there. These have increased and at present there are in all 14," among which "only 9 are pure blooded stock, 5 cows being hybrids between wisent and bison.

"The second largest herd of wisents in Poland—9—live in the forests of Prince Pless, Polish Upper Silesia, in practical liberty. These wisents descend from animals [a bull and three cows] turned over to Pless in 1865 from Bialowies (then Russian). During the war the Pless herd had increased to 74, but continuous political troubles and disorders resulted in the death of all but 3. After more peaceful times these wisents had increased to 11, but 2 died quite recently. The above 9 wisents are absolutely pure blooded and quite wild.

"In March, 1935, an exchange of wisents was arranged between Poland and Sweden. . . . Poland gave two Caucasus stock heifers . . . to the wisent herd near Stockholm, and received in exchange" a 22-year-old cow and a 5-year-old bull. These two, together with two cows "which have been living in Bialowies since 1929 and 1930, are the only ones of pure Bialowies breed remaining and they will from now on be bred further as Lithuanian stock." (Theodor G. Ahrens, MS., October, 1935.)

In Sweden.—"There are, aside from seven pure blooded wisents, five first-class grades with bison blood. Some of the animals are in the Stockholm Zoo on Skansen while the others are in a large game-preserve in Vaestmanland." (Mohr, 1933, p. 261.)

In England.—"The largest herd of all is that of the Duke of Bedford in Woburn Abbey consisting of 20 pure blooded animals and 19 cross breeds." The latter "have traces of the blood of the gray domestic cattle of the steppe of Southern Russia." (Mohr, 1933, pp. 260-261.)

In Germany.—"In a most beautiful old timber-forest" belonging to Count Arnim in Boitzenburg, Uckermark, "13 pure blooded animals are kept, . . . and with the exception of one cow they all

have Caucasian blood. . . . The Berlin Zoo owned five pure blooded wisents. In Hanover, Munich, Springe and Stellingen there was 1 bull each." (Mohr, 1933, pp. 260-261.) A pure-blooded wisent herd belonging to Herr von Beyme, at Scharbow in Mecklenburg, developed foot-and-mouth disease and perished in 1926. The loss of this herd resulted in the adoption of the policy of "Verdrängungs-Zucht."

In other parts of Europe.—"The breeding efforts in Amsterdam are of a somewhat recent date but look very promising. There is one bull in Wien-Schoenbrunn and one in Budapest of which the one in Hungary is used for cross breeding. It has thus far been impossible to ascertain whether the animals that used to be in Ascania Nova in South Russia are still alive. It seems as if the cow of that region was sterile. The bulls of this breeding place are used in the famous old 'supplantation breeding' (Verdrängungs-Zucht)." (Mohr, 1933, p. 261.)

Breeding experiments.—"Verdrängungs-Zucht (breeding by elimination) is as follows: Bison cows are bred to pureblood wisent bulls and the resulting female calves brought in due time also to a wisent bull and so on, while the male calves are excluded from breeding. Experience shows that by continuing this process long enough, even at the end of 10 generations the descendants can scarcely be distinguished from pure stock wisents. . . . To Springe all the available pure-blooded wisents have been brought and are said to be doing well. In the meantime a large new reserve has been created in the Schorfheide, a very extensive forest in the Uckermark. . . . There are here a pure-blooded wisent bull and quite a number of hybrid cows, and the above discussed Verdrängungs-zucht is to be continued, there being in all 29 animals here." (Theodor G. Ahrens, MS., October, 1935.)

A new Wisent park, with a stock of 6 animals, was to be opened in connection with the Hellabrunn Zoo, near Munich, in 1936.

Similar breeding experiments are being undertaken by the Polish Forest Administration at a new Wisent enclosure in the Forestry District of Ksionsch on the Pilica River southwest of Warsaw. "All the halfbreed cows in Bialowies will be brought here and bred to a pureblooded bull, while in Bialowies, in the future, only pure-blooded animals will be tolerated." (Theodor G. Ahrens, MS., October, 1935.) A further step contemplated is the segregation of the pure Lithuanian stock (*B. b. bonasus*) at Bialowies and the provision of a place for the Caucasus-blooded line (*B. b. caucasicus*) in the Tatra (Mohr, 1934).

Rate of increase.—The feral Wisent cow keeps her calf with her about three years and does not rut during this time. For a more rapid increase, 30-40 cows of the Bialowies herd were kept in a

smaller enclosure and fed heavily with oats, and the calves were weaned early. As a result, the cows produced a calf about every year. (Stechow, 1929.)

Present status.—The number of purebred animals (of both subspecies) remaining at the end of 1932 was only 73 (Mohr, 1933, p. 260). These are all contained in various European parks and zoos. Efforts to obtain the best breeding results from this small and scattered stock appear to have been hampered somewhat by international rivalries.

Caucasian Bison. Kaukasischer Wisent (Ger.). Zubr (Russian)

BISON BONASUS CAUCASICUS Hilzheimer

Bison caucasicus Hilzheimer, Mitteil. Nat.-kab. Stuttgart, p. 252, 1909. (Caucasus.)

Figs.: Demidoff, 1898, frontisp. and fig., p. 77; Lydekker, 1898c, pl. 5 and fig. 15, p. 76.

The Caucasian Bison was believed to have been completely exterminated by 1925 (B. K. Fortunatow, *Natur- und sozialistische Wirtschaft*, vol. 5, pp. 172-188, (1932) 1933, as quoted in *Zeitschr. f. Säugetierkunde*, vol. 9, p. 40, 1934). While a few survivors were reported as late as 1930 (Pfizenmayer), the race is now probably extinct in its native wild. At last accounts, however, certain captive specimens in other parts of Europe were at least partly of Caucasian ancestry.

"Very similar in external appearance to the typical race; but perhaps somewhat more lightly built, with less long hair on the fore-quarters. . . . According to Hilzheimer, the skull . . . approximates in many features . . . to the American species." (Lydekker, 1913c, vol. 1; pp. 36-37.)

How far this subspecies may have once extended from the Caucasus toward the northwest to meet the range of the Lithuanian Bison, or in other directions, will perhaps never be known. It had apparently become almost or entirely restricted to the Caucasus region by the time scientific records of it began to be kept. Early records are somewhat uncertain by reason of possible confusion between the Bison and the Aurochs (*Bos primigenius*). Brandt, however, considers (1867, p. 157) that the records by Lamberti (1654) and by Lowitz and Guldenstädt (end of eighteenth century) probably pertain to the present species in the Caucasus; he also states (p. 158) that an unquestionable skin was brought from the Caucasus to St. Petersburg in 1836. By this time the animal seems to have retired to the inner parts of the Caucasus, including the valleys of the Zellentchuk and the Kuban. Brandt goes on to sug-

gest (p. 162) that the drinking horns that Xenophon found among the Paphlagonians in Asia Minor may have belonged to this species.

Radde reports (1893, p. 175):

This animal is at present confined to the district around the sources of the Laba and Bjellaja on the north side of the Caucasus, and extends eastwards from the former locality to the springs of the Selentschük. The Bison is scarce everywhere, and generally seen in twos and threes. . . . Evidently the Bison has discontinued its settled habits, and has taken to wandering about in this, its last refuge. Through the ever increasing encroachments of the settlers, and the consequent dispersal of the wild animals, and also, in many places, owing to the new supervision of the forests, the Bison is driven more and more towards the higher ridges of the mountains. . . .

Formerly, 30 or 40 years ago, it was met with much lower down, about 5000 feet, and it was also more common. . . .

It is under Imperial protection in the Caucasus. . . . Nevertheless it is very difficult to keep guard over these last remaining animals satisfactorily.

Prince Demidoff writes (1898, pp. 3-5):

Not so long ago the Aurochs [=Bison] used to haunt most of the valleys of the Kouban territories, such as the Zellentchuk, where there are said to be some at the present time, both the Great and Little Laba, Urrushten, and elsewhere. But so shy an animal could not long continue to live within easy reach of men, and had constantly to retire before advancing civilization. It is now concentrated in the dense forests overlooking the valleys of the Kisha, and fifty years hence it is to be feared will have entirely disappeared.

There is no doubt of the existence of the Aurochs on the southern part of the Caucasian range, between the hills and the Black Sea Some thirty years ago, as I was told by native hunters, the Aurochs used to be seen in herds of fifty or sixty head, but at the present time one seldom sees more than five or six together. . . .

Leopards . . . are supposed to trouble them a great deal.

Grevé (1906) gives a full summary of records of this Bison from 1633 to 1906. These records cover roughly the northern slopes of the western half of the Caucasus range. By 1895 the animal seems to have become largely restricted to the basins of the Pshekka, Byelaya, Laba, Kisha, and Zellentchuk Rivers.

"It is very difficult to prevent poaching, and . . . much ill-feeling has been created by making the natives vacate their grazing grounds, to which they have considered themselves entitled from time immemorial" (Van der Byl, 1915, p. 43).

The recent status of the Caucasian Bison is summarized by Pfizenmayer (1929; 1930) as follows: At the outbreak of the World War there were more than 500 individuals; in 1918 there were still 100; in 1919, only 50. Reports for the year 1928 give no positive evidence of living individuals. However, in 1930 there was a trustworthy report of a few survivors in one of the least accessible parts of the Kuban district.

"The Soviet Government has made a reserve in the Caucasus

of over three-quarters of a million acres in a locality formerly occupied by the European bison, of which, however, the keepers have yet found no trace" (Mitchell, 1931, pp. 36-37).

For the laudable purpose of preserving racial purity, it would seem just as desirable to prevent interbreeding between the Lithuanian and the Caucasian Bisons in Europe as between the Plains and the Woodland Bisons in America. Such a policy is strongly

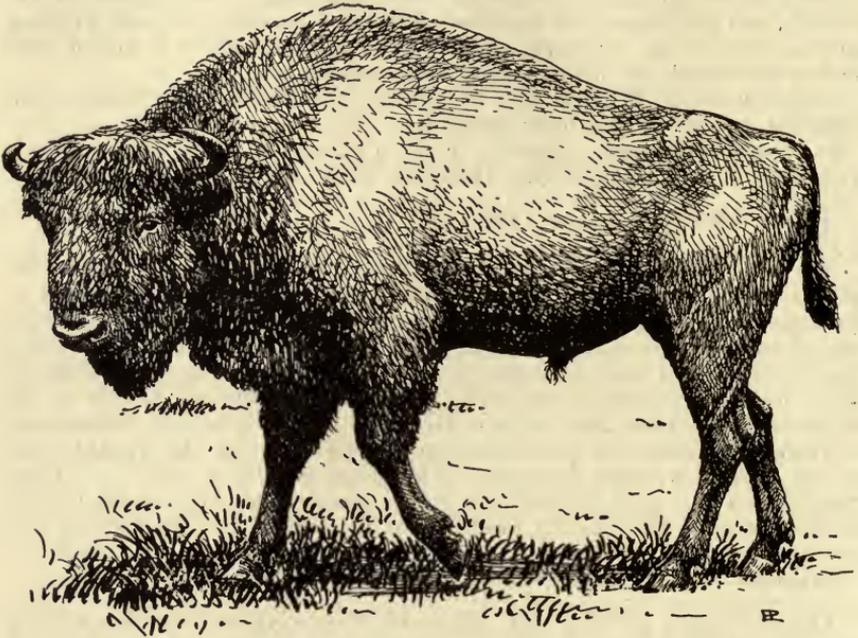


FIG. 51.—Caucasian Bison (*Bison bonasus caucasicus*)

advocated by Groeben (1929). Unfortunately, it seems doubtful whether any pure-blooded Caucasian Bison survive in zoos or preserves; at any rate, there are probably not a sufficient number to perpetuate this racial stock in an undiluted condition.

**Wild Indian Buffalo. Arna (male), Arni (female)
(Hindustani)**

BUBALUS BUBALIS ARNEE (Kerr)

Bos Arnee Kerr, Linnaeus' Anim. Kingdom, p. 336, pl. facing p. 356, upper left-hand fig., 1792. ("India north from Bengal"; type locality restricted by Harper (1940, p. 326) to "Kuch Bihar.")

FIGS.: Inverarity, 1895, pls. A-C; Lydekker, 1898c, pl. 9, p. 119, fig. 25; Lydekker, 1900, pl. 2, figs. 5, 5a, p. 75, fig. 10; Lydekker, 1913c, vol. 1, p. 42, fig. 15; Van der Byl, 1915, pl. 35; Am. Mus. Nat. Hist. Sci. Guide 118, ed. 2, p. 113, 1943.

During the past few decades the Wild Indian Buffalo has suffered serious reduction in numbers. It "requires strict protection if it is not to be exterminated" (Bombay Natural History Society, *in litt.*, December, 1936).

"General form heavy, body massive, legs thick and short, hoofs large. Tail reaching the hocks Hair on the body very thin, especially in old animals. . . . Head carried very low. . . . Horns very large, flattened, transversely rugose, trigonal in section, tapering slowly and gradually from the base, curving at first upward, outward, and slightly backward from the plane of the face, the curve increasing towards the ends, where the horns curve inwards and a little forwards. . . . Colour throughout dark ashy, almost black. The legs are sometimes whitish Horns black." (Blanford, 1891, p. 492.) The height at the shoulder may reach 6 feet.

Owing to the uncertain status of the Long-horned Indian Buffalo (*B. macrocerus*), it is difficult to state the maximum length of horn in *B. b. arnee*. Inverarity (1895, p. 41) considers a 57-inch horn unusually long for a Buffalo of the Central Provinces.

Blanford (1891, p. 492) gives the range (without regard to subspecies) as "plains of the Brahmaputra and Ganges from the eastern end of Assam to Tirhoot, and the Terai as far west as Rohilcund, the plains near the coast in Midnapore and Orissa, and also plains in the Eastern Central Provinces (Mandla, Raipur, Sambalpur, Bastar, and other districts) as far south as the Godávári and Pranhita rivers, and perhaps a little beyond."

Blanford adds (p. 493): "Buffaloes associate in herds, often of large size. I have seen 50 together, and have heard of much larger assemblages. . . . They commit great havoc amongst growing crops. Sometimes a herd or a solitary bull will take possession of a field and keep off the men who own it. . . . A herd will attack a tiger or other dangerous animal without hesitation."

Kinloch (1892, p. 124) refers to the Buffalo as "extremely abundant" in Assam. "It is also to be met with in suitable localities on the banks of many of the great rivers and swamps in Bengal Proper, and immense herds inhabit the unreclaimed portions of the Sunderbuns."

"The buffalo, though by no means so bloodthirsty and dangerous an animal as he is generally described to be, charges sufficiently often to render his pursuit on foot pleasureably exciting. In fact, I think, he is more likely to charge when unwounded than any animal I know." (Inverarity, 1895, p. 43.) Some of these charges result fatally to the persons attacked.

The general range at present is said to be nearly as extensive as in Blanford's time, though locally reduced. "The numerous herds

. . . , once seen in the C[entral] P[rovinces], are now a mere tradition" (Anonymous, 1933, p. 31).

"The sparsely populated south [of the vast tract of Vizagapatam and Jeypore] is the only place in the Madras Presidency where the buffalo is found" (Richmond, 1935, p. 221).

In Madras "fears are entertained for the existence of the Buffalo. Found in any numbers only in the Government Reserved Forests. In these nothing may be shot except under licence." (Chief Conservator of Forests, Madras, *in litt.*, November, 1936.)

In Hyderabad State "a few buffalo are said to occur in the Eturnagaram Range of the Mūlūg Talūka (Warangal District) but their numbers are very small. The shooting of buffalo and gaur has been totally prohibited for some years past, owing to which they have, for the time being, been saved from extinction." (Salim Ali, 1935, p. 231.)

The Chief Conservator of Forests of the Central Provinces writes (*in litt.*, July, 1937):

"This animal has evidently never existed in the majority of the Central Provinces forests area as it demands large grassy plains with plentiful water supply. . . . The past distribution was probably based on the present one viz. the south-east portion of the Central Provinces. Their western limits are the Feudatory States, just east and north-east of Balaghat District. From these states, Buffalo have always occasionally wandered into the Balaghat District and the Banjar Valley of the Mandla District. From North Raipur Division down to Bastar State is another locality holding Buffalo. At present a few survivors of the herds which formerly ranged in both Chanda and South Chanda exist in South Chanda. The Buffalo have within the last 40 years disappeared from the Zamindari areas north of Balispur as from many other tracts. . . .

"The causes of depletion (and extinction in many localities) are the former slaughter (with poisoned arrows) by the aboriginal population for the sake of the hides (which became saleable when the country was even slightly opened up), the spread of cultivation in the comparatively few areas suitable for them and of epidemic disease (to which they are as liable as the domestic cattle with whom they not infrequently associate).

"Hides and meat are saleable.

"Protection of this species in the Government forests has been rigid in the past and still is. In some districts total prohibition has been in force for several years. . . . The prohibition . . . has saved the few remaining herds, the survival of which now depends on the ability of the species to recover from epidemic diseases."

J. W. Nicholson, Conservator of Forests, reports (*in litt.*, December 23, 1936) for Orissa: "Rare probably owing to lack of natural habitats suitable to their existence. Buffalo used to exist in Sambalpur district but they were exterminated and the only known surviving herds in Orissa are one or two in Patna State. I heard a few months ago that some have since returned to the West of Sambalpur district but I have not been able to confirm the statement. Otherwise there are no buffaloes within British Orissa." This report is supplemented by A. F. W. Dixon (*in litt.*, January 23, 1937): "I am to add that a few buffaloes are to be found in the Malkangiri Taluk of Koraput District (Jeypore Estate)."

The Government of Bihar reports (*in litt.*, December, 1936): "Is now extinct in Bihar, except for a herd in North Bhagalpur, which is however believed to be descended from domesticated animals. Was formerly found in Singhbhum, but has not been known there for 60 years or more."

The Buffalo's status in Bengal is summarized by the Senior Conservator of Forests (*in litt.*, September, 1937): "Former range: Jalpaiguri Forests (common) and Buxa Forests (no information). Present range: Torsa forests of the Jalpaiguri Division (still found) and Buxa forests (20). Causes of depletion: poaching and rinderpest infection from cattle. A game sanctuary to the extent of 26 sq. miles is being maintained in the Buxa Forests; grazing of domestic cattle has been prohibited."

There seems to be some question as to whether the Buffaloes of Ceylon are truly wild or merely feral descendants of introduced domesticated animals. Blanford (1891, p. 492) speaks of them as wild and abundant in northern Ceylon, and Lydekker also (1913, vol. 1, p. 43) refers to them as wild. A divergent view is expressed in the following account received from the Ceylon Game and Fauna Protection Society (*in litt.*, October, 1936):

"Wild Buffaloes are still very plentiful in certain areas of the lowlands. In the Yala Sanctuary and surrounding reserves, they are very numerous, and may be seen in large herds at any time. In the Wilpattu Sanctuary, in the northwest, and the Veddichchai reserve, in the northeast, a few herds are still to be found and there are also herds in some of the most remote jungle tracts in other parts of the lowlands. In all probability, the Wild Buffalo in Ceylon is the descendant of imported stock that has escaped to the jungles. Many wild Buffaloes are noosed annually and the young ones tamed for domestic purposes and a few of the larger bulls are shot by sportsmen. In the sanctuaries, the Buffalo receives the same absolute protection that is given to all other animals and in the reserves and outside, a Rs/20/-licence is required before one can be shot. It is, therefore, adequately protected in Ceylon and

its numbers are not likely to diminish greatly unless some epidemic disease breaks out amongst them."

The Chief Secretary of the Assam Government contributes the following information (*in litt.*, June, 1937): "Former range: probably most of the plains portion of Nowgong, was plentiful in Darrang, a large number in Sibsagar. In the North Cachar Hills and Kamrup. Present range: Laokhowa and Lunding reserves, in Kuki reserve during rains and along the Jamuna river up to the Disama reserve during cold weather, in and near Jamuna reserve in Nowgong and along the Borpani River in the North Cachar Hills and in all about 100 in Nowgong Division. About 60 in Darrang, increasing in Siju, Chuimang and Rangbinggiri area, in Garo Hills a good number still exist, a few in the Panidehing and Deroi reserves and some herds in the Kaziranga reserve in Sibsagar, about 400 round about Nagerbera in North Kamrup. Causes of depletion: Rinderpest, poaching, opening up of land for cultivation, increase in the number of guns for crop protection. The bull improves the domestic stock with which it interbreeds. Flesh eaten by certain castes and head, horns are used as combs, buttons, drinking cups, country flutes and various other minor articles are made out of horns, bones are valued for manure, hides form articles of trade especially in the tanning industry. Mature males are protected in the reserved forests from 1st June to 31st October but in the North Cachar Hills, Garo Hills and in four mauzas of the North Lakhimpur Division these species are protected throughout the whole year. The killing and capture of females are prohibited in all reserved forests. There is a proposal for the establishment of reserves for the preservation of these species. Limitation of the number that can be shot in the forest reserves is imposed."

Peacock (1933, p. 121) writes concerning the Buffalo's status in Burma:

It is very doubtful whether the true wild buffalo still exists in Burma. One gathers from Colonel Pollock's book on shooting in Burma that wild buffaloes were very plentiful along the banks of the Irrawaddy and its main tributaries a few decades ago.

Wild buffaloes may still exist in the forests of the Irrawaddy Delta. The villagers near the Kadonkani Reserve, in the Delta Forest Division, maintained that the true wild buffalo still existed in that Reserve: in 1923 they showed me some old and very large tracks and said that the wild buffalo was a much larger and heavier beast than the domesticated one. . . . I . . . still believe that they were the last remaining members of the original wild buffalo. . . .

The last of the wild buffaloes have, no doubt, been exterminated since I heard of them in 1923.

Enemies.—The Indian Buffalo seems to have no serious enemies other than man and epizoötics. "Association with domestic cattle, grazing in wild Buffalo grounds, places these animals in constant

danger of disease to which they are most susceptible" (Bombay Natural History Society, *in litt.*, December, 1936).

Referring primarily to the domesticated animals, Peacock says (1933, p. 122): "Buffaloes seldom show any fear of tigers or panthers. They have any amount of courage and will readily charge and fight with any tiger that attempts to molest them. As a rule, tigers leave buffaloes very much alone, but a large tiger, if it happens to be very hungry, will kill a solitary buffalo."

Domestication.—Domesticated Buffaloes (*Bubalus bubalis bubalis* (Linnaeus)) of various parts of the world are generally regarded as descendants of the Wild Indian Buffalo, and it has been a common practice to apply the same technical name to both.

Hamilton Smith writes (1827, p. 393):

The Bhain of India [designated as "*Bos Bubalus*" and distinguished from the wild "*Bos Arni*"] may be regarded as the true stock of the Domestic Buffaloes of Southern and Western Asia, North Africa, and Eastern Europe. Little doubt can be raised, that in India that animal was first subdued, perhaps, by means of the intelligence and powers of the Elephant, who alone could compel it to subjection; from thence, commerce or remote military expeditions seem to have introduced it into Tartary and Eastern Persia, till by either of these means the Domestic Buffalo was found on the shores of the Caspian. Here they resided at the time of the Macedonian invasion They were found by the Mahomedan Arabs in Persia, and during their wars brought westward into Syria, and Egypt. Baron Cuvier . . . proves the pilgrims and writers concerning Palestine to have noticed them by the name of *Bufus*, early in the eighth century, and we have already seen at what period [sixth century] they reached Italy.

In India "tame buffaloes are chiefly kept for milk and for draught" (Blanford, 1891, p. 493).

"At the present day buffaloes are met with in a more or less completely domesticated state throughout the Malay countries, a large portion of China, Afghanistan, Baluchistan, Persia, Mesopotamia, Syria, Hungary, the *landes* of Gascony, Italy, and, I believe, Spain, as well as Egypt, Algeria, Tunis, and probably Morocco" (Lydekker, 1912*b*, pp. 182-183). Lydekker goes on to describe (pp. 184-186) several of the "numerous more or less well-defined local breeds" in India.

[No information is at hand concerning the numerical status of the Upper Assam Buffalo (*Bubalus bubalis fulvus*¹ (Blanford)), which is distinguished by its dun color and by skull characters. "The range includes the Mishmi Hills as well as Upper Assam" (Lydekker, 1913*c*, vol. 1, p. 46).]

¹ *Bos bubalus* var. *fulvus* Blanford, Fauna Brit. India, Mammalia, p. 492, 1891; type locality, "Upper Assam."

Long-horned Indian Buffalo

BUBALUS MACROCERUS Hodgson

[*Bubalus Arna*] var. *Macrocerus* Hodgson, Jour. Asiatic Soc. Bengal, vol. 10, pt. 2, p. 912, 1841 (*nomen nudum*).

[*Bubalus*] *Macrocerus* Hodgson, Jour. Asiatic Soc. Bengal, vol. 16, pt. 2, p. 710, 1847. ("India"; type locality restricted by Lydekker (1913c, vol. 1, p. 45) to "Assam.")

FIGS.: Philos. Trans. 1727, no. 397, pl., figs. 2, 3; Griffith, Anim. Kingdom, vol. 4, pl. facing p. 366, fig. 2, 1827; Proc. Zool. Soc. London 1855, Mammalia, pl. 11; Ward, 1935, p. 313, fig.

Extremely meager information is available concerning this animal, which now seems to be considered extinct.

It was distinguished by Hodgson merely on the length and shape of its horns. He speaks (1847, p. 710) of both long-horned animals (*macrocerus*) and curve-horned animals (*speirocerus*) being found in the wildernesses of India as well as in the cow-houses. "The length of the horns of *Macrocerus* is sometimes truly enormous, or 6½ feet each. There is such a pair in the British Museum, and another pair I saw in Tirhut." He also says: "Whether they be separate species or merely varieties, I shall not venture to decide, but I incline to regard them as species."

The apparently sporadic occurrence of this form in the domesticated as well as in the wild herds of Buffaloes suggests that it is not entitled to recognition as either a species or a subspecies, but represents merely an individual variation in both *Bubalus bubalis bubalis* and *B. b. arnee*.

"The alleged difference [between the two forms] . . . is certainly not sufficient to warrant their receiving different scientific names" (Kinloch, 1892, p. 124).

Lydekker remarks (1913c, vol. 1, p. 45): "Characterized by the great length and outward direction of the horns, which turn upwards only towards the extremities. Whether the difference in this respect from the typical representative of the species is of racial or merely of dimorphic value, has yet to be determined.

"These long-horned buffaloes are natives of Assam and Kuch-Bihar; but horns of a very similar type occur in Malaya, although it is not known whether they belong to wild or tame animals."

"Both types may be found together in the same herd and there is much inter-grading between the two forms. . . . The largest known horn—a cow's—is 77¾ ins. in length. Giants of this size must be exceptional." (Anonymous, 1933, p. 31.)

In Assam "the great-horned variety, *macroceros*, formerly existed on the Monas, but had been practically shot out before the formation of the Sanctuary. The writer was fortunate enough to meet the last survivor, a well-known cow, at least a hand higher than

the ordinary sized bull with which she was consorting. The Vernay-Fa[u]nthorpe Expedition searched for this cow unsuccessfully, and she was never seen afterwards." (Milroy, 1934, p. 102.)

Ward (1935, p. 308) refers to *macrocerus* as "probably now extinct."

Indo-Chinese Buffalo

BUBALUS BUBALIS subsp.

FIGS.: Acad. Nat. Sci. Philadelphia, 1931 Year Book, p. 34, fig; Field Mus. News, vol. 3, no. 3, p. 1, fig., and vol. 3, no. 5, p. 1, fig., 1932; Jour. Bombay Nat. Hist. Soc., vol. 36, no. 4, suppl., pl. 7, 1933.

The question as to whether truly wild Buffaloes occur in French Indo-China and Siam does not seem to be definitely settled. If they do exist, the question of subspecific designation also remains unsettled. On the other hand, there is no doubt whatever as to the occurrence in Indo-China of Buffaloes that are at least feral.

Siam.—Flower (1900, p. 370) refers to the Buffalo as "wild or feral in parts of Burma, Siam, and the Malay Peninsula." He had information of "Buffaloes near Pailin, in Siam, descendants of some that ran wild about fifty years ago."

According to Gyldenstolpe (1919, p. 173), "some herds of semi-domesticated Water Buffaloes occur in Siam, where they have been recorded from Muang Pimai in Eastern, from Pailin in South-eastern, from Sam Roi Yot in South-western, and from the neighbourhood of Raheng in Central, Siam, but really wild Water Buffaloes do not occur in the country."

In 1931 protection of the female only throughout the year was recommended by the Siam Society.

Guehler says (1936, pp. 171-172) that in 1935 "we . . . met a herd of wild buffalo far up on the Me Wong near the Burmese frontier."

French Indo-China.—"In Cambodia I saw the tracks of buffalo about E. Long. 105°, and the guides with me stated that these were wild animals" (Elwes, 1914, p. 111).

The Résident Supérieur of Cambodia writes (*in litt.*, November 20, 1936) that the Buffalo is observed in all forested parts of the country, and specifically in nine different provinces. Hunting is limited to males, in a certain number and at a certain season. There is no danger of extinction.

In Cochin China the former range included the Cochin China delta, and the Provinces of Tayninh, Thudaumot, Bienhoa, and Baria. The present range includes the northern part of Tayninh and Thudaumot and the eastern part of Bienhoa. The present numbers are about 1500. The Buffalo is of interest as a big-game

animal, and there is occasional economic utilization of the hides. Three males may be killed on a license, but females are protected. (Roche, *in litt.*, December, 1936.)

P. Vitry (*in litt.*, December, 1936) gives the following information for Laos. Even 25-30 years ago the Buffalo was not very numerous. About 1910 one or two herds were observed below Ban Houeisai on the left shore of the Mekong, the same number in a great forest south of Savannakhet near Sebang Nouane, and a few somewhat more important herds on the east and southeast of Bassac and on the Cambodian border along the Mekong. These are the only places where a few individuals may perhaps still exist. The natives do not seem to have been particularly interested in killing them, although the meat, horns, and hide are in some demand. Since the animal is almost extinct, complete protection would not change the situation. The country does not seem to form a favorable habitat, with the possible exception of the Boloven Plateau. Although feral domesticated animals seem to thrive there, Wild Buffaloes are not known to have been observed.

James L. Clark (*in litt.*, June 26, 1936) refers to two great game areas where Buffaloes still survive. "One is the plains of the Lagna River, 125 miles northeast of Saigon; the other is Cioba, in Annam.

"In spite of all the loose shooting . . . , the game generally, with the exception of the buffalo, is holding its own very well. . . .

"On account of their being confined to a very limited type of habitat, the buffalo are really in danger of extinction.

"Defosse [a professional hunter] told me that the game had been tremendously plentiful there in the early days, but about 1912 rinderpest came in and wiped it out in great numbers; and again about 1920 rinderpest came and again destroyed the buffalo.

"Louis Defosse told me that his father must have shot 2,000 or 3,000 of these wild buffalo for hides, which he sold for 25 piastres each. At this time, which was 20 years ago, they were there in thousands and the whole plains were sometimes covered with them."

Malay Peninsula.—"Malayan *Bubalus* are feral and need no protection" (F. N. Chasen, *in litt.*, March 31, 1937).

Bornean Buffalo

BUBALUS BUBALIS HOSEI (Lydekker)

Bos bubalis hosei Lydekker, Wild Oxen, Sheep, & Goats, p. 126, 1898. ("Borneo"; type locality restricted by Lydekker (1913, vol. 1, p. 46) to "Sarawak, Borneo.")

Very meager information is available as to the numerical and even the systematic status of this animal. Authorities do not agree as to whether it is an aboriginally wild form. It is included here mainly to round out the account of Asiatic and Malayan Buffaloes.

"Size small, the height at the shoulder being about 3 feet $8\frac{1}{2}$ inches, with relatively short horns, which are continuous with the plane of the forehead, without any backward curvature. General colour ashy-black; the lower lip, a narrow gorget on the throat, the fore-legs from above the knees downwards, the front of the thighs and of hind legs below hocks, except for a triangular patch on the fetlocks, dirty white." (Lydekker, 1898c, p. 126.)

"This form is represented by a mounted specimen [the type] in the British Museum sent by Mr. C. Hose from Borneo, purporting to be that of a wild animal. . . . Mr. Hose mentions that buffaloes exist in a wild state on the Miri and Baram rivers, and it is quite as probable that there should be a native race of buffalo in Borneo as in the Philippines. Accordingly, the present form is provisionally reckoned as such." (Lydekker, 1898c, p. 126.)

It is remarkable that Hose's own account of the Buffalo's structure and habits, in his *Mammals of Borneo* (1893, pp. 64-65), is merely a copy of Blanford's account (1891, pp. 492-493) of the Indian Buffalo, and hence has no particular bearing on the Bornean form.

"The well-known Water-Buffalo, *Bos bubalis*, has been domesticated by the inhabitants of the northern parts of Borneo, and is quite a familiar object of the country-side. Two or three herds have run wild at the mouth of the Baram River, and have afforded exciting sport to not a few of the Sarawak Government officials." (Shelford, 1916, p. 46.)

In discussing the question as to whether certain Buffaloes of the Malay Peninsula are truly wild or merely feral, Lydekker remarks (1912, p. 228): "A somewhat similar degree of uncertainty obtains with regard to the buffaloes found wild in parts of Borneo."

Banks (1931, pp. 37-38) writes that "the Buffalo is found wild in various places in Sarawak notably at Baram Point and at Tanjong Sirik, though it has occurred at other localities such as the Ulu Mukah"; he maintains that "the wild ones differ in no way from the tame ones," and that it is "likely that there are no indigenous buffaloes in Borneo."

Ward (1935, p. 308) apparently limits the range of the Bornean Buffalo to "the neighbourhood of the Miri and Baram Rivers."

The type description of *hosei* differs so decidedly from descriptions of the domesticated Indian Buffalo (*B. b. bubalis*) that the two can scarcely be regarded as identical.

Mindoro Buffalo; Tamarao

ANOA MINDORENSIS (Heude)

Bubalus mindorensis Heude, Mém. Hist. Nat. Empire Chinois, vol. 2, pp. 4, 50, 1888. ("L'île de Mindoro," Philippines.)

Figs.: Meyer, 1896, pl. 7; Steere, 1891, pls. 24, 25; Lydekker, 1898c, pl. 10; Worcester, 1898, p. 403, fig.; Taylor, 1934, pl. 25; Field Mus. News, vol. 7, no. 7, p. 4, fig., 1936.

As a distinctive member of the Buffalo group, confined to a single island in the Philippines, the Tamarao enlists our interest. It has suffered depletion in the past, and its restricted insular range increases our concern for its future. Recently, however, it has been made the subject of special protective legislation.

"A small, stoutly built species, in many respects intermediate between *B. bubalis hosei* and *B. depressicornis*. Horns short and stout, with deep irregular grooves and pits on the surface, directed mainly upwards, with the tips somewhat incurved. . . . General colour ashy black, sometimes tending to brown; a triangular patch on inner side of eye, one or two spots on side of lower jaw, lower lip, in some cases one or two gorgets on throat, inner side of ear, and a band or patch above hoof, whitish or greyish white. . . . Shoulder height about $3\frac{1}{2}$ feet." (Lydekker, 1913c, vol. 1, p. 47.) Length of horn on front curve, up to $16\frac{1}{2}$ inches (Ward, 1935, p. 312).

Steere (1889, pp. 414-415) writes as follows: "The animals . . . come out upon the sandy reaches of the rivers at night . . . , and gather together in bands of some size. They separate by day going two or three together, or solitarily. . . .

"The domestic Buffalo (*Bubalus indicus*) . . . has escaped from its owners in the island of Mindoro in large numbers, and is now found wild. . . . The Tamarao and these come in frequent conflict, the Tamarao being said to attack it at first sight, and, though much smaller, being quicker and stronger, to drive the Buffaloes back."

Steere gives a further account in another paper (1891).

Meyer (1896, pp. 13, 15) refers to the Tamarao as apparently numerous and distributed throughout the island.

Whitehead (in Thomas, 1898, pp. 410-411) writes: "This interesting little Bovine is not uncommon in the huge virgin forests that cover nearly the entire island of Mindoro. It is, however, difficult to hunt the animal successfully, unless a number of beaters, accompanied by good dogs, are employed. . . . The aborigines of Mindoro told me that they never attack the 'Tamarao,' being much too afraid of it; the only reduction of its numbers is caused by a few sporting Spaniards and one or two professional Indian hunters."

Worcester (1898, pp. 364-425) gives an extended account of hunting this animal in the wilds of Mindoro, and adds (p. 513): "It

lives in the densest jungles. It voluntarily attacks and kills the much larger *carabao*. If trapped, it will usually kill itself in trying to escape, and in any event will refuse to eat. It is said that its young calves, when captured and put to suck to a tame buffalo, will not only refuse to eat, but will attempt to attack their foster-mother. Although the *timarau* is abundant in Mindoro, it is seldom killed, on account of its wildness and pugnacity. Its flesh is good eating."

In a recent manuscript Pedro de Mesa gives the following account: "The Tamarao is the king of the forests of Mindoro, being very furious though wild. It fights to the last breath and kills human beings as well as other animals, especially when it is in a disadvantageous and dangerous position and sees its foes. But when it smells or notices a person at a distance, it tries to run away if there is a chance to do so. . . . The Tamarao is so wild that it can not be tamed. . . ."

"The Tamarao is mostly found in Mount Halcon and Calavite Mountains, and in the interior forests of Mindoro, as well as in the forests near San José, Mansalay, and Bulalacao in the south."

He adds that the natives capture the animal by means of rope snares suspended from trees, corral traps, and pitfalls, into all of which the animals are driven. Desperate and occasionally fatal encounters with the Tamarao are experienced by the natives. The Government is now trying to preserve this species. According to an executive order of the Governor-General, a hunter is allowed to take only one Tamarao per year. Calavite Mountain is a reserve, in which no hunting of this animal is permitted. Sportsmen from various countries are attracted to Mindoro to hunt the Tamarao.

Theodore Roosevelt (1934) and a companion secured three specimens in the southern part of Mindoro, where the species appeared to be moderately common.

The Tamarao "is in danger of early extinction." In recent years A. W. Exline has obtained three specimens for the Field Museum. (Field Mus. News, vol. 7, no. 7, p. 4, 1936.)

The Philippine Bureau of Science reports (*in litt.*, April, 1937) that although depletion of the species is observed by everybody concerned, there are no statistics available to prove it. Poaching for food and the settlement of a large part of its former range are the two main causes of depletion. Formerly, during the open season in January, the taking of one male was allowed but females were protected. Since 1936 both males and females are completely protected, except that they may be killed for the protection of person or property, or for scientific purposes duly authorized by the Secretary of Agriculture and Commerce.

About 15 years ago, when rinderpest was raging among the Carabaos of Mindoro, the Tamaraos were also affected. In the meantime the rinderpest has been brought largely under control. (E. D. Merrill, oral communication, 1938.)

Common Anoa

ANOA DEPRESSICORNIS (Hamilton Smith)

A[*ntilope*] *Depressicornis* Hamilton Smith, Griffith's Cuvier's Anim. Kingdom, vol. 4, p. 293, 1827. ("Island of Celebes"; type locality here restricted to the vicinity of Menado, northeastern Celebes.¹)

FIGS.: Quoy and Gaimard, 1829, pl. 20; Quoy and Gaimard, Voy. Astrolabe, Atlas zool., Mamm., pl. 26, 1833; Gray, Gleanings from Knowsley Menagerie, pl. 30, 1850; Schlegel, Handleiding Dierk., Atlas, pl. 5, fig. 5, 1857; Vogt and Specht, 1883, p. 337, fig.; Royal Nat. Hist., vol. 2, p. 207, fig., 1894; Lydekker, 1898c, pl. 10 and p. 133, fig. 26; Lydekker, 1903, pl. facing p. 304; Ouwens, 1911, pl. 2.

Evidently the Anoa of Celebes are at least less numerous than formerly, and F. N. Chasen writes us (*in litt.*, March 31, 1937) that the two species "are certainly worthy a place in your list."

Owing to the long-standing confusion in the systematics of these animals, and to the vagueness of many of the records as to locality, it is frequently impossible to differentiate between the two forms in the literature. However, as a provisional arrangement, all Anoa of Celebes, except those of certain mountain areas in the western part, will be referred to *depressicornis* (*cf.* distributional map in Mohr, 1921, p. 212).

The height at the shoulder is about 3 feet 3 inches; limbs rather short, body plump, neck thick; tail reaching about to the hocks; young animals covered thickly with woolly hair; skin of old ones almost completely bare; color of adults varying from dark brown to blackish, often with white areas on lower limbs, throat, hind part of neck, in front of eyes, on sides of lower jaw, and on inner surface of ears; under parts generally light brown. Horns up to $15\frac{3}{8}$ inches in length along outer curve, ringed and triangular at the base, nearly straight, and directed upwards and outwards nearly in the plane of the forehead; tips sharply pointed. (Lydekker, 1898c, pp. 132-133.) Tail, 11 to $11\frac{1}{2}$ inches (Quoy and Gaimard, 1830, vol. 1, p. 136). The white areas in the pelage appear to be a variable feature. The horns are much longer than in *fergusoni*; those of the type were described as "ten inches long."

Heller (1892, p. 4) refers to the Anoa as common in Gorontalo, northern Celebes. He also says (p. 6) that it is retreating before

¹ Cf. Weber (1890-91, p. 112): "Hitherto this curious animal has been known only from North-Celebes." The first definite locality mentioned in the literature seems to be Menado (Quoy and Gaimard, 1829, p. 426).

advancing culture more and more into the interior of the island, abandoning coastal areas where it was previously common.

Weber (1890-91, pp. 112-113) gives the following information, without differentiating between the two species now recognized:

Hitherto this curious animal has been known only from North-Celebes. But without question it is spread over the whole island. I heard of it first . . . in South-Celebes, where the Prince of Sidenreng told me that it was found in the central part of Celebes. Afterwards . . . different people told me, that it was met with in Bingkoka, one of the provinces of the

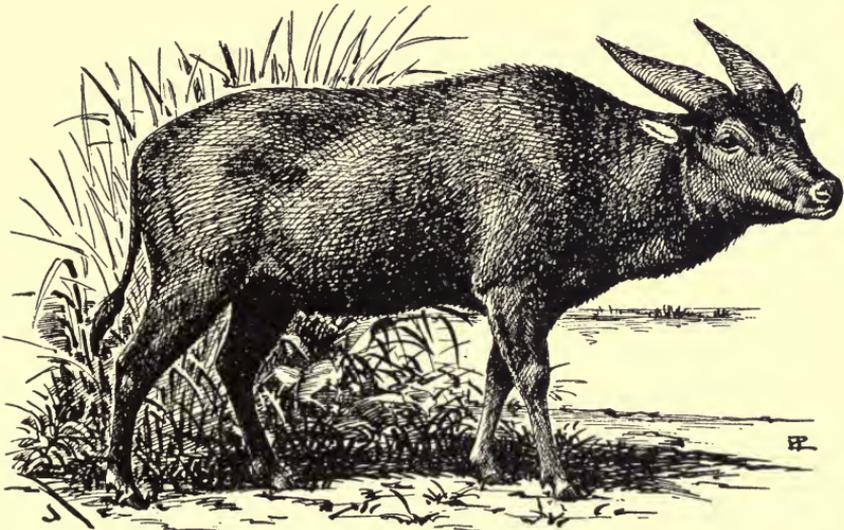


FIG. 52.—Common Anoa (*Anoa depressicornis*)

principality of Luwu, situated in the south-eastern peninsula of Celebes. Here it extends up to the small island of Kubuna, south of island Muna near the well known island Buton. . . .

Also on the south-western peninsula of Celebes Anoa is living, but as far as I could make out only on the peak of Bonthain. . . .

The fact, that Anoa is spread over the whole island of Celebes, although it is wanting in many places, is of much interest. . . .

From 1893 to 1903 P. and F. Sarasin (1905, vol. 1, pp. 67, 73, 154, 159, 170; vol. 2, pp. 6, 48) encountered the Anoa or its tracks in various places. It was evidently locally common in northern Celebes at that period, although it had disappeared from the vicinity of Sonder, south of Menado, since that area had been put largely under cultivation. The Sarasins also reported the Anoa about Palu and Lindu Lake (in the northwestern part of central Celebes), and spoke of many occurring in the Konaweha Basin (southeastern peninsula) [evidently *fergusoni* in the latter area].

Harry C. Raven informed me that about 25 years ago he secured about half a dozen specimens of Anoas (species not specified). He considered the animal fairly common; it occurs even in some of the more thickly settled districts. There is no doubt about its viciousness. It inhabits very dense forests and is by no means easy to come upon.

The nature reserve of Gunong Tjongkoko Batoeangoes, in the northeast of the Minahassa, is maintained more especially for the Babirusa and the Anoa (Dammerman, 1929, pp. 26, 62).

Heynsius-Viruly and Van Heurn write (1936, p. 52):

In Kolaka [southeastern peninsula] some animals weigh as much as 300 Kg. on the hoof [thus doubtless *depressicornis*, not *fergusoni*]. . . .

They live as a rule in higher remote mountainous country, such as the Bonthain district With the exception of the kind called "tokata" by the Toradja [*fergusoni*] . . ., they are very dangerous when shot at; as a consequence they are only sporadically hunted. . . .

Dwarf buffalo are still abundant in the islands south of Celebes, especially in Kendari (District Laiwoei). Elsewhere they are decreasing slowly. In Totallang it is felt that their hunting should be prohibited. The extension of the Decree on Hunting to this species is therefore desirable.

The Forest Officer for the Division of Menado reports (*in litt.*, April, 1937) that the Anoa is still quite common there.

The Forest Officer at Gorontalo, northern Celebes, writes (*in litt.*, March, 1937) that the former distribution included all areas covered with old forests in Gorontalo, and has not changed up to the present. Although the animals are now seen less frequently than previously, and have evidently been affected by the development of agriculture, no real depletion has been observed. In former days they were hunted quite commonly for food, but only in the forests in the immediate vicinity of the plantations. They are not killed by professional hunters and therefore are shot only occasionally. Hunting is here allowed practically only on permission of the Resident, and a maximum of six head is allowed on each annual license. The use of lamps, fire-lights, traps, nets, etc., is forbidden.

The Chief Forester of Celebes writes (*in litt.*, May, 1937): "I know from personal experience that this animal is common in the subdivisions of Mamoedjoe, Mamasa, Makale-Rantepao, Palopo, Boeton (mainland), Kendari and Kolaka, which seems to prove that it must also be common in Malili and Masamba. Protected according to the Game Pres. Ord. 1931."

The Forester at Blora, Java, writes (*in litt.*, February, 1937), from former experience in northern and central Celebes, that the Anoa is still locally numerous, though decreasing as long ago as 1928. The decrease is due to eager hunting for the horns and hide, and the animal is also driven away by the advancing cultivation.

It is still frequently collected for zoos. The hide [presumably of *fergusoni*] is highly appreciated everywhere in Toradja. The Koela people (Paloe Subdivision, Donggala Division) use the hide, tanned white with the tail still on, as a dancing dress. The nature reserves of G. Lokon and G. Tjongkoko Batoeangoes are of practically no use since water is lacking. Some other suitable reserve in the Menado Residency would perhaps be the means of saving the species from extermination.

The Sarasins report (1905, vol. 1, p. 159) that the Anoa are apparently not attacked by the bloodthirsty land leeches that swarm in the mountains; this is perhaps because of the toughness of their hides.

Mountain Anoa

ANOA FERGUSONI (Lydekker)

Bos (Bubalus) depressicornis fergusonii Lydekker, The Field, vol. 106, no. 2747, p. 378, 1905. (Type locality unknown; probably the mountains of western Celebes.)

SYNONYM: *Anoa quarlesi* Ouwens (1910).

FIGS.: Ouwens, 1910, frontisp., and 1911, pl. 1; Lydekker, 1912, pl. 23; Mohr, 1921, p. 210, fig.; Dammerman, 1929, p. 27, fig. 7.

Scarcely any information is available as to the numerical status of the Mountain Anoa, which appears to have a much more restricted range than the Common Anoa. From the nature of its haunts, it perhaps enjoys more security than the latter.

The name *fergusoni* was unfortunately based upon a zoo animal of unknown origin. "The height of the female is only 27 in., and that of the male 29½ in. Both animals are brown, and both show spots on the face, while in both the tail does not reach nearly to the hocks." (Lydekker, 1905, p. 378.) They are further described as woolly-coated when young.

Ouwens (1910, p. 7) was evidently not aware of Lydekker's *fergusoni* when he described *Anoa quarlesi* from the high forested mountains of the central region of Toradja. (These mountains lie near the northwestern angle of the Gulf of Boni.) The essential characters given for *quarlesi* are: pelage uniform light brown, except for small light spots on all limbs above the hoofs; hair long, soft, and woolly; tail short, reaching scarcely more than halfway to the hocks; inner surface of ears dark brown; height at shoulder, 25 inches; length of tail, 7 inches; horns, about 6-6½ inches.

The two descriptions are in such close accord as to make it appear extremely probable that *quarlesi* is a synonym of *fergusoni*.

Practically the only information we have on the range of the Mountain Anoa is furnished by Ouwens (1910, pp. 6-7; 1911,

pp. 452-453). The two living cotypes of *quarlesi* came, as mentioned above, from the mountains of Toradja. The same small form occurs in the high districts of Binoewang (on the west coast of Celebes, at about lat. 3° 30' S.). Even the natives distinguish it from the Common Anoa by a name signifying "Small Anoa." The large form alone occurs in the swampy lowland woods of Malili Rongkong and Kolaka (on the southeastern peninsula), and not in the mountains. Specimens of the latter are recorded from Malili and the island of Buton.

Thus *fergusoni* appears to be a dwarf form restricted, as far as known, to the mountains of western Celebes (*cf.* distributional map in Mohr, 1921, p. 212). In the absence of any definite evidence of intergradation with *depressicornis*, it may rank as a full species.

Ouwens remarks (1910, p. 2) on the gentle nature of the present species, as compared with the viciousness of the Common Anoa. Heynsius-Viruly and Van Heurn (1936, p. 52) refer to it as "the kind called 'tokata' by the Toradja (perhaps a distinct species)," and remark on its not being dangerous.

P. and F. Sarasin (1905, vol. 2, p. 318) report Anoa as numerous about the high Peak of Bantaeng [or Bonthain] (near the tip of the southwestern peninsula), where the natives pursue them with dogs and spear them. This suggests the probability of the Bonthain Anoa being *fergusoni*, since the Common Anoa would be a very dangerous animal to hunt by such a method.

Cape Buffalo

SYNCERUS CAFFER CAFFER (Sparman)

Bos caffer Sparman, Kongl. Svenska Vet.-Akad. Handl., Stockholm, vol. 40, p. 79, 1779. (Sunday River, Algoa Bay, Cape of Good Hope.)

SYNONYMS: See Allen, G. M., Bull. Mus. Comp. Zool., vol. 83, pp. 551-552, Feb. 1939.

FIGS.: Illustr. London News, vol. 99, no. 2583, p. 1 (insert), 1936 (col. photo., Addo Bush); Roosevelt and Heller, Life Histories of African Game Animals, vol. 1, pls. facing pp. 406, 412, 1914 (East Africa); Rowland Ward's Records of Big Game, ed. 10, pl. facing p. 300 (horns), 1935.

In spite of the many names applied to the buffaloes of Africa, there seem to be but two really valid forms of the larger open-country species: the typical one of southern and eastern Africa and a northern and eastern race (*aequinoctialis*). The smaller animal of the Congo basin is at present regarded as a distinct species, *S. nanus*, the Dwarf or Forest Buffalo. The typical form is now gone from much of its former range in southern Africa but is still plentiful in suitable localities over the eastern parts of the continent, while the northern race also is locally common. It will suffice to call attention merely to the present status of the typical race.

W. L. Sclater's (1900) excellent description follows: "General appearance bulky and oxlike, with no marked ridge or hump at the shoulders; body very thinly covered with black hairs, rather thicker on the face, neck, and along the middle of the back, the skin, which is a dark grey black, showing through almost everywhere; head massive, facial line somewhat convex, rhinarium very large, extending well above, but not much below the nostrils, which are separated by a considerable space; skin of the throat somewhat loose and flabby, forming an incipient dewlap; ears drooping, of moderate size, rather broad, nearly naked within, hairy behind, generally much torn and slit; limbs massive, with broad and rounded hoofs and with pointed and well developed false hoofs; tail reaching the hocks, thinly clothed with short hairs ending in a considerable brush. Female smaller. . . . Young, reddish. . . . Very old animals quite hairless." The horns arise nearly together at the vertex of the skull, where they are flattened and ridged; they curve outward and down, then up and in, and slightly forward. Rowland Ward's *Records of Big Game* gives 56¼ inches as the record spread, and 41 inches or slightly over for the length on the front curve. Anything over 44 inches in width across the beams is large. In a mounted male buffalo the head and body were 9 feet 1 inch; tail, 28 inches; height at shoulder, 59 inches.

In localities where there is plenty of water and grazing, with thick bush or swamp near at hand for cover, buffaloes were "formerly found throughout the southern and eastern parts" of South Africa. Kolben states that in his time, about 1731, "they were common close to Cape Town," and Paterson at the end of that century met with them at Caledon. By 1900, W. L. Sclater wrote that "there are still a considerable number in the Addo and Kowie bush, in the districts of Uitenhage, Alexandria, Bathurst, and Albany; also in Zululand, Damaraland, Rhodesia and the Beira Provinçee. They appear to be exterminated in Bechuanaland and in the Transvaal, though a few years ago there were a good many along the Sabi River in the eastern Transvaal." There is a mounted skeleton in the South African Museum from the Addo Bush, and skulls and horns from Knysna, where it is now extinct. In Portuguese East Africa, Tanganyika, Kenya Colony and into the Sudan, buffaloes are still locally common. In some areas, as in Northern Rhodesia, buffaloes are even "increasing to an alarming extent and the country is overrun with large herds of these animals" (David Ross, *in litt.* 1936). Again, as in some parts of Tanganyika, the numbers have increased to the extent that "even its removal from the schedule would probably not reduce its numbers, provided no export were permitted of its skins" (Jour. Soc. Pres. Fauna Empire, pt. 2, p. 46, 1932). In 1933, there were said to be about 20 buffaloes in the Addo Reserve, South Africa. In

Natal, in 1934, there were about 500 on the Umfolosi Reserve and some 400 on the Hluhluwe Reserve. In the Transvaal, there were in the Game Reserve in 1902 a little over a dozen individuals, but in 1925 this number had increased in much the same degree "as domestic cattle might be expected to do under reasonably favourable conditions" and were then "well spread over much of the area in the central parts of the Reserve, between the Sabi and Crocodile Rivers" (Ann. Rept. Transvaal Game Res., 1925). By 1933 this herd was estimated at "close on 800."

South-West Africa is too arid to support buffaloes over much of its extent, nevertheless they are present along the river valleys of the northern and northwestern parts, as in the eastern and central Caprivi near the Maschi and on the lower Okavango. In times of low water they may cross over occasionally from the Angola side of the Okavango River. In Angola there are some numbers also along the Kwando and on the Cunene, while throughout the district of Benguela (lat. 12° south) they are reported in large numbers, "right up to the Congo" as well as along the southern border of the Congo basin, between "the Kasai on the west and the Lualaba on the east," but are "completely wiped out in certain regions" as the Haut Katanga and southern Bukama. . . . In one of the regions where it was most abundant—the region of Ankoro—commercial hunting has destroyed enormous quantities. The construction of the [railroad] from Bukama to the limit of Kasai was also the cause of regrettable massacres. In 1935 the native hunters employed by the coffee plantations of Katombe killed about 400 buffaloes. Each year the brush fires destroy entire troops, and the native hunters give them no respite. In and about the zones of stock raising, the buffaloes have been systematically exterminated. If it is desired to save the species" the following measures are urgent: (1) strict bag limits; (2) prohibition of commercial hunting; (3) prohibition of the employment by Europeans of native hunters for provisioning their personnel; (4) total protection in certain zones (A. J. Jobaert, *in litt.* 1936).

While thus the species as a whole is in no immediate danger, it becomes clear that its reduction is certain in the areas of settlement, whereas in agricultural regions it will more slowly be reduced, either through hunting for food or for sport by Europeans. In reserves its numbers regularly increase and may from time to time need thinning as the carrying capacity of the range is approached or the proportionate representation that appears desirable is attained. As a game animal, the buffalo is among the most dangerous and at times will even attack without apparent provocation, so that its very nature confers on it a certain immunity, while at the same

time making its too close proximity to human settlement undesirable.

Buffaloes are subject to epizootic attacks of the rinderpest, introduced into South Africa 50 years or more ago. During a severe outbreak about 1896, it wiped out all the herds south of the Okavango in South-West Africa and these have never since reestablished themselves. According to Sir F. J. Jackson, after an outbreak in 1890, buffaloes almost disappeared in East Africa and became one of the rarest animals in the country. After about twenty years, however, they gradually built up their numbers and are again locally common. As an example of this, A. B. Percival states that in the case of the El Donyo Sabuk herd, which in 1901 was reduced to less than 40 head, he counted in 1917 nearly 400, in spite of shooting; again in the Kapiti swamps of East Africa, where in 1901 he found only some 30 animals, the number had increased by 1917 to at least 200. In Uganda, in spite of the widespread ravages of the rinderpest in recent years, the species not only continues to hold its own, but is actually increasing.

G. M. A.

Wild Sheep of the Old World

The Wild Sheep of the entire world are a distinctly menaced and gradually vanishing group. The areas they occupy are for the most part beyond or above the limits of agriculture, although there is some contact or conflict with grazing domestic flocks. The menace comes from excessive hunting, on the part of both primitive peoples and those of more advanced culture. Great increase in the use and precision of firearms during recent decades has contributed largely to the present state of affairs.

While probably not more than one or two forms of Old World Wild Sheep have disappeared completely, and while some stocks in the most remote and inaccessible regions may have held their own fairly well up to the present, the next few decades are likely to be critical for a considerable proportion of the Old World forms. It is therefore important to make an inventory of the entire group, as a basis for future conservation measures. For this reason all known forms will be included in the following account, although those that seem fairly safe for the present will be accorded rather brief treatment.

Sushkin's paper (1925) furnishes the main basis for the classification employed. It does not appear logical, however, that certain subspecies of *Ovis ammon* should be widely separated from certain other subspecies, while the intervening territory is occupied by various forms of *Ovis polii*. I have therefore reverted to Lydekker's point of view, in treating all these as subspecies of *Ovis ammon*.

Cyprian Mouflon; Cyprian Wild Sheep; Cyprian Red Sheep. Mouflon de Cypre (Fr.)

OVIS OPHION OPHION Blyth

[*Ovis Musimon*] var. *orientalis* Brandt and Ratzeburg, *Getreue Darstellung und Beschreibung der Thiere*, vol. 1, p. 54, 1827. (Cyprus.¹) (Preoccupied by *Ovis orientalis* S. G. Gmelin (1774).)

Ovis Ophion Blyth, *Proc. Zool. Soc. London* 1840, p. 73, 1841. (Cyprus.)

SYNONYM: *Ovis cyprius* Blasius (1857).

FIGS.: Brandt and Ratzeburg, 1829, pl. 9, figs. 1, A; Biddulph, 1885, pl. 58, and p. 594, figs. 1, 2; Lydekker, 1898c, p. 164, fig. 31; Lydekker, 1901, p. 138, fig. 30; Lydekker, 1913a, pl. 11, fig. 2, pl. 19, fig. 2; Nasonov, 1923, pl. 4, fig. 1.

In 1936 the numbers of the Cyprian Mouflon were said to be reduced to 25 or 30 individuals. This reduction, in connection with the restricted insular range of the animal, indicates that its status has become distinctly precarious.

Horns of male yellowish brown, three-sided, curved at first upward and outward, then downward and inward; longer hairs varying from white to reddish yellow or blackish brown; eye region, stripe near the nose, muzzle, chin, ears, and a spot on throat brownish white; stripe on breast, one along flanks, and one along front of thigh blackish brown; under parts and inner side of limbs white, partly mixed with brown. Height at shoulder, about 26 inches. (Brandt and Ratzeburg, 1829, pp. 54-55.) Biddulph (1885, pp. 595-596) states that the general color above is rufous-fawn, with an indistinct saddle-patch on the ribs formed by a few scattered white hairs; front of forelegs above the knees blackish; horns 23-24 inches along fronto-nuchal edge; the fronto-orbital edge almost completely rounded off. The females are hornless (Nasonov, 1923, p. 21).

Biddulph (1885, pp. 593-595) writes of this sheep:

The Cyprian Mouflon is not found in all parts of the island, but is confined to the Troodos mountains in the western central portion, where the highest point rises to 6590 feet above the sea-level. Here the Wild Sheep have a considerable area of pine-clad mountain to wander over, disturbed only by occasional wood-cutters and peasants herding goats and sheep. At the time of the first occupation in 1878 it was supposed that the Wild Sheep had been exterminated with the exception of a single flock of twenty-five members, and a check was placed on their slaughter. Since then their numbers have increased and it may be hoped that under modified restrictions Mouflon-stalking in Troodos may long continue to be one of the sports of Cyprus.

Bate (1904, p. 348) says:

The Mouflon . . . is still found in the forests of the western part of the Troödos Range, this being the wildest and least inhabited district in the

¹ Although the authors include Persia in the range, they state that a Cyprian specimen formed the basis of their description.

island. On more than one occasion during the summer of 1902 some were seen on Olympus, the highest point in the island, and probably the most easterly to which they now roam.

During my visit in 1901 and 1902 none were allowed to be shot, and at all times a special license is necessary. In spite of this it is supposed that many are still killed by the peasants; I myself saw several skins and horns, mostly of immature specimens, that were undoubtedly illegally come by . . . As a rule the horns are hidden or thrown away in the forest, where some have been subsequently found by the police.

"It is pleasing to be able to record that a flock of some 200 Mouflon is still to be found in this Island. These animals live mainly in the forest of Paphos and are under the protection of the Forest Department of the local Government." (Editorial, Jour. Soc. Preservation Fauna Empire, pt. 8, p. 41, 1928.)

"Some 20 or 30 years ago its numbers were approximately 200. Now it is doubtful if there are more than 25 or 30 left. They inhabit the mountain range of Troodos at a height of 4,000 to 6,000 feet, and in some localities have become extinct. The reason for this depletion is . . . poaching during the winter months when the mountains are covered in snow and the Mouflon come down to lower ground for food, thus falling an easy prey to poachers. Measures are however now being taken for the stricter preservation of the species. It is hoped that their number will increase." (G. F. Wilson, *in litt.*, September, 1936.)

Anatolian Wild Sheep; Anatolian Red Sheep

OVIS OPHION ANATOLICA Valenciennes

Ovis anatolica Valenciennes, Rev. et Mag. Zool., ser. 2, vol. 8, p. 346, 1856, and Comptes Rendus Acad. Sci. [Paris], vol. 43, p. 65, 1856.¹ ("Bulgardagh," Cilician Taurus, Asia Minor.)

Figs.: Danford and Alston, 1880, pp. 56, 57, figs. 2, 3, 5, 6; Nasonov, 1911, pp. 1278, 1279, figs. 2, 3, and 1923, pl. 5, fig. 1; Ward, 1935, p. 297, lowest fig.

Our latest information on the status of this form of Red Sheep dates from about 30 years ago, when it was evidently on the decrease.

Danford and Alston (1877, p. 277) give the following description of a male, evidently from the district of Eregli and therefore virtually a topotype. "Head, neck, back, and sides, russet-yellow; belly and underparts of legs white; space before the eye, nose, chin, and undersides of the ears whitish; a dark purple-brown mark above the knee on the fore legs, and a darkish line on the chest; the ridge of the neck and back somewhat darker than the rest of the back; neck thick and bushy. . . . Height at shoulder 33 inches."

¹ According to Danford and Alston (1880, p. 59), the first of these two citations is the original description.

"In the Cilician Sheep the terminal portion of the horns are bent boldly upwards The fronto-orbital edge is not distinct, except at the base The females are hornless." (Danford and Alston, 1880, pp. 55, 58.) Length of horn on outside curve up to 30½ inches (Ward, 1935, p. 296).

Sushkin (1925, p. 148) gives the range of *anatolica* as "Cilician Taurus; Bulgar Dag; Ala Dag; and probably Anti-Taurus."

Danford and Alston (1877, pp. 276-277) give the following account (under the name of *Ovis gmelini*):

Common in many districts of the interior, particularly about the salt lakes in the Vilayet of Konia. It is also found in the elevated plain of Palanga, above Marasch, and thence ranges east and north to Kurdistan and Armenia. It is somewhat remarkable that Danford could find no trace of this animal either in the country to the north of the Ala Dag or on the wide-reaching grassy plateau between Kaisariyeh and the Black Sea.

It seems hardly ever to occur on the southern slopes of the Taurus, preferring the barer districts of the north. . . .

Specimens were obtained from the district of Eregli, where they are common, and frequent the salt-licks in large flocks. . . . The severe winter of 1873-74, which was so fatal to the tame breeds of Sheep, also destroyed a great number of the wild species.

Gmelin's Sheep is a very graceful animal, deer-like in its appearance, having long fine limbs, and in the male a thick bushy throat.

Carruthers (1915a, pp. 10-16) writes of it as follows (under the name of *Ovis orientalis gmelini*):

The difficulties encountered [in hunting it in Asia Minor] are owing chiefly to the nature of the ground, also to the gradual curtailment of "wild" country by increasing domesticated flocks. The habitat of the sheep consists of rolling downs, without breaks, with smooth, even sky-lines; also always utilized by the native shepherds and their flocks. The result of this is a most phenomenal shyness and an extreme wariness on the part of the game. . . .

This comparatively arid region [the interior of Asia Minor] has its own peculiar fauna, amongst which is an exceedingly beautiful little wild sheep (or mouflon) The traveller . . . will come into the westernmost haunts of the mouflon in the neighbourhood of Konia. . . .

There is a large area of country here [the plateau basin of inner Anatolia, north and east of Konia] which one would consider suitable for wild sheep, yet their range is very circumscribed. In 1913 . . . I traversed the north-eastern portion of the plateau between the Anti Taurus, Kaisariyeh and Angora. We never found traces of mouflon, nor could even find natives who knew of them by name. . . . Konia was once the centre of a large area of country inhabited by mouflon, for they ranged from the north-eastern slopes of Sultan Dag, south of Akshehr, to Boz Dag and other small ridges on the plains of Axylon [lat. 39° N., long. 32° E.]. In these days the mouflon are almost driven out of the western portion of this area

From the Boz Dag they range over all the country to the south and east. In the little hills within sight of the railway between Karaman and Eregli Mr J. H. Miller has seen them in numbers; while in the foothills of the main Taurus, to the south of the railway, in the same locality, several travellers have successfully hunted them These mouflon confine themselves, for

the most part, to the rolling foothills and the outlying spurs of the Cilician Taurus. They inhabit quite isolated ridges, lying far out in the plains, as well as the flanks of the main Taurus. In these localities a wide expanse of featureless country forms their retreat and saves them from extinction, instead of rugged ranges of high altitude. The mouflon apparently never go very high, even on the spurs of the Taurus. . . . The northern range of the mouflon on the central plateau of Asia Minor is probably somewhere about Akserai, to the east of Tuz Kul. . . .

The mouflon turns up again on the eastern side of the Anti Taurus in the same form, ranging, in isolated habitats, as far north as Erzerum and as far south as the Karaja Dagh between Urfa and Mardin. . . .

Mouflon are said to exist in this area [Aintab, Marash, Albistan, and Malatia], but I cannot find definite information as to the exact localities.

Armenian Red Sheep

OVIS OPHION ARMENIANA Nasonov

O[vis] ophion armeniana Nasonov, Bull. Acad. Sci. Russie, ser. 6, vol. 13, pt. 2, p. 1231, (1919) 1921. (Mountains near the town of Bayazid, sanjak of Bayazid [west of Mount Ararat], Turkey (Nasonov, 1923, p. 25).)

FIGS.: Nasonov, 1921, figs. 11, 12 (facing p. 1230), p. 1240, fig. 13, and 1923, pl. 1 and figs. 2, 3.

In the early part of the present century this sheep appeared to exist in moderate numbers, but it has probably suffered depletion in the meantime.

General color varying from reddish yellow to brownish red; throat ruff long in winter, but shorter and less developed in summer; saddle patches lacking in summer pelage but sometimes very distinct in winter; fronto-orbital edge of the horns weakly developed. The females seldom have horns; they never have throat ruff or saddle patches. (Nasonov, 1923, pp. 27-28.)

The range extends north to Alaghez; east to the mountains of the Nakhitchevan district on the left bank of the Araxes; south to the vicinity of Ordubad, the Negram Mountains, and the vicinity of Khoi (north of Lake Urmi); west to the district of Bayazid and to the Pir-Reshid mountains 60-80 km. east of Lake Van (Nasonov, 1923, pp. 25-26). These localities are in Armenia, northwestern Persia, and extreme eastern Turkey. Sushkin (1925, p. 148) summarizes the range as "Alaghez; Djulfa; Ararat; Bayazid."

According to Radde (in Satunin and Radde, 1899, p. 111), this sheep lives in summer on the lower course of the western [=eastern?] Arpatchai. In severe winters it moves in considerable numbers down into the Araxes Valley; it is then very cautious, and wanders eastward from Erivan in the foothills between Nakhitchevan and Ordubad.

Satunin (1896, p. 312) reports a Wild Sheep as pretty common in the mountains of the Erivan and Kars districts; it extends northward about to the vicinity of Novo Bayazet, west of Sevan Lake.

Satunin writes later (1904) that it is sedentary on Ararat and in the southern part of the Nakhitchevan district; but from Ararat to Sarikamish it appears only in winter; it is especially numerous on the Zor Heights (south of Igdyr) about 40 km. west of Ararat (Nasonov, 1923, p. 26).

Carruthers (1915, pp. 18, 20-21) gives the following account:

The mouflon find suitable haunts amongst these high mountain masses [south and southeast of Lake Van]. . . .

They are much more numerous and easier to stalk than the ibex They are not always easy to find. One traveller records them on a certain range and the next visitor is disappointed at finding nothing there. It is certain that they change their quarters and migrate at fixed seasons, one of the most important influences in forcing their movements being the annual migrations of the Kurd shepherds, for they come in thousands, with their flocks and herds in tens of thousands, eating up the whole country as they go by, and disturbing all the game. . . .

Captain Dickson spoke of finding many wild sheep in the ranges to the south-east of Van; other hunters have failed to find any game there at all. . . . Mr Isidor Morse tells me that he actually killed ibex and sheep on the same ground in the Ardost Dagh, at the south-east corner of Lake Van.

W. G. Heptner writes (*in litt.*, December, 1936) that this subspecies exists [within the Soviet Republic] only in a very limited region of the Armenian mountains, and that hunting is forbidden.

Erzerum Sheep

OVIS GMELINII GMELINII Blyth

O[vis] Gmelinii Blyth, Proc. Zool. Soc. London 1840, p. 69, 1841. (Blyth states that the Zoological Society of London received the cotypes "from Erzerum," but this does not necessarily indicate the exact type locality. Sushkin remarks (1925, p. 139) concerning Erzerum: "Reputed *terra typica*; no wild sheep have been found by later explorers near Erzerum and no specimens exactly similar to the type have been found elsewhere.")

FIGS.: Ann. Mag. Nat. Hist., vol. 7, pl. 5, fig. 8, 1841; Lydekker, 1901, pl. 3, fig. 5; Nasonov, 1911, p. 1276, fig. 1, and 1921, p. 1228, fig. 10.

In view of what has been said concerning the uncertain type locality, there is very little that can be added on the distribution or status of this subspecies.

"Size of an ordinary tame sheep, with a remarkably short coat, of a lively chestnut-fulvous colour, deepest upon the back; the limbs and under parts whitish, with few traces of dark markings, except a finely contrasting black line of more lengthened hair down the front of the neck of the male only, widening to a large patch on the breast; and in both sexes a strip of somewhat lengthened mixed black and white hairs above the mid joint of the fore-limbs anteriorly . . . ; tail small, and very slender; horns of the male sub-trigonal, compressed, and very deep, with strongly marked angles

and cross-striae, diverging backwards, with a slight arcuation to near the tips, which incline inwards. . . .

Horns . . . 20 inches over the curvature Around the eye and muzzle this species is whitish; the chaffron and front of the limbs are more or less tinged with dusky. . . . Female generally similar, but smaller, with no black down the front of the neck, and in the observed instances hornless." (Blyth, 1841, pp. 69-70.)

Lydekker (1913c, vol. 1, p. 80) refers to this subspecies specimens from "Khodarendikian, Asia Minor," and from "Ivuz Dagh, near Enagli, Asia Minor"—places which I have not located in any atlas. Perhaps the first of these should read "Khodavendikyar" or "Khodawendikiar," a vilayet in western Asia Minor, although Wild Sheep do not seem to have been recorded otherwise from this region. Possibly the second should read "Ibris Dagh, near Eregli"; this, however, is very close to the type locality of *Ovis ophion anatolica*. Perhaps Lydekker's colored figure (1901, pl. 3, fig. 5) is based upon the first of these specimens (*cf. op. cit.*, p. 135).

Ispahan Sheep

OVIS GMELINII ISPHAGANICA Nasonov

Ovis orientalis isphaganica Nasonov, Bull. Acad. Impér. Sci. St.-Petersbourg, ser. 6, vol. 4, pt. 1, p. 686, 1910. (Mountains in the vicinity of Ispahan, Persia (Nasonov, 1923, p. 33).)

Figs.: Nasonov, *op. cit.*, pl. facing p. 702; Nasonov, 1911, fig. 9 (facing p. 1296).

Our information on the numbers of this sheep is meager and far from up-to-date.

It is closely related to *O. g. urmiana*, but its horns are more closely curled; females hornless (Nasonov, 1923, pp. 32, 35).

Sushkin (1925, p. 148) gives the range as "mountains of southwestern Persia: near Ispahan; Range Pushti-Kuh."

"About Isfahán it is not uncommon to find wild sheep grazing in the plain near the hills" (O. St. John, in Blanford, 1876, p. 88).

In years gone by Wild Sheep were "not too plenty nor far from Ispahan" (William Lord Smith, *in litt.*, February 17, 1938).

Nasonov (1923, p. 33) records specimens from Kamyshlu (60 km. from Ispahan), from the vicinity of Dopolun (southwest of Ispahan), and from the Pusht i Kuh.

Urmian Red Sheep

OVIS GMELINII URMIANA Günther

Ovis ophion var. *urmiana* Günther, Jour. Linnean Soc. [London], zool., vol. 27, p. 374, 1899. ("Koyun Daghi, the largest island of the Urmi Archipelago," Lake Urmi, northwestern Persia.)

FIGS.: Günther, 1899, pl. 22; Lydekker, 1901, p. 140, fig. 31; Nasonov, 1911, pp. 1283, 1284, figs. 4, 5, and 1923, pl. 6, fig. 2, and p. 37, fig. 9.

Little is known of the present numbers of this sheep.

"The horns are bent outwards in a regular curve, describing a semicircle, without any trace of that spiral twist at the extremity . . . constant in the adult Cyprian Mouflon; . . . remarkably flattened and compressed in a vertical direction, with an obtuse upper and a sharp lower ridge"; the whole of the broad, flat posterior surface in the same plane; horns with transverse wrinkles and, at irregular intervals, five deep grooves; length round outer curve 500 mm. (Günther, 1899, p. 375; description based upon a cranium with horns and skin attached). Some females possess horns (Nasonov, 1923, p. 39).

Sushkin (1925, p. 148) gives the range as "Islet Koiun-Daghy in the Urmi Lake (introduced?); Mountains Kara-Dagh; north of Travriz (?) [=Tabriz?]." He adds (p. 150): "The true home of *O. g. urmiana* is unknown."

Nasonov (1923, pp. 36-39) contributes the following information: In 1916 Smirnov estimated the Koyun Daghi herd at no more than 350-400 head, and Verestchagin considered the number even less. The permission of the owner of the island was required for hunting. The island is 11 by 6 km., and the mountains are not very high. According to the Russian consuls at Urmia, the sheep were brought to the island by human agency from other places. One of the consuls, Baron Tcherkassoff, wrote that the sheep were descended from a couple of animals that had been captured alive 50 to 75 years ago by order of some princes in the district of Baba-Bagy in Kara-Dagh, and thereafter had been introduced on the island. Possibly the Wild Sheep were brought there many times and from different places. Nasonov records two specimens from Kara-Dagh, which he is inclined to consider the true home of *urmiana*.

Laristan Sheep

OVIS LARISTANICA NASONOV

Ovis laristanica Nasonov, Bull. Acad. Impér. Sci. St.-Pétersbourg, ser. 6, vol. 3, pt. 2, p. 1179, 1909. ("Laristan, southern Persia.")

FIGS.: Nasonov, 1911, fig. 10 (following p. 1296); Nasonov, 1923, pl. 4, fig. 2, and p. 38, fig. 10.

Information on the numerical status of the Laristan Sheep is lacking.

Horns subtrigonal, weak, and with edges similar to those of *O. vignei*; black line of longer hairs below neck interrupted in middle; white patches on each side of body joined dorsally. Height at shoulder about 28 inches. (Nasonov, 1911, p. 1295.)

General color of upper parts in winter dark brownish yellow; a dark band across the shoulder, with whitish patches before and behind, forming a sort of double saddle-patch; a blackish flank-band; belly white; crown, forehead, and muzzle blackish; a black streak from eye to mouth, and below this a narrower gray one; outer side of ears gray; tail whitish; front and outer side of forelegs above knees, and front of shank below white knees, blackish tawny; elsewhere lower part of forelegs and the whole of lower part of hind legs white; a strong black throat-ruff, with some brownish yellow hairs. In summer the general color changes to chestnut, with almost complete obliteration of the saddle-patch. (Lydekker, 1913, vol. 1, pp. 83-84.)

Sushkin (1925, p. 148) gives the range as "Laristan (southern Persia) and (?) probably to Persian Baluchistan."

The following remarks of St. John (in Blandford, 1876, p. 88) on Persian sheep may refer in reality to the present species: "The wild sheep of the south is found, so far as I have observed, at much lower elevations than that of the north. In Fárs I have noticed that *O. cycloceros* is generally found in the lower hills."

Nasonov (1923, p. 39) writes that the exact place of occurrence in Laristan is unknown. Some specimens taken by Zarudny in the vicinity of Kaskin, southeastern Persia, resemble the type. Thus the range may extend through the mountains of southern Persia from Laristan to Persian Baluchistan.

Elburz Red Sheep

OVIS ORIENTALIS S. G. Gmelin

Ovis orientalis S. G. Gmelin, Reise durch Russland, vol. 3, pp. 432, 486, 1774.

(Bare mountains of Gilan and highest mountains of Mazanderan, Persia; type locality restricted by Nasonov (1923, p. 42) to the eastern part of the Elburz Mountains, Persia.)

SYNONYM: *Ovis gmelini erskinei* Lydekker (1904).

FIGS.: Gmelin, 1774, vol. 3, pl. 55; Nasonov, 1910, pp. 700, 701, figs. 9, 10, and 1911, pp. 1288, 1289, figs. 6, 7, and fig. 8, facing p. 1290; Lydekker, 1913a, pl. 19, fig. 1, and 1913c, vol. 1, p. 82, fig. 25; Nasonov, 1923, pl. 8, fig. 3, and p. 37, fig. 8.

Although Nasonov (1923, p. 42) and Sushkin (1925, p. 148) recognize both *Ovis orientalis orientalis* Gmelin and *Ovis gmelinii erskinei* Lydekker, it must be noted that their type localities and general ranges are practically identical, and that no very tangible distinction can be found in the type descriptions. Accordingly *erskinei* is here considered a synonym. It would be most unusual for two species of the genus *Ovis* to occupy the same range. Possibly *Ovis gmelinii* Blyth will prove to be a subspecies of *orientalis*.

General color of head whitish; area in front of horns, and a broad band from each eye to mouth, dark red; hairs on chin dark gray and yellowish; beard with numerous bristly hairs, whitish and black; area beneath eyes with bristly black hairs, longer than those of the beard; back of head red; outer surface of ears ashy, inner surface white; hairs of back apically reddish, basally whitish; a prominent throat ruff, of long, stiff hairs, black at the tips; upper parts of limbs colored like upper part of body; lower parts of limbs like under parts of body, ashy gray, but with traces of reddish on the hind feet. Horns of male compressed and curved spirally backwards; provided all around with raised cross rings; tapering to thin and sharp tips; length, $20\frac{1}{2}$ inches. Female hornless. (Gmelin, 1774, vol. 3, pp. 487-491.)

The above type description of *orientalis* may be compared with the rather meager description of *erskinei*, which follows. "So far as can be judged from the head and neck, the colour is less distinctly red than in the Cyprian [*ophion*] and Armenian [*gmelinii*] races, while there is a distinct front outer angle to the horns, and a strongly developed dark throat-ruff in winter" (Lydekker, 1913c, vol. 1, p. 83). "The horns . . . sweep backwards in a spiral exactly the opposite to that of those of the true urial The fineness of the ridges on adult horns, the flatness of the inner surface of the latter, and the bevelling off of the front angles, are . . . characteristic The horns of the Persian sheep have a flatter front surface [than those of *gmelinii*], more or less distinctly defined from the lower surface, instead of merging imperceptibly into the latter." (Lydekker, 1904d, p. 1031.) Length of horns on front curve up to $27\frac{1}{2}$ inches (Ward, 1935, p. 298).

Sushkin (1925, p. 148) gives the range of *orientalis* as "eastern part of Elburz Mountains, Persia"; of *erskinei*, as "Elburz Mountains; Mount Savelan."

According to Gmelin (1774, vol. 3, pp. 486, 492), this animal lives in flocks in association with various goats in Mazanderan, and is confined to the highest mountains. He speaks of having been in a place where the horns, broken off in combats between the rams, almost covered the earth. The flesh is a real delicacy, but the wool is of scant value.

Blanford (1876, p. 88) records a specimen from the Elburz Mountains, north of Teheran, at an elevation of 12,000 feet. St. John (in Blanford, 1876, p. 88) refers to the animal in those days as "very plentiful everywhere."

Lydekker (1913a, p. 258) mentions "a series of heads obtained about 1904 at an elevation of some 10,000 ft." in the Elburz Range. The type specimen of *erskinei* was included in this series.

Nasonov (1923, p. 35) records specimens of "*erskinei*" from the vicinity of Dere-Kazah (12-18 km. north of Teheran), from the southwestern side of Mount Demavend, and from Mount Savelan.

Ladak Urial; Astor Urial; Shapu

OVIS VIGNEI VIGNEI Blyth

O[vis] Vignei Blyth, Proc. Zool. Soc. London 1840, p. 70, 1841. ("Little Thibet, and . . . the Sulimani range between India and Khorassan"; type locality restricted by Blyth (p. 78) to "Little Thibet," and by Blanford (1891, p. 498) to "Astor," Kashmir, India.)

FIGS.: Proc. Zool. Soc. London 1860, pl. 79 (Mammalia); Lydekker, 1898c, p. 166, fig. 32, and 1900, pl. 3, fig. 3; Van der Byl, 1915, pl. 46; Nasonov, 1923, pl. 8, fig. 4; Stockley, 1928, pl. facing p. 120.

Apparently this Urial still exists in moderate numbers.

General color rufous-brown; face "livid," without a white muzzle; a conspicuous fringe of lengthened blackish hairs down the front of the neck; belly white, bordered by a black lateral band; limbs brown, with a whitish ring above each hoof, then a dark ring. Horns subtriangular, compressed, describing three-fourths of a circle and pointing towards the back of the neck; $32\frac{1}{2}$ inches in length over the curvature. (Blyth, 1841a, p. 71.) Record length of horns on front curve, 39 inches (Ward, 1935, p. 292). Height at shoulder, 36 inches (Lydekker, 1913c, vol. 1, p. 85). The females of all the subspecies have horns (Nasonov, 1923, p. 53).

"The range extends from Astor to Zaskar, Ladak, and probably Tibet" (Lydekker, 1913c, vol. 1, p. 85). "In Zanskar and Ladak this sheep is found at elevations of from 12,000 to 14,000 feet elevation" (Lydekker, 1898c, p. 169). Sushkin (1925, p. 149) gives the distribution as "Ranges along the upper Indus as far south as Gilgit, north to Vakhan (southwestern Pamir)."

"Vast numbers of this species are driven down by the snow in winter to the branches of the Indus, near Astor, at the southern extremity of Little Thibet, where the river breaks through the chain of the Himalaya" (Vigne, in Blyth, 1841, p. 72).

"In Ladak good heads have been getting scarce of late years.

"In winter they come low down, especially near Bunji in Astor. In the old days the native hunters used to account for many at this season, but this, fortunately, is now restrained by the officials of the Game Preservation Department." (Van der Byl, 1915, p. 118.)

Burrard (1925?, p. 188) writes of this Urial:

This handsome sheep is essentially an inhabitant of the valley of the Indus. It is found in hills and mountains on both banks of that great river, and

also in the basins of most of its tributaries from Ladak to the Plains of India, but it never occurs in the basin of the Jhelum in Kashmir. . . . In Ladak it is found on both sides of the Zaskar Range Hence it follows the valley of the Indus down stream, although it is much more common to the south of the river than to the north, as far as Chilas. Between Chilas and Attock the Indus is unexplored, but as orrial occur in the hills in the neighbourhood of both these places I see no reason to doubt their being found on both banks of the river in between.

To the north-east [=northwest] they extend up to the Hindu Kush Range beyond Chitral and Gilgit.

Punjab Urial

OVIS VIGNEI PUNJABIENSIS Lydekker

Ovis vignei punjabiensis Lydekker, Cat. Hume Bequest Brit. Mus., p. 10, 1913. ("Salt Range, Punjab," India.)

Figs.: Proc. Zool. Soc. London 1860, p. 128, fig., and pl. 80 (Mammalia) ("*cycloceros*"); Stockley, 1922a, pl. facing p. 529, and 1928, frontisp.; Ward, 1935, p. 297, upper fig.

This Urial has recently shown a marked decline, in at least part of its range.

"A rather smaller and redder sheep than the last [*O. v. vignei*], with the girth of the horns seldom exceeding 10 inches" (Lydekker, 1913b, p. 10). (The girth in *O. v. vignei* is 10 to 12 inches.) Height at shoulder about 32 inches; curves of horn nearly in one plane, and tending to form a circle; ruff strongly developed (Lydekker, 1913c, vol. 1, p. 87). The record length of horns on the front curve is 38½ inches (Ward, 1935, p. 294).

"No reliance can be placed on horn characteristics, as individual variation is very great even in members of the same herd. In the Kala Chitta Range near Campbellpore, native shikaris recognise two distinct types of horn . . . ; one has a wide spiral with the points turning inwards, the other a close flat spiral with the points diverging outwards." (Stockley, 1922a, p. 529.)

Lydekker (1913c, vol. 1, p. 87) records specimens from the Salt Range, Nishapur, and Akhor Hills (north of Campbellpur), in the Punjab. Ward (1935, p. 294) records additional specimens from near Attock, near Rawal Pindi, and Kala Chitta Hills, Punjab. Sushkin (1925, p. 149) gives the distribution as "Salt Range, Punjab; perhaps also Soliman Range."

Stockley (1922b, pp. 1126-1128) speaks of hunting Urial in the Shahpur and Talagang districts and in the Nili rukh (Jhelum district), and adds:

It has always been found that on grounds where the old males have been shot off, that the heads never recover their strength, even with several years complete preservation

A possible alternative to complete cessation of shooting for five years is

closing for two or three years and then reopening to limited shooting with a higher size limit: I would recommend 26 inches. . . .

As far as relative damage by sportsmen and villagers is concerned, it must be remembered that the modern young officer has still to be educated in the ethics of sport and the principles of preservation. There is a great deal of poaching carried out by Europeans in rukhs near the railway: notably Nili and Lehri Godari. I heard of three British officers basing their operations on Tarki railway station in the middle of last October, and killing 14 rams between them. I have personal knowledge of two other cases I found that much of this was due to ignorance of the shooting regulations, and after getting the Commandant of the Musketry School at Rawalpindi to post a notice on the subject, the practice ceased to a large extent. . . .

Villagers' dogs are a fruitful source of damage, as they chase ewes heavy with young, and frequently destroy the new-born lambs. . . .

Complaints as to destruction of crops . . . were justified in some few localities before this last disastrous season.

Burrard (1925?, p. 189) regards the animal as "still fairly plentiful" in the Punjab Salt Range.

"In the first half of November I was in the oorial preserves of the Campbellpore district, and consider that the stock is one third of what it was five years ago: again due to unlicensed rifles and want of whole-time watchers" (C. H. Stockley, *in litt.*, December 12, 1933).

Afghan Urial

OVIS VIGNEI CYCLOCEROS Hutton

Ovis Cycloceros Hutton, Calcutta Jour. Nat. Hist., vol. 2, p. 514, 1842. ("The Huzarreh [=Hazara] hills," Afghanistan.)

SYNONYM: ?*Ovis blanfordi* Hume (1878).

FIGS.: Hutton, 1842, pl. 19; Jour. Asiatic Soc. Bengal, vol. 46, pt. 2, pl. 4, 1878 ("*blanfordi*"); Lydekker, 1898c, pl. 13, and 1900, pl. 3, figs. 4, 4a, p. 91, fig. 12; Lydekker, 1913a, pl. 20, fig. 1, and 1913c, vol. 1, p. 88, fig. 26.

The fact that much of the Afghan Urial's range lies beyond the ordinary reach of European hunters would seem to augur well for its survival in fair numbers to the present day. Information from some localities, however, is not encouraging.

Upper parts uniform yellowish or fawn-colored brown; buttocks, under parts, and inside of limbs white; knees and fore pasterns dirty white; face bluish gray; forepart of forelegs grayish; a black beard, interspersed with white or gray hairs, extending from the jaws to the chest. In summer the hair is stiff and short; in winter, coarser and less smooth, and of a darker shade of brown. The upper parts become interspersed with white in old individuals. Horns triangular, strongly wrinkled; curving strongly from the base, forming nearly a circle. Height at shoulder, 32 inches. (Hutton, 1842, pp. 515-516.) Hay (1840, pp. 440-441) describes an adult male from Bameean, in the Hindu Kush, as being 40 inches

in height at the shoulder, with horns 30 inches in length; he states that the female has small horns. Ward (1935, p. 294) gives the record length of horn on the front curve as $41\frac{1}{2}$ inches.

The range of this subspecies will be provisionally considered to include Afghanistan and Baluchistan, extending eastward into the North West Frontier Province of India and westward perhaps as far as eastern Persia. Sushkin (1925, p. 148), following Nasonov (1923, pp. 47-48), gives the range as "Great Balkan (Transcaspia), Kopet Dagh, and Paropamir, east to Peshawar and Kandahar," but admits (p. 150) that there is some doubt as to the identity of Kopet Dagh specimens. I prefer to follow Lydekker (1913c, vol. 1, pp. 88-89) and Ward (1935, p. 291) in not extending the range so far to the northwest. There is some indication, however, of the occurrence of this form in eastern Persia in the following remark by Kennion (1915, p. 63): "The sheep found in Seistan and the Kainat . . . seem to be very similar to the urial of Baluchistan and the Punjab." He reports (1911, pp. 128-137) moderate numbers in the Palang Koh, Seistan.

Among the localities from which Lydekker (1913c, vol. 1, pp. 89-90) records specimens of *cycloceros* are the following: Seah Koh, Afghanistan; Pishin Valley, Kelat, Pubbi Hills, and Quetta, Baluchistan; hills north of Peshawar, North-West Frontier Province; and Chitral.

"During winter" they "frequently descend to the plains and valleys [of Afghanistan] in small flocks. They are pursued by the hunters for the sake of the flesh, which is good and well-flavoured; while the horns are placed, as are those of Goats, as trophies of success, and proofs of skill, upon tombs and temples.

"When taken young they are easily domesticated, . . . and will breed readily with the domestic Sheep." (Hutton, 1842, p. 517.)

"They are gregarious in flocks of about 40" (Hay, 1840, p. 441).

Blanford (1876, p. 87) refers to this form two specimens collected at Jalk and Dizak, "Baluchistan" (now southeastern Persia), and adds: "We heard of its occurrence, and saw its tracks, close to the sea level on some low hills three marches west of Gwádar in Balúchistán, a country with an excessive summer temperature, and it is found on hills of no great height in Sind, where the climate is still hotter. It is usually met with in small herds, which keep to the slopes of hills and small valleys between the ranges." It may be recalled here that Nasonov (1923, p. 39) provisionally extends the range of *O. laristanica* eastward to Persian Baluchistan.

Thomas (in Aitchison, 1889, p. 63) records specimens "of the most pronounced *cycloceros* type" from Gulran, Kambao, Khusan, Bala-morghab, and Chasma-sabz Pass, in northwestern Afghanistan. Aitchison adds (p. 64): "This Wild Sheep . . . is very numerous

on the higher ground and lower ranges of hills throughout the Badghis, from 2000 feet and upwards. I saw a skull and horns at a *Ziarat* or shrine . . . between Kara-kainta and Kushk."

"At one time they were common in the hills round Quetta [Baluchistan], but they have been rather shot out in this neighbourhood" (Burrard, 1925?, pp. 188-189).

"Oorial (locally called '*gud*') are scattered all over the district [Zhub Valley, Baluchistan], are still fairly plentiful in spite of much shooting, and good rams are still to be met with fairly close to main roads" (Stockley, 1930, p. 567).

"The Afghan race . . . is said to include the Urial inhabiting the Khirtar range and its lower spurs in Sind" (Anonymous, 1933, p. 33).

"I am . . . on my way back from the Kirchat preserve in W. Sind. I have been to it three times before, since the War, and estimated that there were between . . . 80 to 100 oorial on the preserve, which is about 90 miles north of Karachi. . . . In 1931 . . . the local native gentry swarmed in and slaughtered the animals. . . . I reckon the stock is now under . . . 30 oorial." (C. H. Stockley, *in litt.*, December 12, 1933.)

Bokharan Urial; Panja Urial

OVIS VIGNEI BOCHARIENSIS Nasonov

O[vis] vignei bochariensis Nasonov, Bull. Acad. Impér. Sci. [Petrograd], ser. 6, vol. 8, pt. 2, p. 1130, 1914.¹ (Baljuan, Russian Turkestan (about lat. 38° 20' N., long. 69° 30' E.) (Nasonov, 1923, p. 59).)

Figs.: Nasonov, 1921, figs. 1-6 (following p. 1224), pp. 1225-1227, figs. 7-9; Nasonov, 1923, pl. 9, fig. 1, p. 58, fig. 13; Serebrennikov, 1931, pl. 4, fig. 2.

W. G. Heptner (*in litt.*, December, 1936) has no information in respect to the numbers of this Urial, but regards it as probably not threatened.

It is very near to *O. v. vignei*, but differs by its small size and thinner horns. The shape of the horns varies greatly with age. (Nasonov, 1923, pp. 57-59.)

This Urial ranges north to the upper Zerafshan, and south to the mountains about the northern tributaries of the Panja River (from about Shirabad in the west to Baljuan and Khuljab in the east). It was reported by Lazdin (1915) as absent from the Darwaz district in the northwestern part of Pamir. (Nasonov, 1923, pp. 56-57.)

Serebrennikov (1931, p. 161) mentions a young one caught in the southern foothills of the Hissar Mountains.

¹ Nasonov (1923, p. 57) also gives an earlier reference: Nasonov, For. Trav. Rep., 1913.

Transcaspiian Urial

OVIS VIGNEI ARKAL Eversmann

Ovis arkal Eversmann (*ex Brandt in litt.*), *Estest. Istoriya Orenburghsk Kraya* [Natural History of the Orenburg Government], vol. 2, p. 271, 1850. ("Typical locality Ust-Urt Plateau, Transcaspia" (Lydekker, 1913c, vol. 1, p. 91). *Cf.* Harper, 1940, p. 326.)

SYNONYMS: *Ovis arkar* Brandt (1852); ?*O. arkal* Blasius (1857); ?*O. vignei varenzovi* Satunin (1905); ?*O. arcar dolgopolovi* Nasonov (1913).

FIGS.: Proc. Zool. Soc. London 1903, p. 103, fig. 10; Kennion, *The Field*, vol. 109, p. 529, fig., 1907; Nasonov, 1913, fig. 2, facing p. 10 (*varenzovi*), p. 18, fig. 4 (*arkal*), p. 24, fig. 6 (*varenzovi*), fig. 11, following p. 32 (*arkal*), fig. 12, following p. 32 (*varenzovi*), fig. 13, following p. 32 (*dolgopolovi*); Lydekker, 1913a, pl. 20, fig. 2, and p. 266, fig.; Lydekker, 1913c, vol. 1, p. 91, fig. 27; Kennion, 1915, pl. 19; Nasonov, 1923, pl. 8, fig. 1 (*dolgopolovi*), pl. 8, fig. 2 (*arkal*).

This sheep has apparently maintained itself in fair numbers, at least in parts of its range in Russian Turkestan, and northeastern Persia.

"Size (*teste* Kennion) very large, but measurements of height not available. Horns with the front surface much flattened and sparsely wrinkled, and the two front angles strongly developed; frequently forming more than a complete circle; basal girth in fine specimens from 10 to 12 $\frac{1}{4}$ inches. Ruff almost wholly white in front in adult rams; . . . general colour of body rufous." (Lydekker, 1913c, vol. 1, pp. 91-92; description based probably upon Persian specimens). Record length of horns on front curve, 45 $\frac{1}{4}$ inches (Ward, 1935, p. 295). According to Nasonov (1923, pp. 46, 51), the females of "*dolgopolovi*" are hornless, while those of "*arcar*" are horned.

Nasonov (1923) recognizes "*O. orientalis arcar*," of the Ust-Urt Plateau; "*O. orientalis cycloceros*," extending northwestward from Afghanistan to the Kopet-Dagh and the Great Balkan; and "*O. orientalis dolgopolovi*," of the Astrabad region and the Ala-Dagh, in northeastern Persia. He considers *O. vignei varenzovi* Satunin a synonym of *cycloceros*. In view of the plasticity of this group, the range assigned by Nasonov to *cycloceros* seems unduly extensive. Evidently more material is required to settle the taxonomic status of the Urials of this region.

The combined range of the three proposed forms (*arkal*, *varenzovi*, and *dolgopolovi*) extends from the Mangyshlak Peninsula and the Ust Urt Plateau south through the Great Balkan and the Kopet-Dagh to the mountains of Astrabad and Khorassan (*cf.* Sushkin, 1925, pp. 148-149).

According to Radde and Walter (1889, pp. 1066-1067), this animal is unusually numerous in the entire Kopet-Dagh, from Tejend to the western end of the range, and likewise common in Astrabad and on the Great Balkan. It ranges northward to the

region between the Caspian and the Aral Seas, and reaches the coast of the former, as in the vicinity of Krasnovodsk. In the Kopet-Dagh they observed it mostly in flocks of 5 to 20, and occasionally of 60 to 100. In the winter of 1886-87 a hundred of these sheep were bought by a German sausage-maker in Ashkhabad.

"The best district for urial in Persia—and probably in Asia—is the hill country that lies south-east of the Caspian, where the Elburz chain is split up into a number of small spurs and subsidiary ranges, the Kopet Dagh and others. . . . On these hills I have had four stalks in a day after different herds. Once I saw a mixed herd of at least three hundred sheep that raised a cloud of dust like an army as they swept across a dry ravine, and immediately after I found a herd of forty hoary old rams." (Kennion, 1915, p. 64.) Five of Kennion's specimens from "Bujnurd, Ala-Dagh," north-eastern Persia, are recorded by Lydekker (1913c, vol. 1, p. 92).

Ogneff and Heptner (1928, p. 266) report this sheep as very numerous in many places on the mountain plateaus of the Kopet-Dagh.

There is no information with respect to the numbers on the Mangyshlak Peninsula and the Ust Urt Plateau, but the sheep of the Kopet-Dagh are still rather common (W. G. Heptner, *in litt.*, December, 1936).

European Mouflon; Sardinian Mouflon. Mouflon d'Europe; Mouflon de Corse (Fr.). Muflone (Ital.)

OVIS MUSIMON (Pallas)

Aegoceros Musimon Pallas, Zoogr. Rosso-Asiat., vol. 1, p. 230, 1811. (Type locality restricted to Sardinia (*cf.* Miller, 1912, p. 987).)

FIGS.: Pallas, 1834-42, pl. 19, fig. 7; Geoffroy and Cuvier, Hist. Nat. Mammif., livr. 1, pl. 3, livr. 19, pl. 114, 1824-42; Gervais, Hist. Nat. Mammif., pt. 2, pl. 40, 1855; Royal Nat. Hist., vol. 2, p. 226, fig., 1894; Lydekker, 1898c, pl. 12, and pp. 155, 156, figs. 29, 30; Martin, 1910, pl. 47; Lydekker, 1913c, vol. 1, p. 76, fig. 24; Millais, 1914, pl. 79; Colosi, 1933, pl. 4; Didier and Rode, 1935, p. 332, fig. 195; Pocock, 1937, p. 687, fig.; Schmidt, 1938, pl. 8.

The European Mouflon has been reduced by persecution to a mere remnant in its native range in Sardinia and Corsica and now appears to have a better chance of survival in various continental localities where it has been introduced.

General color of back and sides reddish brown; a blackish median stripe on neck and shoulders; a grayish-white patch on posterior half of sides; under parts of body and inner surface of legs dull whitish; a blackish area on front of neck, continued down foreleg nearly to hoof; a black stripe extending along the side and down the outer side of hind leg to heel; tail black above (Miller, 1912, p. 989). Height at shoulder about 27 inches. Horns forming a close

spiral curve, the tips generally bending forward and outward, but sometimes inward; length in wild specimens up to 34½ inches. Sardinian females usually with short horns; those of Corsica generally hornless. (Millais, 1914, pp. 376-377.)

"The Musmons of Sardinia and Corsica . . . live in small herds, . . . uniting occasionally into flocks of near one hundred . . . Their skins are used for various purposes, and . . . the mountaineers still convert them into vests, and a kind of cloaks, which may be the present representatives of the *Mastruca Sardorum*, noticed in the commentaries on Cicero." (Hamilton Smith, 1827, p. 324.)

In 1856 Valenciennes (p. 56) reported the species as still rather abundant in Corsica and Sardinia.

"Though by law the close time extends from November till June, the law has little force in the mountain ranges which these animals inhabit [in Sardinia], and they are shot indiscriminately, and with impunity all the year round" (Tennant, 1885, p. 195).

"Mouflon are restricted to certain mountain ranges in their native islands, and there frequent only the higher portions . . . Formerly, at any rate, mouflon were found in flocks of very large size . . . If sufficiently hung, the flesh of the rams is excellent for the table when the animals are in good condition . . . Mouflon will breed with domesticated sheep." (Lydekker, 1898c, pp. 157-158.)

It lives in small bands, and decreases day by day, being much persecuted by the Corsican hunters (Martin, 1910, pp. 47a-47b).

Millais (1914, pp. 376-378) gives the following account:

This grand little sheep holds its own in Sardinia, in spite of constant persecution; but in Corsica the numbers are decreasing, although it is well preserved on a few estates. . . .

They are seldom found in flocks of more than a dozen . . .

The native method of hunting mouflon both in Corsica and Sardinia is to drive the animals to well-known passes. This usually results in the mouflon being seen and females and young being killed, but the old rams are seldom killed in this way.

It lives in the mountains of Corsica and Sardinia in small bands, which remain by day in the most rugged spots and in the thickets (maquis). It is much hunted, and diminishes in number. (Didier and Rode, 1935, p. 334.)

"It still exists in some numbers in Corsica and Sardinia, where it is protected. But I don't know how efficiently!" (Jean Delacour, *in litt.*, July 25, 1936.)

In Sardinia the Mouflon is found especially on the Gennargentu. Its numbers appear to be rather few. Hunting is not allowed. The National Park of Gennargentu, now under preparation, will be created mainly to protect this species. It has been introduced into some reserves in Italy, including the Mount Circée National Park

in Latium. (Laboratorio di Zoologia Applicata a Caccia, *in litt.*, September, 1936.)

Mouflon introduced into the Sila Mountains, Calabria, Italy, in the middle of the last century have long since disappeared (Hecht, 1932, p. 23).

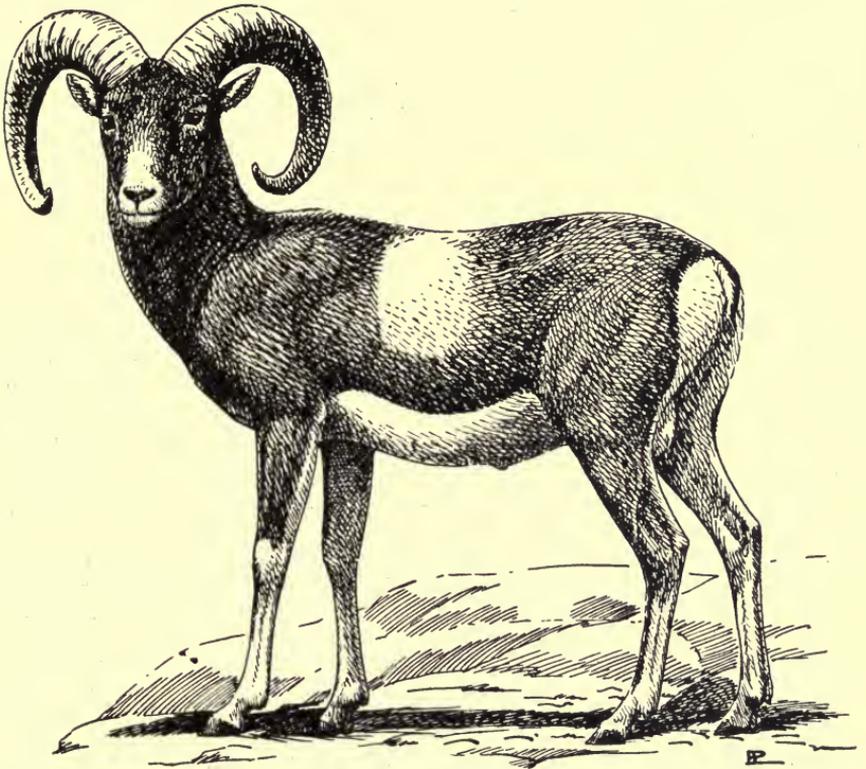


FIG. 53.—European Mouflon (*Ovis musimon*)

In past years Mouflon have been introduced in various parts of Germany (Hesse, Harz, Thuringia), and have everywhere increased satisfactorily. In the Schorfheide Reserve near Berlin there are already 50 head. (Theodor G. Ahrens, MS., December, 1935.)

In 1905, 20 Mouflon were introduced in the Harz Mountains, and by 1916 they had increased to 80 individuals. In 1912 a similar attempt succeeded in the Schaffgott district. (Krumbiegel, 1930, p. 7.)

In 1882 the species was introduced in the districts of Nyitra, Gömör, and Upper Tatra, Hungary (now Czechoslovakia). At that time it was absolutely protected. (J. Schenk, *in litt.*, November, 1936.)

In Austria it has been introduced in various places in Burgenland, Carinthia, and Lower Austria. In Salzburg there are about 200 head. Where care is taken of the animals, they seem to thrive quite well. (G. Schlesinger, *in litt.*, March, 1937.)

In Rumania the animal was introduced from 1860 on, in Ghimes, Transylvania. The attempt gave very good results; the hunting from 1871 to 1904 yielded 759 individuals. This stock was exterminated during the Communists' trouble (1918), but is now being reestablished. There have been two other very successful attempts—at Balc, Bihar, Transylvania, and on Mount Retezat in the southern Carpathians. (R. J. Calinescu, *in litt.*, September, 1937.)

Siberian Argali; Mongolian Argali

OVIS AMMON AMMON (Linnaeus)

Capra Ammon Linnaeus, Syst. Nat., ed. 10, vol. 1, p. 70, 1758. (Based upon the "Argali" of J. G. Gmelin (Reize door Siberien naar Kamtschatka 1733-43, vol. 1, p. 193, 1752) or the "*Rupicapra cornubus arietinis*" of J. G. Gmelin (Novi Comm. Acad. Sci. Imper. Petrop., vol. 4, p. 388, pl. 8, figs. 2, 3, 1758); type locality, apparently the mountains (Russian Altai) about Ust-Kamenogorsk, on the Irtish River, Semipalatinsk, Russian Turkestan.)

SYNONYMS: *Ovis argali* Pallas (1777-80); *Ovis argali mongolica*, *O. a. altaica*, and *O. a. dauricus* Severtzov (1873); *Ovis ammon przewalskii* Nasonov (1923).

FIGS.: Gmelin, *op. cit.*, 1758, pl. 8, figs. 2, 3; Pallas, 1834-1842, pl.; Severtzov, 1873, pl. 4; Lydekker, 1898c, pl. 14, p. 178, fig. 33; Demidoff, 1900, frontisp., pls. facing pp. 260, 290, 310; Lydekker, 1902, p. 81, fig. 15, 1913a, pl. 21, fig. 2, and 1913c, vol. 1, p. 95, fig. 28; Carruthers, 1913, vol. 2, frontisp., pls. facing pp. 338, 342, and 1915, pls. 68, 71; Nasonov, 1923, pl. 12, fig. 1, pl. 15, fig. 1, pl. 16, fig. 1; Ward, 1935, p. 283, lower fig.; Bull. New York Zool. Soc., vol. 38, no. 2, p. 45, fig., 1935.

Sushkin (1925, pp. 149-150) restricts this subspecies to the Russian Altai but considers *O. a. przewalskii*, of the adjacent Sailughem Range, of uncertain validity. Nasonov (1923, p. 113) and Sushkin (1925, p. 149) recognize *mongolica* as a distinct form, and give it a range extending from the Mongolian Altai to Transbaikalia. However, the occurrence of both *ammon* and *mongolica* in a single mountain range (the combined Russian and Mongolian Altai) does not impress one as a very logical state of affairs. Furthermore, as Hollister (1919, p. 46) has pointed out, Severtzov's name *mongolica* is preoccupied and not available. For the present, therefore, I shall treat both *mongolica* and *prezvalskii* as synonyms of *ammon*, and extend the range of the last from the Russian Altai through northwestern Mongolia to Transbaikalia.

This Argali has been extinct for about a century in Transbaikalia, and is likewise extinct in the western part of the Russian Altai

(Sushkin, 1925, p. 149). However, in various parts of the intervening territory it still occurs in considerable numbers.

An old ram from the Altai (Chagan Gol district) is described by J. H. Miller (in Carruthers, 1913, p. 339) as follows: horns $61\frac{1}{2}$ inches in length, $20\frac{1}{2}$ inches in girth, and with a spread of $37\frac{1}{2}$ inches; height at shoulder, 53 inches; in autumn coat the nose is white, forehead and cheeks gray-brown, and neck and upper part of body dark chocolate, freely sprinkled with white hairs; belly and rump-patch white; legs gray-mottled above and white below the knees. "In full winter coat an ammon ram is of a dirty-white colour on the body and neck, and pure white on the nose, legs, and rump. . . . He does not grow a long neck-ruff."

Elsewhere Carruthers (1915, p. 181) writes:

The home of the ammon stretches from the Siberian frontier to the borders of the high Gobi Desert; it consists, in fact, of the north portion of the great plateau. The wild sheep range on to the watershed of the mountains which form the actual frontier between the two Empires The Little Altai, the Sailugem Range and the Tannu-ola Mountains form the northern limit; the crest of the Mongolian or Great Altai bounds their territory on the west; towards the south and east they range as far as well-pastured hill country extends into the Gobi. The nucleus of their range . . . is . . . between the Little and the Mongolian Altai. This is where they are most numerous and run largest; towards the south and east they diminish in numbers and size, it being still doubtful whether the wild sheep which the Russian explorers have found on the Ati-bogdo and Gurbun Saikhan ranges in the Northern Gobi are true *Ovis ammon* or some new variety of the species. . . . There is a wild sheep in the mountains to the south-east of Lake Baikal which is probably of the same type.

According to Ledebour and Bunge, Argali had disappeared by 1820 from Uimon, east of Ust-Kamenogorsk, but were numerous on the Chulyshman Mountains; they were also found on the mountains along the Katun and the Chuya. Pevtsoff (1883) reports them as not numerous in the Khangai Mountains, southeast of Ubsa Nor. The present eastern limit is the sources of the Selenga River. (Nasonov, 1923, pp. 117, 120-121.) Sushkin (1925, p. 154) mentions the Russian Altai, Tannu-ola, and the mountains near Kosso Gol as the extreme northern habitats.

Miller (in Carruthers, 1913, pp. 320-346) gives the following account:

[In the Little Altai] roams one of the finest beasts in nature, the father of all sheep, the *Ovis ammon*. . . . There are few species of big game that appeal more to the heart of the hunter and lover of the wild regions of the earth, than an old ram in his upland solitudes. Apart from the magnificent horns he carries, his unrivalled wariness tests the resources of the hunter to the utmost. . . .

It is principally persecution, from time immemorial, by their most dreaded enemies, the wolves, that has made them the wonderful tacticians that they are.

[Near the Chagan-gol Valley] we covered an enormous stretch of country that day, and saw large numbers of sheep We came across a great quantity of derelict horns that day; in one small valley below a cliff I counted fifty in about half a mile; it is in places like this that most of the horns are met with, the reason being that the driven snow lies deep in such places in winter. At that season packs of wolves are continually harrying the sheep; a herd, in its mad rush for safety, gets caught in a drift; the females and young rams, unencumbered with 40 lb. weight of horn, make good their escape, while the old rams get stuck fast and are killed. This accounts for the predominance of fair-sized horns lying about in certain localities. . . .

Undoubtedly, in by-gone ages, the distribution of these sheep was considerably wider than it is at the present day. At the period of Central Asian history when the whole land was one great battlefield, and every able-bodied man was drafted into the ranks of the vast hordes which swept backwards and forwards under the banners of Jenghis and other conquerors, people could have had little time for hunting, and, in all probability, lived in compact communities for safety's sake; this allowed the sheep to roam undisturbed over large areas to-day overrun by the nomads.

In more recent times the introduction of firearms into the country has undoubtedly helped to thin out the game; but . . . this is only a minor cause for their steady decrease, both in number and distribution; the primary cause is undoubtedly the rapid increase of the population on the Chinese-Russian frontier. Not only is the birth-rate among the Kirghiz increasing, but yearly large numbers are driven over to the Chinese side by the advancing Russian settlers. This necessitates the opening up of new grazing-grounds year by year, so that the game is slowly but surely being driven into higher and more inaccessible regions. The contraction of their grazing grounds is the chief cause of the steady decrease in the numbers of the wild-sheep of Central Asia.

The southern slope of the Tannu-ola Range, at the point where we crossed it [northwest of Ubsa Nor], was the first place where we came upon signs of sheep, in the shape of a few old horn-cores and fragments of horn. But they were of great age, and I can safely say that, at the present time, no sheep reach as far east as this. The western slope of the Kundelun group [southwest of Ubsa Nor] was the first place where we came upon fresh horns, it being the limit of their winter range in this direction. The natives say that there are sheep at the head-waters of the Kemchik [near the western end of the Tannu-ola]; . . . this would be the most northerly limit of the ammon. . . .

Between the Chagan-bugazi and Ulan-daba is the region which sportsmen have most visited, and, without doubt, it is the nucleus of the ammon ground. The higher pastures of this broad mass of ideal sheep-country lie above the summer range of the Mongols, and rams are still undoubtedly plentiful there. The Bain-Khairkhan, in the days of Demidoff and Littledale, must have abounded in rams, but to-day the natives graze their flocks over the greater part of it, and the chances of shooting a good head there are remote. There is ample proof that the range of *Ovis ammon typica* extends along the whole length of the Great or Mongolian Altai, to the eastern extremity of the range.

Miller adds (pp. 346-347) that the Kirei Kirghiz reported plenty of sheep in "the Baitik Bogdo Range, a southern and somewhat isolated appendage of the Altai."

According to Salesski (1934, p. 375), the range of this animal formerly extended over nearly all of the southern, southwestern,

central, and eastern Altai. Now it is restricted to a small area, including the Katun and Chuya Alps, the Sailughem Range, and the upper courses of the Chulyshman and the Bashkaus. But even here the Argali is rare and would perhaps be wholly wiped out, if hunting was not forbidden throughout the year.

In Transbaikalia Argali were known from the vicinity of the Ingoda and Selenga Rivers as long ago as 1724. According to Radde (1862), shortly after the severe winter of 1831-32 the last few Argali were killed on the Odon-cholon Range, west of the Onon River, on the Mongolian frontier. (Nasonov, 1923, pp. 113-114.) "The Cossacks are said to be responsible for the disappearance of this fine sheep from the greater portion of Eastern Siberia, where it appears to have been once common" (Lydekker, 1901, p. 125).

Gobi Argali

OVIS AMMON DARWINI Przewalski

Ovis Darwini Przewalski, Third Journey in Central Asia, p. 453, 1883 [in Russian], and Prschewalski, Reisen in Tibet, p. 268, 1884. (Southern slopes of the Hurku Mountains and southern and northern borders of the Galbyn Gobi (about lat. 42° N., long. 105° E.).)

SYNONYMS: *Ovis jubata* Peters (1876) (preoccupied); *Ovis kozlovi* Nasonov (1913); *Ovis comosa* Hollister (1919).

FIGS.: Peters, 1876, pls. 1-4; Przewalski, 1883, pl. facing p. 454; Prschewalski, 1884, p. 269, fig.; Nasonov, 1913, pp. 624, 625, figs. 2, 3; Sowerby, 1918, pls. 8, 13; R. C. Andrews, 1920, p. 350, fig.; Nasonov, 1923, pl. 16, fig. 1; R. C. Andrews, 1926, pl. facing p. 165; Sowerby, 1937, pl. following p. 252.

G. M. Allen (1930a, p. 2) finds "no difference that would possibly be of value in distinguishing the sheep" from the central Gobi and the Chinese provinces of Shensi, Shansi, and Chihli (now Jehol?), and I follow him in regarding the three names mentioned above as synonyms of *O. a. darwini*.

Early extinction is feared for the few remaining Wild Sheep in northern China, and the numbers in central Mongolia now appear to be rather limited.

Height at the shoulder of a male 6-7 years old, 105 cm. Horns with the form of *hodgsoni*; much curved, measuring 88 cm. round the curve; basal circumference, 36 cm. Pelage dark brown, more pronounced on the hind parts, wavy and rather long on the withers and back; muzzle, outer border of eyes, inner surface of ears, lower limbs, buttocks, and border of abdomen, reddish; tail and median dorsal stripe gray. (Prschewalski, 1884, pp. 268-269.)

Under the name of *O. a. jubata*, Sushkin (1925, p. 149) extends this form southwest to the Columbus Range in the Altyn-Tagh region of Chinese Turkestan and to the Tangla Mountains of Tibet. It is very doubtful, however, if *darwini* actually extends so far to

the southwest. (See the account of *O. a. hodgsonii*.) Sushkin himself remarks (p. 150): "The races which inhabit the Alashan Range, mountains of southeastern Mongolia (Sumakhada and Khara-narin-ula), eastern Nan-shan, and the mountains south of Tangla are uncertain."

In the type locality of *darwini*, in the southern Gobi, Prschewalski (1884, p. 270) found this animal not shy, "since it is not pursued by man." He also had (Prejevalsky, 1876, vol. 1, p. 261) native reports of the occurrence of Argali in the northern unforested parts of the Ala-Shan range.

Prior to 1905, Kozlov found small herds in the isolated Yabarai Mountains in the southern Gobi (Nasonov, 1923, p. 111). Nasonov (1913, p. 621) described the animal of this region as *O. kozlovi*.

In 1923-25 R. C. Andrews (1926, pp. 243, 294, 343) found these animals on Artsa Bogdo, Baga Bogdo, and Jichi Ola in the central Gobi; on the first-mentioned range they were apparently common. Perhaps the Wild Sheep reported by Kozlov (*vide* Carruthers, 1913, p. 629) on the Ati Bogdo (about lat. 43° N., long. 98° W.) belong to the present form. Lattimore (1929, p. 242) sighted a solitary ram in the Gobi south of the Ati Bogdo, near the "House of the False Lama."

Formozow (1931, p. 76) found considerable numbers of Argali on Iche Bogdo, just west of Artsa Bogdo.

G. M. Allen (1930*a*, p. 2) records "nine from Kweihuacheng, Shansi, as well as a single one from Lao Tsa Tao, Chihli Province, one hundred miles north of Peking, and another from Tai Pei Shan, Tsingling Mountains, Shensi, the last apparently a new locality for sheep in China."

Sjölander (1922, pp. 140-144) gives an interesting but melancholy picture of the animals in the Ta Tsing Shan, north of Kuei-Hua-Ch'eng in Suiyuan. "They are no doubt doomed to extinction within the not very distant future, because here as elsewhere in the borderland agriculture conquers yearly new strips of land." They are much disturbed by hundreds and thousands of "people from the plains roaming about in the hills in search for fuel." The largest flock he saw consisted of 22 animals. "The regions where the sheep can live their own natural life are very few and far between in this part of Ta-Tsing-Shan."

Arthur de C. Sowerby writes (1937, pp. 255-256):

The range of this fine wild sheep is from the mountains north of Peking in what is now known as Jehol westward through Charhar into Suiyuan and Ninghsia Provinces and northward throughout Southern or Inner Mongolia where suitable country occurs. There is a record of a single specimen, referred to this species by Dr. Glover M. Allen, which was taken by Dr. Roy Chapman Andrews in the T'ai Pai Shan area in the Tsing Ling range in South

Shensi, but no other Western hunter or collector appears even to have heard of this type of sheep in this region. . . .

Though formerly plentiful, the North China wild sheep is now practically extinct in the eastern section of its range, and is only at all plentiful in the high mountains in Suiyuan, from immediately west of K'uei-hua-ch'eng westward to north of Pao-t'ou. Here it is in grave danger of extermination at the hands of American and European so-called sportsmen from Tientsin and Peiping. Recently several shooting parties have committed the grossest outrages in killing large numbers of ewes and small rams, which were sent back to Peiping and Tientsin in a frozen condition and distributed as food. The natives also hunt these fine sheep for food, and there is no doubt that the species is doomed to extinction unless protected.

Semipalatinsk Argali

OVIS AMMON COLLIUM Severtzov

O[vis] collium Severtzov, Izvestia Imper. Obshchestvo Liub. Estest., Antrop. i Etnogr. [Moscow], vol. 8, pt. 2, p. 154, 1873. (Based upon the "*Arkhar* ou *Moutons-des rochers*" of Karéline (1841, p. 563), inhabiting "les monts Arkhates et les monts Tchinguvis"; type locality here restricted to the Chinghiz-tau, in the Kirghiz Steppe, east of Karkaralinsk and north of Lake Balkash (cf. Karéline, 1841, p. 562).)

Figs.: Proc. Zool. Soc. London 1900, p. 114, fig.; Nasonov, 1914a, pls. 3, 5, and 1923, pl. 9, fig. 2, pl. 18.

If this sheep is not exterminated, it is in any case very rare (W. G. Heptner, *in litt.*, December, 1936).

The general color varies from chocolate-brown to yellowish brown (Nasonov, 1923, p. 82). "Nasonov's figure shows a large white-muzzled argali, with horns approximating closely to the *O. a. poli* type, but stouter and less expanded" (Lydekker, 1916, vol. 5, p. 98).

According to Nasonov (1923, pp. 79-80), the range includes the mountains (Ortau) in the eastern part of Akmolinsk, the mountains in the Karkaralinsk and Kyzyl-tau districts of Semipalatinsk, and the Chinghiz-tau and the Arkat Mountains north of Lake Balkash; it also extends eastward to the Irtish River in the vicinity of Zaisan Nor and southward to the Tarbagatai, Monrak, and Saur Mountains. Sushkin (1925, p. 149) omits the Monrak and Saur Mountains from the range.

Karéline (1841, p. 563) speaks of securing several specimens on the Chinghiz-tau in 1840.

Jair Argali

OVIS AMMON SAIRENSIS Lydekker

Ovis sairensis Lydekker, Wild Oxen, Sheep, & Goats, p. 185, 1898. ("The Sair, or Saiar Mountains, situated in the Great Altai on the north-western border of Mongolia, nearly due east of a point midway between the Semipalatinsk and the Semirechinsk Altai, in latitude [= longitude] 86° E. longitude [= latitude] 47°." Type locality later given by Lydekker

(1913c, vol. 1, p. 101) as "the Saiar, Sair, or Jair Mountains of Zungaria." Nasonov (1923, p. 92) evidently considers the Jair Mountains (about lat. 46° N., long. 84° E.) the true type locality; he states that the more northerly Sair or Saur Mountains are inhabited by *O. a. collium*.)

Figs.: Lydekker, 1898c, p. 186, fig. 36, and 1902, pl. 7, fig. 2; Nasonov, 1923, pl. 15, fig. 2.

Up-to-date information on the status of this sheep seems to be lacking.

"Considerably smaller than *hodgsoni*, but with relatively massive horns, which form rather more than a complete circle, and measure (in the few specimens known) from 45½ to 47 inches in length In summer the whole of the upper-parts, with the exception of the white muzzle, as well as the upper portion of the legs, are reddish fawn, there being no rump-patch, while most of the under-parts are darker. Females with a dark dorsal streak." (Lydekker, 1913c, vol. 1, p. 101.) Height at shoulder about 38 inches (Lydekker, 1898c, p. 185).

Sushkin (1925, p. 149) gives the range as: "Saiar, Sair or Jair Mountains"; also 'Semi-tau,' '86° E. long., 47° N. lat.,' and '84° E. long., 46° N. lat.' Probably Saur (or eastern Tarbagatai); Semiz-tau; and Jair." He adds in a footnote that this form is "doubtful geographically and systematically."

Nasonov (1923, p. 93) quotes Pevtsoff (1879) to the effect that the highlands and high valleys of the mountains of Semis-tau and Urkashar are the principal habitats of Wild Sheep in Tarbagatai.

Miller (in Carruthers, 1913, pp. 548-552) writes as follows concerning the present form in the Barlik-Mailli Range, situated between the Jair Mountains and the Dzungarian Ala-tau:

The chance of procuring specimens of that rare sheep—*Ovis sairensis*—lured us to this region, but our quest was tantalizing and unsuccessful. The range of this sheep, which was first discovered by Mr. St. George Littledale in the Sair, or Jair, Mountains at the eastern end of the Tarbagatai, and south-east of Lake Zaisan, extends southwards through the Urkashar and other small ranges as far as the Mailli-Barlik group. This is also its eastern (?) limit. How far its range extends westwards along the Tarbagatai seems to be imperfectly known. . . .

Large numbers of yurts scattered over the lower slopes [of the Barlik] account, in no small degree, for the scarcity of game. I shall not weary the reader with an account of the strenuous days spent in searching for those scarce and elusive sheep; only one small band of ewes and three yearling rams were sighted. [Later several more sheep were sighted on the Western Mailli plateau.]

"The area it inhabits is composed of the Barlik and Mailli ranges, besides the Sair and probably the jumble of mountains to its south, such as the Urkashar and Jair uplifts. . . . There is much to be learnt with regard to this sheep. . . . Knowledge of its range and habits are both needed." (Carruthers, 1915, p. 147.)

Littledale's Argali; Kulja Argali

OVIS AMMON LITTLEDALEI Lydekker

O[vis] sairensis littledalei Lydekker, Proc. Zool. Soc. London 1902, vol. 2, p. 83, 1902. ("One of the tributaries of the Ili Valley on the northern flank of the eastern Thian-Shan, some distance to the southeast of Kuldja or Ili," Chinese Turkestan.)

Figs.: Lydekker, *op. cit.*, pl. 7, fig. 1; Lydekker, 1913*a*, pl. 22, fig. 2 (type), and 1913*c*, vol. 1, p. 102, fig. 30; Carruthers, 1913, pl. facing p. 550, and 1915, pls. 57, 64; Leister, 1935, p. 61, fig.

A quarter of a century ago this sheep was decidedly numerous, but probably its numbers have now declined to some extent.

General color of upper parts bright rufous-fawn, darker on middle of back, but no distinct dorsal line or flank band; head grayish brown, muzzle pure white; throat ruff and tail pale yellowish fawn; thighs colored like back; no light rump-patch. Horns forming a little more than one complete turn; rising from the head at a much greater angle than in *ammon* and *polii*; more massive and less elongated than those of *polii*; length up to 58 inches; girth 17 inches. (Lydekker, 1902, pp. 81-82, and 1913*c*, vol. 1, p. 102.)

Sushkin (1925, p. 149) gives the range of *littledalei* as "Dzungarian Alatau, west to the River Chilik (tributary of Ili), east along upper Ili and Yulduss; perhaps as far as Hami."

Severtzoff (1876, p. 220) writes as follows concerning sheep on the Russian side of the Dzungarian Alatau: "In the neighbourhood of Copal, . . . in the central steppes of Kara, . . . the sheep have been driven out from these places and only visit them late in the autumn. In places where good meadows and rocky places are found, sheep can be met with . . . to about 10,000 feet at the rivers Lepsa, Larkan, Kora, Karatala, and Koksa."

Prejevalsky (1879, p. 45) reports "Ovis Poli" as often seen in Yulduz, in the central Tian Shan, in herds of thirty to forty.

Most of our information concerning *littledalei* is due to J. H. Miller and Douglas Carruthers, although they refer to it as *karelini*.

In two days in 1911, on the southern slopes of the Dzungarian Alatau, "I must have seen not less than three hundred ewes and young, but not a single ram" (Miller, in Carruthers, 1913, p. 557). Later a number of rams were secured here, in the upper Borotala Valley, which is referred to (p. 578) as "undoubtedly one of the finest sheep countries in Central Asia."

Miller (in Carruthers, 1913, pp. 569-570, 593) writes:

The distribution of *Ovis ammon karelini* [in reality, *littledalei*] stretches from the north-east end of the [Dzungarian] Ala-tau Mountains, which is their northern limit, westwards along the range to the head of the Borotala, and from there eastwards along the whole length of the northern declivities

of the Tian Shan, from Sairam Nor to the Karlik Tagh, which forms the most easterly extremity of the range. . . . The horns seen in the Karlik Tagh, right on the edge of the Gobi, were in every respect similar to those of the Borotala. It is in the region of the Manas-Yulduz divide that the puzzle commences, for on the Yulduz *littledalei* are to be found on the same ground with *karelini* and in almost equal numbers. . . .

The two days at Ta-shih-tu [on the northern side of Tian Shan, 90-100 miles west of Barkul] were spent in hunting for sheep. There were a good many of them about.

"The outlying Kanjik ridge, to the north-east of Sairam Nor, which is of no altitude and does not form much of a retreat, is inhabited by wild sheep. . . . We know from our own observations that wild-sheep exist, in winter, on the low foothills at the northern base of the range in the vicinity of Shi-Kho." (Carruthers, 1915, pp. 146-147.) The same author (pp. 142-148) supplies considerable information concerning sheep in other parts of the Tian Shan.

[Miller (in Carruthers, 1913, p. 571) refers to a third and "as yet imperfectly known" variety of Tian Shan sheep. It "is apparently considerably rarer than the other two [*karelini* and *littledalei*]. It approximates to the *O. a. hodgsoni*, its chief characteristics being great massiveness, short length, and narrow spread. There is practically no second twist to the horn. Colonel Biddulph . . . measured several heads in the Western Yulduz and found them to average, length 40 to 50 in., girth 16 to 18 in., and spread 17 to 20 in. As this type of horn appears to differ just as much from the other two as they do from one another, it has every right to be considered a distinct variety."

Sven Hedin (1903, vol. 1, p. 339) reports wild sheep in the rather isolated Kurruk Tag, a range lying south of the Tian Shan, toward the Tarim River and Lop Nor. According to Nasonov (1923, p. 78); Kozlov had also found them in this range about 1893-95. Possibly this is the form rather loosely described by Kowarzik (1913, p. 442) as *Ovis poli adametzi*, with no more exact type locality than the Lop Nor region.]

Karelin's Argali; Issyk Kul Argali; Alatau Argali

OVIS AMMON KARELINI Severtzov

Ovis Karelini Severtzov, Izviestia Imper. Obshchestvo Liub. Estest., Antrop. i Etnogr. [Moscow], vol. 8, pt. 2, pp. 84, 86, 1873. (Alatau of Semiretchie, Russian Turkestan; this Alatau, according to Sushkin's interpretation (1925, p. 149), lies between the Ili River and Issyk Kul.)

FIGS.: Severtzov, 1873, pl. 1, pl. 5, fig. 3; Lydekker, 1913a, pl. 22, fig. 1, and 1913c, vol. 1, p. 104, fig. 32; Nasonov, 1914a, p. 704, fig. 3, and pl. 1; Nasonov, 1923, pl. 3; Roosevelt and Roosevelt, 1926, pl. facing p. 152 (subsp.?).

According to the latest information available, this sheep seems to have survived in fair numbers.

Horns moderately thick, with rather rounded edges; frontal surface very convex; orbital surface flat; tips curving spirally outwards; length, 44-45 inches. Neck covered with a white mane, shaded with grayish brown; light brown of back and sides separated from yellowish white of belly by a wide dark line; toward the tail the color becomes grayish white; tail and a small patch round it yellowish white; a distinct dark median line on the back. Height at shoulder, 42 inches. Female with short horns. (Severtzoff, 1876, pp. 210, 219.) Most or all of the horn measurements given by Ward (1935, p. 285) for this subspecies are probably of specimens of *littledalei*.

Sushkin (1925, p. 149) gives the range of *karelini* as "Trans-Ilian or Za-Iliiskii Alatau; upper Naryn (sources of Syr Daria); and around Issik-kul." The sheep of the central Tian Shan, from the international boundary east of Issyk Kul as far east as the Yulduz Valley, may be more or less intermediate between *karelini*, *littledalei*, and *humei*. There is much confusion in the literature as to the ranges of *karelini*, *littledalei*, *humei*, and *polii*. For example, Miller (in Carruthers, 1913, pp. 569-573, 593) and Carruthers (1915, p. 143) seem to mistake *littledalei* more or less throughout for *karelini*. This is apparently due to an assumption that the Dzungarian Alatau, instead of the Trans-Ilian Alatau, is the type locality of *karelini*. Lydekker (1909, p. 117) is particularly hazy in referring to the range of *karelini* as "the Alatau and other parts of the Altai." Thus much of the more recent literature dealing with "*karelini*" applies actually to *littledalei*, if Sushkin's interpretation (1925, p. 149) of the ranges is correct in the main. South of Issyk Kul, along or near the crest of the southwestern Tian Shan, the range of *karelini* seems to meet that of *humei*.

Severtzoff (1876, p. 220) gives the following account:

O. Karelini inhabits all the Semiretchje Altai [=Alatau] and also the Saplisky Altai [=Za-Iliiskii Alatau], but is not so common there as it is in the mountains between Turgeli and Kaskelen; it has been lately driven out of the latter locality by the Cossack sportsmen, and has gone to a higher elevation, namely the Kebin steppe above the range of trees. East of Turgeli, on the bare mountains and plains near the rivers Chilik and Keben [=Kelen], *O. Karelini* is still very abundant, except in localities which are covered with trees, extending from Chilik as far as Lantash [=Santash]. Further, it inhabits all the neighbourhood of Issik-kul; it is rather rare on the northern part of the Thian-Shan, which is thickly covered with trees. I also met with numerous flocks in the steppes of the Narin, where they find such an abundance of food on the meadows and shelter among the rocks; these localities are about 12,000 to 13,000 feet above the sea-level.

O. Karelini is sometimes also met with on the mountains separating the Narin from its tributary the Atpash, as far as the plains between the rivers

Kurtka and Chatir-kul; but from the eastern sources of the Atpash down as far as the Chatir-kul it is only found in company with *O. Poli* [= *O. a. humei*].

Severtzoff adds some remarks on the distribution of sheep on the Russian side of the Dzungarian Alatau, a territory now included in the range of *O. a. littedalei*.

Nazároff's notes (1932), referring to the period about 1919-20, furnish some of the latest information we have concerning this sheep. "Here [in the ravine of Kegats, somewhere near Issyk Kul] there are quantities of wild sheep (arkhar, *Ovis karelini*), which go about in large flocks" (p. 179). "In Kok Mainak [near the western end of Issyk Kul] wild sheep and ibex come down from the mountains in the early morning to water in the Chu" (p. 221). "There are lots of arkhar in this district [near the station of Sary Bulak, southwest of Issyk Kul]" (p. 232).

In 1925 T. and K. Roosevelt (1926, pp. 132-145) found considerable numbers of sheep in the Kooksu district of the Tian Shan, southwest of the Yulduz. They refer to them as *karelini*, but the specimen figured on the plate facing page 152 does not appear to be altogether typical of that subspecies; it is perhaps an intergrade between two or three subspecies. Its horns measured 61 inches.

[*Ovis heinsii* Severtzov (Izviestia Imper. Obshchestvo Liub. Estest., Antrop. i Etnogr. [Moscow], vol. 8, pt. 2, pp. 84, 87, 1873), was based upon subadult skulls found in the Tokmak district, about 100 miles west of Issyk-kul, Russian Turkestan. It does not seem to be very clearly differentiated from *O. a. karelini*. Tokmak is situated in the valley of the Chu River, and the mountains both to the north and to the south are inhabited, according to Nasonov (1923, pp. 73-74), by *karelini*. This author (p. 90) considers it quite possible that, owing to the increase in the number of villages in the Tokmak district, *heinsii* has become extinct. W. G. Heptner (*in litt.*, December, 1936) expresses the same opinion.]

Karatau Sheep; Karatau Argali

OVIS AMMON NIGRIMONTANA Severtzov

Ovis nigrimontana Severtzov, Izviestia Imper. Obshchestvo Liub. Estest., Antrop. i Etnogr. [Moscow], vol. 8, pt. 2, p. 87, 1873. (Karatau, between the Syr Darya and the Chu, Russian Turkestan.)

FIGS.: Severtzov, *op. cit.*, pl. 5, fig. 7; Nasonov, 1914a, p. 706, fig. 4, p. 712, fig. 6; Nasonov, 1923, pl. 10, fig. 1.

The Karatau Sheep was formerly abundant but has now become rare.

Horns not massive; nuchal edge very sharp, and the two other edges not much rounded; frontal surface narrow, and the two other

surfaces rather concave; length, 38 inches. General color light grayish brown; belly and rump white. Height at shoulder, 34 inches. (Severtzoff, 1876, pp. 211-212.) Throat-ruff weakly developed, dirty white in old males (Nasonov, 1923, p. 71).

Sushkin (1925, p. 149) gives the distribution as "Range Karatau, north of Syr Daria," explaining that this is the "western continuation of the range Alexandrovskii."

Severtzoff (1876, pp. 327-328) gives the following account:

This species inhabits almost the entire Karatau; it is abundant on the summits of the Buguni, on the rocks near Marnin-saz, and on the western portion of the Teramsk hills, where the numerous steep rocks and ravines near the river Borolday afford good hiding-places to these animals. They also occur on the summits of the Chayan mountains; further in a north-westerly direction I met with them on the rocks of the Turlansky-Pereval; and, according to the native tribes living there, these sheep are abundant also on the Min-Djelkey, the highest point of the Karatau mountains; and are to be found even at the foot of these mountains, namely in the Karamurun hills, about 1000 feet high, and the steppes not above 1500 feet above the level of the sea. . . .

These sheep keep in very small flocks of from three to four individuals; and often single females with a lamb are to be met with, and even single males. This cannot be attributed to the usual habits of this species; but the reason for this scattering is more to be looked for in the very rocky nature of the parts of the Karatau mountains to which this sheep is driven by the different nomad tribes of the Kirgies, with their numerous flocks and herds. . . .

O. nigrimontana . . . certainly is one of the smallest and weakest of the whole group of the Central-Asiatic sheep. It is also very cautious and shy; and the reason for this is easily found—namely, the way in which it is constantly driven out of its localities.

Nasonov (1923, p. 70) records a considerable number of specimens from the Karatau region.

W. G. Heptner writes (*in litt.*, December, 1936) that this sheep is now rare in the Karatau.

Severtzov's Sheep; Severtzov's Argali

OVIS AMMON SEVERTZOVII NASONOV

Ovis severtzovi Nasonov, Bull. Acad. Impér. Sci. St.-Pétersbourg, ser. 6, vol. 8, pt. 1, p. 761, 1914. ("Nuratau," in the southern part of the Kizil Kum Desert northwest of Samarkand, Russian Turkestan.)

FIGS.: Carruthers, 1909, p. 623, fig.; Lydekker, 1913c, vol. 1, p. 103, fig. 31; Nasonov, 1914b, fig. 1 (facing p. 764) and pls. 1-3; Carruthers, 1915b, pls. 56, 62; Nasonov, 1923, pl. 17; Ward, 1935, p. 288, fig.

Thirty-five years ago Carruthers wrote (1909, p. 623): "These sheep are not numerous, and only inhabit the extreme north-western end of the Nurata Dagh." Probably their status has not improved in the meantime.

Size small. "Above dark brown, slightly paler on the neck, greyish-brown on the flanks, belly and rump white; tail, greyish-brown; mane, tinged with grey . . . ; head, darker than the neck, with white face markings. Legs dirty white, with dark reddish-brown stripes." Horns resembling those of *Ovis vignei blanfordi*; flat-surfaced, sharp-edged, and deeply grooved on frontal surface; tips remarkably thick and blunt, turning outward; length along front curve $35\frac{3}{4}$ inches. (Carruthers, 1909, p. 623.) The throat-ruff does not reach the lower part of the head. Horns of female 14 cm. (Nasonov, 1914*b*, p. 776.)

Sushkin (1925, p. 149) gives the distribution as "Range Nuratau or Karatau, southern part of Desert Kizyl-Kum," and adds that this is "not to be confounded with another Karatau, habitat of *nigrimontana*, which lies much farther north." He also says (p. 153): "Of *O. polii*, the least specialized form is *severtzovi* of the hill-ranges of Kizyl-Kum Desert. Its origin is supposed to be postpliocenic and preglacial. . . . Next to *severtzovi* comes, geographically and morphologically, *nigrimontana* of the westernmost branch of the Tian-Shan System."

As long ago as 1872 A. P. Choroschichin found this sheep in Aktau, in the southern part of Kizil Kum, and saw two at the spring Ak-Kuduk, in the mountains between Aktau and Tamdy (Nasonov, 1914*b*, p. 761). Nasonov (1914*b*, p. 763) records specimens from Nuratau, Aktau, and Petro-Alexandrovsk.

Carruthers (1915, pp. 150-151) writes of this as "an exceedingly beautiful little wild sheep," "which is restricted to the most outlying desert hills of this mountain world" [southeastern Russian Turkestan]. "The Nurata Dagh is a ridge about a hundred miles long." In 1908 "the sheep existed on the further half of the range alone, being found in twos and threes, as well as in herds of a dozen or more. . . . Owing to the presence of native shepherds and their flocks they are very wary of man, never allowing a close approach Their refuge is in the ruggedness of the escarpments, not in high altitude or huge areas of rolling country. There is no portion of their habitat which is more than 2,000 feet above the plain."

Kashgarian Argali; Hume's Argali

OVIS AMMON HUMEI Lydekker

Ovis ammon humei Lydekker, Cat. Hume Bequest Brit. Mus., p. 6, 1913. ("To the south of Chatir Kul, on the Thian Shan" (Brooke and Brooke, 1875, p. 513); "Tian Shan, north-west of Kashgar" (Lydekker, 1913*c*, vol. 1, p. 106).)

FIGS.: Severtzov, 1873, pls. 2, 3; Stoliczka, 1874, pl. 53 (inaccurate); Brooke and Brooke, 1875, p. 512, figs. 2, 3; Carruthers, 1915, pl. 59, lower fig.

This sheep was formerly abundant, but its present numerical status is uncertain.

"Horns more or less of the *littledalei* type, but with the outer front edge rounded in adults. Head greyish brown above and at sides, but whitish on most of face; back brownish gray, without dark dorsal streak, and no distinct flank-band; under-parts, limbs (including whole of thighs), a large rump-patch, and tail pure white." (Lydekker, 1913*b*, p. 8.) Record length of horns on front curve, 54½ inches (Ward, 1935, p. 286). Height at shoulder, 46 inches (Severtzoff, 1876, p. 212).

Nasonov (1923, p. 66) and Sushkin (1925) do not recognize this form, considering it a synonym of *O. a. polii*. Severtzoff (1876, pp. 220-225) likewise referred specimens of this animal to *polii*.

Its range may be considered to extend approximately from the Terek-tau, northwest of Kashgar, through the Kokshal-tau as far as Khan-tengri, on the international boundary east of Issyk-kul.

Under the name of *Ovis polii*, Severtzoff (1876, pp. 223-225) gives the following information concerning this sheep:

O. Polii was met with by Mr. Semenov on the high plains near the snow-covered summits of the gigantic mountains of Han-tengri, at the sources of the rivers Karkara, Tekes, and Sari-jaws. These places form the most northern limits of its range, which, to the south-west, extends as far as the Narin, the upper Syr-Darja, and the tributaries of the Kashgar-Darja at the frontier of Turkestan. I found skulls of *O. Polii* within a distance of from 10 to 12 versts to the north of the above-mentioned rivers, at the Ulan, about the mountains of Atpash; here it lives together with *O. Karelini*, but only in very limited numbers; and these localities form the narrow line where these two species are found together.

On the high plain of the Aksay only *O. Polii* is to be met with, and is very abundant there; here it usually keeps in the mountains of Bos-adir, on the left or north shore of the Aksay

I saw this species on Han-tengri and Aksay in small scattered flocks of from five to ten individuals—unlike *O. Karelini*, which species I have seen in flocks of hundreds in the neighbourhood of the Narin. . . .

At the Aksay, . . . the sheep are not pursued at all, and therefore do not avoid spots which afford hiding-places for a man; but on the plains of Han-tengri, which in summer are regularly visited by the different Kirgees tribes, these sheep are very cautious.

Stoliczka writes (1874, p. 425): "Large flocks . . . were observed on the undulating high plateau to the south of the Chadow-Kul [=Chadir or Chatir Kul]."

In 1889-90 Pevtsoff found these sheep very numerous in the Kokshal-tau (Nasonov, 1923, p. 84).

Carruthers (1915, p. 145) speaks of the Kashgar, the Kok-kia, and the Kok-shal ranges as all being good sheep country.

Pamir Argali; Marco Polo's Sheep

OVIS AMMON POLII Blyth

Ovis Polii Blyth, Proc. Zool. Soc. London 1840, p. 62, 1841. ("Pamir." According to Lydekker (1898c, p. 191), the type was obtained "on the high plateau near Lake Siri Kol [= Victoria Lake], at an elevation of about 16,000 feet." This lake is in the Wakhan district, northeastern Afghanistan.)

FIGS.: Ann. Mag. Nat. Hist., vol. 7, pl. 5, fig. 1, 1841; Proc. Zool. Soc. London 1875, pp. 514-515, figs. 4, 4a, 5, 5a; De Poncins, 1895, pl. facing p. 53; Lydekker, 1898c, pl. 16, p. 189, fig. 37, p. 201, fig. 39; Lydekker, 1900, p. 79, fig. 11, pl. 3, figs. 1, 1a; Lydekker, 1913a, p. 282, fig.; Lydekker, 1913c, vol. 1, p. 107, fig. 33; Royal Nat. Hist., vol. 2, p. 221, fig., 1894; Carruthers, 1915b, pl. 52; Nasonov, 1923, pl. 9, fig. 2; Morden, 1927, pls. facing pp. 95, 106; Jour. Bombay Nat. Hist. Soc., vol. 36, no. 4, suppl., pl. 10, 1933; Ward, 1935, p. 289, fig.; Leister, 1935, p. 60, fig.

This famous sheep has actually increased during the past 20 years on the Alai plain and in part of the Russian Pamirs (W. G. Heptner, *in litt.*, December, 1936), but in the Tagdumbash or Chinese Pamirs its numbers have been reduced.

"Horns slender and forming a more open and outwardly extended spiral than in any of the other races; length of fine specimens 69 to 75 . . . inches. . . . General colour . . . light speckled brown; most or all of face, throat, chest, under-parts, buttocks, and legs white or whitish, the white extending largely on to outer side of thighs; a blackish streak from nape to withers; no distinct throat-ruff. In winter the hair considerably longer, forming a white ruff on throat and chest and a darkish crest from nape to withers. . . . In females, which have no ruff, the front of the neck is brown in winter, while in summer there is no dark stripe from nape to tail." (Lydekker, 1913c, vol. 1, p. 107.) Height at shoulder, 44 inches (Morden, 1927, p. 92).

Sushkin (1925, p. 149), following Nasonov (1923), gives the range as "Pamir and Alai, south to Hunza, north to Khan-tengri." On the other hand, Lydekker (1913a, p. 284) limits its northward extension to the Alai, and distinguishes the animal of the southwestern Tian Shan as *O. a. humei*. In the western Pamirs (*e. g.*, vicinity of Ishkashim) it is apparently replaced by some form of *O. vignei* (Nasonov, 1923, p. 86). It is "rarely found at elevations below 10,000 and 11,000 feet" (Lydekker, 1898c, p. 192), and ascends to more than 18,000 feet.

According to De Poncins (1895, p. 61), "Big herds always consist of females and young males." The herds of old males "spend the summer in the highest and most remote nullahs, but in winter they come lower down and many die of starvation in the spring." This author estimated the number he saw during a single day near the Great Pamir Lake at 600 head.

Cobbold writes (The Field, Nov. 5, 1898) that rinderpest raged all over the Pamirs throughout the winter of 1897-98, and that these sheep succumbed literally by hundreds.

Carruthers (1915*b*, pp. 129-131) writes of this sheep:

For the most part the *poli* have retreated westwards, where the great feeding grounds of the Alichur, the Great and Little Pamirs and Kara-kul still afford a safe retreat. . . .

Harassed by stray sportsmen in summer, killed off by wolves and natives in winter, the wild sheep have retreated westwards, where there is less persecution and wilder country. . . .

The colossal heads of 70 and 75 inches are no longer to be obtained, even on the Russian Pamirs. The Chinese Pamir has not produced many heads over 60 inches for several years, and one is lucky to get one over 50 inches now.

In 1925 Theodore and Kermit Roosevelt (1926, pp. 223-242) found fair numbers in the Chinese and the Russian Pamirs.

Conditions during the following year are reported by Morden (1927, pp. 73, 83, 93-94):

With the advent of more modern firearms and the absence of any restrictions, it is to be feared that in a few years the herds of Marco Polo's sheep will be materially decreased. . . .

Ovis poli, while scarce in Chinese territory, were plentiful in the Russian Pamirs. During our month in that region we counted 1052 rams and 607 females and young. . . .

We were told that the sheep were found practically everywhere in the Pamirs. . . .

The lives of the *poli* must be made miserable by the great number of parasites infesting them. All adults collected by us had quantities of grubs beneath the skins. . . . Grubs were found in the noses of many specimens and all were infested with ticks. The ticks probably caused the frequent rubbing against rocks which we noticed.

"Within Indian limits, *Ovis poli* are found only in Hunza. The Mir of Hunza has given them for some years strict protection in his territory." (Anonymous, 1933, p. 35.)

Altyn-Tagh Argali

OVIS AMMON DALAI-LAMAE Przewalski

Ovis dalai-lamae Przewalski, Cat. Zool. Coll. Przewalski Central Asia, p. 16, 1887. (Apparently the Moscow Range, south of the Altyn-Tagh, and adjacent to the Columbus Range, Chinese Turkestan.)

Fig.: Nasonov, 1923, pl. 14, fig. 2.

The slight information we have concerning this apparently rare sheep is far from up-to-date. That given below is derived chiefly from Nasonov (1923, pp. 101-103), since most of the works from which he quotes have not been available to me.

Horns small, 32½ inches in length on the front curve; throat-ruff weakly developed, not clear white; muzzle, belly, groin, and but-

tocks white; height at shoulder almost 4 feet (Przewalski, Fourth Journey in Central Asia, p. 275, 1888).

Much remains to be done in delimiting the animal's range. It is given by Sushkin (1925, p. 149) as "Altyn-Tagh, Toguz-Davan, and (?) Russkii Range, south to Przewalski's Range."

Przewalski (*op. cit.*, pp. 274, 275) met with this sheep in the Khatyn-Zana Valley between the Zaidam and the Columbus Mountains, and in the Zaisan-saitu Valley between the Zaidam and the Moscow Mountains. He reported it as inhabiting the central Kuen-lun, the Chamen-Tagh, and the Altyn-Tagh, and as being extremely rare.

Roborovsky (Rept. Tibet Exped. 1889-1890, pt. 3, pp. 15, 22, 47, 1896) reports it on the Muzluk Range (southwest of Altyn-Tagh and west of the Moscow Range), on the northern slope of the Toguz-Davan, and on the Przewalski Range.

Pevtzoff (Rept. Tibet Exped. 1889-1890, pt. 1, pp. 224, 226, 1895) states that this sheep lives in the western part of the Przewalski Range, about the headwaters of the Bostan-tograk—a place seldom visited by hunters.

A specimen secured by Sven Hedin in the Columbus Range, and described and figured by Leche (1904, p. 2), is referred by Nasonov (1923, p. 102) to *O. a. jubata*, although on geographical grounds it should apparently be close to or identical with *dalai-lamae*.

Tibetan Argali

OVIS AMMON HODGSONII Blyth

Ovis Hodgsonii Blyth, Proc. Zool. Soc. London 1840, p. 65, 1841. (Based upon the "Wild Sheep of the Hemalaya" of Hodgson (Asiatic Researches, vol. 18, pt. 2, p. 134 and 2nd pl. following p. 138, 1833); type locality restricted by Lydekker (1913c, vol. 1, p. 98) to "Tibet; probably on the northern frontier of Nepal.")

SYNONYM: *Ovis henrii* A. Milne-Edwards (1892).

FIGS.: Jour. Asiatic Soc. Bengal, vol. 15, pls. 1, 3. [4], 1846; Brooke and Brooke, 1875, pp. 520-521, figs. 6, 7; Lydekker, 1898c, pl. 15, pp. 182, 184, figs. 34, 35; Lydekker, 1900, pl. 3, figs. 2, 2a; Burrard, 1925?, pl. facing p. 206; Stockley, 1928, pl. facing p. 112; Jour. Bombay Nat. Hist. Soc., vol. 36, no. 4, suppl., pl. 9, 1933; Ward, 1935, p. 283, upper fig.

Formerly plentiful, the Tibetan Argali is now somewhat reduced in numbers.

Size somewhat less than in *O. a. ammon*. "Horns with the tips . . . less everted than in *ammon*, the descending portion nearly vertical, the front outer angle often distinct, and the whole forming about one complete circle . . . A large throat-ruff, apparently at all seasons, and a nuchal crest. General colour greyish brown above, paler and whitish below; rump-patch, buttocks, throat, chest, under-parts, and inner sides of the legs white; crest and a stripe

down front of each leg dark. . . . In females there is little or no crest and no ruff, while the white is less pure, and the rump-patch less distinct." (Lydekker, 1913c, vol. 1, p. 98.) Height of old rams at shoulder $3\frac{1}{2}$ to 4 feet, females not much less" (Blanford, 1891, p. 495). Record length of horns on front curve, $55\frac{1}{4}$ inches (Ward, 1935, p. 281).

The northern and eastern distributional limits of this sheep are none too definitely known. Blanford (1891, p. 495) gives the range as "the plateau of Tibet from Northern Ladak to the country north of Sikhim and probably farther east. This sheep does not range south of the main Himalayan axis; it is not found in summer below about 15,000 feet elevation; in winter it may descend to about 12,000 in places." Lydekker (1900, p. 85) extends the range "northwards to the Kuen-lun," but Nasonov asserts (1923, p. 96) that its presence in those mountains is not yet proved.

"Large flocks of ewes and young rams . . . are met with in the Chang-chenmo district" of Ladak (Lydekker, 1900, pp. 85-86). In 1891 it required a good many days' hunting to secure two out of a few rams seen in the Chang-chenmo Valley (Hunter, in Lydekker, 1900, pp. 396-397). Carruthers writes of this same area in 1915 (p. 117): "Now that the 'block' system has been introduced for their further protection the total number that can be shot each season has been materially reduced. Hitherto the twenty 'guns' allowed into Ladak—both first and second leave—were each allowed to kill one, and it is to be hoped that the new regulations will be found sufficient for the preservation of these fine sheep."

Burrard writes (1925?, pp. 193, 196, 206-207; distr. map facing p. 194):

There are two spots in which *Ammon* rams will sometimes cross the crest of the Zaskar Range, although they will never wander far down the southern slopes of that range. These two places are: first, just to the south of the Tso Morari (lake), where they may be occasionally found at the head of the Kibber Valley in Spiti; and secondly, in the neighbourhood of the Kangri Bingri Pass on the borders of Kumaon and British Garhwal. . . .

I believe . . . that in hard winters when food is scarce the rams with the biggest and heaviest heads find the burden of them too much to carry easily and are unable to gallop as fast as the others, and so fall a prey to the wolves.

[The habitat in Ladak] has been so heavily hunted for very many years past, that rams with shootable heads are not common. In 1911 a friend of mine traversed Ladak from Chang Chen Mo in the north to Hanle in the south, and saw but one ram worth shooting . . . They are also sometimes to be found in the neighbourhood of Tso Lhama (lake) at the head of the Tista River in the extreme north of Sikkim, but here again they are only occasional visitors.

C. H. Stockley writes (*in litt.*, September 16, 1933): "Ammon have been wiped out in the Tiri Foo [Kashmir], which used to be a

sanctuary: the usual result in India of creating a 'sanctuary' without proper protection; it merely becomes a poacher's paradise.

"On the right bank of the Indus there are still plenty of ammon on their old grounds."

The same authority says (1936, p. 169): "For about nine months of the year they are to be found on the high plateaux of the Rupshu district, and the immediately adjoining nullahs, in the whole of the Changehenmo district, the country round the Pangong Lake and thence southward right along the east flank of the Himalayas to Sikkim and Eastern Tibet."

The Game Warden of Kashmir writes (*in litt.*, May, 1937) concerning conditions in Ladak: "Plentiful, but impossible to give even an approximate number. Strict Game Laws protect them. Only a limited number of heads allowed to be shot annually with the size limit of over 38 inches."

The name that should be applied to the Argali of the northeastern Tibetan region (now known as Ching-hai), from the Nan Shan south to the Tangla Mountains and the Szechwan border, has long been a matter of doubt. Probably some of the following records summarized by Nasonov should be only provisionally referred to *hodgsonii*.

Kozlov found Argali in the Burkhan Buddha Range; he reported them very common in the Nan Shan, and extremely numerous in the Humboldt Range. They were reported by Przewalski as very numerous south of the Shugan-ula, and as rare in the Baien Kara Mountains. He also had Mongol report of their occurrence in the South Kuku Nor Range. Sven Hedin, Roborovsky, and Kozlov found Argali in the Anembar-ula, situated between the Humboldt Range and the Altyn-Tagh. (Nasonov, 1923, pp. 105-110.)

E. H. Wilson writes (1913, vol. 2, p. 146) concerning the Chino-Tibetan borderland: "Another Sheep, probably Hodgson's . . . , occurs immediately to the west and north of Tachienlu, but is very rare. It has been seen in the neighbourhood of Litang by at least two travellers Zappey saw three near the Rama-lal Pass."

G. M. Allen reports (1939a, pp. 291-292) on the Second Dolan Expedition (1934-1936) as follows:

Several fine specimens from the extreme upper waters of the Yangtse in Chinghai (Kokonor, Tibet) doubtless represent typical *Ovis ammon hodgsoni* and agree with Lydekker's diagnosis of that race

Mr. Dolan writes that this sheep was first found on the steppe of Seshu (Camp 61) [about lat. 32° 50' N., long. 98° 15' E.], where they inhabited island-like ranges of granite rising from the steppe. Skulls and old sign were seen here. Later, specimens were collected west of Drechu Gomba (Camp 79) [about lat. 33° 40' N., long. 97° 20' E.] and farther west on the Chang Tang. Sheep were seen also on granite ranges north of Tossun Nor on the steppes

of the upper Yellow River in Kokonor. Two large solitary rams were seen in May, and in July rams and ewes were found in separate bands on the mountains of the high steppe northwest of Jyekundo.

Kamchatkan Bighorn

OVIS NIVICOLA NIVICOLA Eschscholtz

Ovis nivicola Eschscholtz, Zool. Atlas, Heft 1, p. 1, 1829. (Mountains of Kamchatka.)

SYNONYM: *Ovis storcki* Allen (1904).

FIGS.: Eschscholtz, 1829, pl. 1; Guillemard, 1885, p. 676, fig. 1; Royal Nat. Hist., vol. 2, p. 216, fig., 1894; Lydekker, 1898c, pl. 17 A, p. 222, fig 42, and 1901, pl. 1, fig. 2, pp. 20, 22, figs. 5, 6; J. A. Allen, 1904, pp. 294, 296, figs. 1, 2, 4, 5.

This sheep is "still very numerous in Kamchatka" (W. G. Heptner, *in litt.*, December, 1936).

Horns brown, trigonal, forming a circle, with the tips pointing forward and outward; hair yellowish gray on back, lighter on belly, almost straw yellow on neck and head; legs rufous in front, yellowish gray behind; hind part of thigh and caudal disk yellowish white (Eschscholtz's description (1829, p. 1) of the type, an old male in winter pelage). Height at shoulder up to 41 inches (Guillemard, 1885, p. 678). "Good horns measure from 34 to 39¼ inches in length" (Lydekker, 1913c, vol. 1, p. 121).

Sushkin (1925, p. 150) gives the range of this form as "Kamchatka." *Ovis storcki* Allen, from northwestern Kamchatka, is considered by Nasonov (1923, p. 11) to represent merely a very old specimen of *nivicola*.

Eschscholtz remarked (1829, p. 1) that this animal was killed commonly in the mountains.

In 1881, according to Dybowski, 300 of them were killed in Kamchatka (Kuntze, 1932, p. 47).

In 1882 Guillemard (1885, pp. 675-678) found small herds, containing three to nine individuals (exclusively males), on the sea cliffs about 50 miles E. N. E. of Petropavlovsk. Here his party bagged 13 individuals in the course of two days. He was informed of others near Gunol, in the south-central part of the peninsula, and also in the Bolcheresk Valley.

Demidoff (1904, pp. 200, 216-217) speaks of this animal as plentiful along the coasts of Kamchatka, and mentions "a precious medicine" made by a native "of the dried hearts of wild sheep; these he had roasted and ground into powder, which he said was a sure remedy against any kind of disease He intended to sell the powder in China, where he could obtain a high price for this quaint medicine."

Storck (in J. A. Allen, 1904, p. 293) remarks concerning the form

described as *O. storcki* that specimens "are very hard to get, as they are found only in the central range of mountains in the northwestern portion of Kamchatka."

Carruthers writes (1915, p. 190):

They are common at 3,000 to 4,000 feet on the ranges in the interior during the summer months, but probably all migrate seawards in winter. . . .

The existence of sheep is only known of in the vicinity of the Avatcha Bay, on which Petropavlovsk lies, and around the extinct volcano of Kamchatskaia Vershina which Demidoff and Littledale visited. They are said to be numerous on the coastal range to the north and south of Petropavlovsk.

In 1921 Burnham (1929, p. 134) had a report that sheep were still very abundant at Cape Shipunski; also that many were to be seen along the Kamchatka River.

Although Bighorns are ordinarily such sure-footed animals, even they seem occasionally to fall victims to the precipitous nature of their environment. Guillemard (as quoted by Lydekker, 1898c, pp. 225-226) tells of witnessing the fatal slip of one of them over the edge of a Kamchatkan precipice.

Allen's Bighorn

OVIS NIVICOLA ALLENI Matschie

Ovis alleni Matschie, in Niedieck, Kreuzfahrten im Beringmeer, p. 236, 1907 (English translation, p. 226, 1909). (Based upon a specimen (No. 18212, Am. Mus. Nat. Hist.) figured by J. A. Allen (1904, pp. 295, 296, figs. 3, 6) as *Ovis borealis* (?); type locality,¹ "Taiganose Peninsula, N. E. Siberia" (approximately lat. 61° N., long. 161° E.).)

SYNONYM: *Ovis middendorfi* [properly, *middendorffi*] Kowarzik (1913).

FIGS.: Middendorff, 1853, pl. 12, fig. 1; J. A. Allen, 1904, pp. 295, 296, figs. 3, 6; Burnham, 1929, pls. facing pp. 121, 128 (subsp.?).

At the beginning of the present century this sheep was reported as common, but in the meantime its numbers have dwindled considerably.

The name *alleni* was based upon a figure of a skull with horns. The horns apparently are more divergent than those of *nivicola*, and do not form quite such a complete circle; their length along the outer edge is 730 mm., and the spread at the tips is 453 mm. The description of the pelage given by J. A. Allen (1903, p. 131) is apparently a composite one, based upon specimens from the Taiganos Peninsula and from Baroness Korf Gulf, which are not necessarily identical.

Sushkin (1925, p. 150) gives the range as "Taiganos Peninsula; Kolyma Range; and Djugdjura Range." (The last-mentioned range

¹This type locality may, however, be erroneous. In a previous publication J. A. Allen stated (1903, p. 130) that specimen No. 18212 came from Baroness Korf Gulf, which is situated at the eastern base of the Kamchatka Peninsula.

forms part of the Stanovoi system, at about lat. 56° N., long. 132°-137° E.) He adds that "the subspecies which inhabits the Chukchi Peninsula is still unknown." I shall include the latter provisionally with the present form.

According to Middendorff (1853, p. 116), the Tungus stated that a Wild Sheep inhabited the mountain summits about the source of the Utshur River, in the Djugdjura Range; further, that the mountains east of the Polowinnaja River, and south of the above-mentioned range, contained many sheep. In June and July some of the hunters resorted there with dogs; the sheep retreated to the highest points, where they either were cut off and killed, or ran the gauntlet of the remaining hunters holding the passes.

Buxton (in J. A. Allen, 1903, p. 132) says:

Mountain Sheep probably occur all over Northeastern Siberia wherever the mountains are rugged enough to attract them, although I have only a few reliable records of their presence at widely separated places in that vast territory. They are found in the Stanovoi Mountains, at Ayan, Okhotsk, Ola, Yamsk, Mickina or Niakinsk, and on as far north at least as the Arctic Circle, and perhaps further, although the range becomes much less rugged towards the north. They are also found along the Kolyma River to the westward of that range. A few are taken in the mountains in the Anadyr Territory about Marcova. They are common on the Taiganose Peninsula The wandering reindeer Koryaks inhabiting the Taiganose Peninsula kill a few every winter.

In 1921 Burnham (1929) made an expedition along the south coast of the Chukchi Peninsula, from Emma Harbor to Holy Cross Bay, expressly in search of sheep. He found them very scarce and severely pressed by the natives. The Chukchi deer-herders are "exceptionally capable stalkers and if they succeed in locating a sheep they follow until they get it. Under such conditions the sheep are doomed." (P. 120.) Burnham killed a female near the Shairrainnik River, west of Emma Harbor (p. 108), and saw a few others or found traces of them at several additional places, including Mount Matasingi, at the head of Holy Cross Bay (pp. 247-267). He quotes a manuscript of Sokolnikoff's, who states that about 1900 he secured a specimen from the Paku-Puai Mountains, and two others from the mountains to the south of Anadyr (p. 200). He states (p. 280) that "the sheep from the Matasingi-Chaun Bay sector have coal black horns."

Belopolski indicates (1933, p. 186 and map) that sheep occur on all the more prominent ranges from the Stanovoi Mountains eastward to Bering Strait, but that their numbers have greatly declined in the past 20-30 years.

Lydekker's Bighorn; Clifton's Bighorn; Verkhoyansk Bighorn

OVIS NIVICOLA LYDEKKERI Kowarzik

O[vis] borealis lydekkeri Kowarzik, Zool. Anzeiger, vol. 41, no. 10, p. 443, 1913.

(Based upon a specimen described and figured by Lydekker (1902, pp. 83-85, pl. 8) as *Ovis canadensis borealis* Severtzov; type locality, "Northern Siberia, at a point distant about 40 miles from the mouth of the Yana River. The exact locality is the north-west end of the Verkhoyansk Mountains, forming the watershed between the valleys of the Yana and the Lena.")

FIGS.: Lydekker, 1902, pl. 8, and 1913a, pl. 24, fig. 2.

While no information of very recent date is available concerning the numerical status of this sheep, at last accounts it appeared fairly plentiful.

"Essentially the same type of animal" as the Kamchatkan Bighorn; "although its general coloration is decidedly lighter, there is a much greater proportion of white, and the dorsal streak and tail are much darker. . . . In the male . . . the white rump-patch is much larger The face, too, is white, with the exception of a wood-brown transverse band midway between the nostrils and the eyes, which expands out to include each cheek. The whole nape is also white mingled with grey. An indistinct dark line runs down the back and becomes more distinct as it approaches the tail, which is blackish brown. There is also a larger proportion of white on the legs and under-parts. . . .

"A female head . . . is wholly greyish white, passing into pure white on the forehead and muzzle." (Lydekker, 1902, p. 85.)

Sushkin (1925, p. 150) gives the distribution as "northeastern Verkhoyansk Range."

Bunge (1884, pp. 34-35) speaks of meeting with this sheep in 1883 on the extreme northern point of the right bank of the Lena River, opposite Stolbovoi Island, where it was apparently not rare. He adds that several specimens were secured in the vicinity of Bulun, a post on the lower Lena. According to Nehring (1890, pp. 36-37), Bunge found the animal in the entire extent of the Verkhoyansk Range.

About 1901 J. Talbot Clifton secured two specimens, at least one of them at a point "40 miles from the mouth of the Yana River" (Lydekker, 1902, pp. 83-85).

From information recently supplied by Pfizenmayer (1939, pp. 68-69; 138, 204-214), it appears probable that this sheep occurs on most or all of the larger ranges situated between the lower Lena and the Indigirka. In 1901 he saw many sheep in the Tas-chayach-tach Mountains (which form the divide between the Yana and the Indigirka), at about latitude 67° 40' N. Here he noted two herds of over a hundred individuals each. In 1908 he found a fair number

on and near the Kharaulakh Mountains, on the right bank of the Lena just above its delta, and secured several specimens.

Syverma Bighorn

OVIS NIVICOLA BOREALIS Severtzov

Ovis borealis Severtzov, Izvestia Imper. Obschestvo Liub. Estest., Antrop. i Etnogr. [Moscow], vol. 8, pt. 2, p. 153, 1873. (Mountains and highlands of the Piasina and Khatanga districts in northern Siberia.)

Our information concerning this sheep is extremely meager.

It was briefly described as an intermediate form between *O. nivicola* and *O. ammon*, and nearer the former; from the latter it differs in its smaller horns, inferior size, and whitish belly (Severtzov, 1873, p. 153).

Sushkin (1925, pp. 150-154) gives its distribution as the Syverma Range, between the sources of the Piasina and the Khatanga Rivers. He regards it as "somewhat uncertain in its characters and distribution," and states that its range "is divided from that of the geographically nearest *lydekkeri* by a distance of about 1,000 kilometers of woodland."

Middendorff (1853, p. 117) received information concerning the occurrence of a Wild Sheep at about latitude 67° N., east of the Yenisei in the Syverma Range, at the headwaters of the Cheta. A Tungus chief assured him that his people had formerly hunted this animal on the steep summits of the range, but for some time had not ventured to do so, since on the last occasion one of the hunters had been tossed by the animals into an abyss.

Severtzov (1873, p. 86) speaks of this sheep as occurring in the mountains that separate the basin of the Lower Tunguska from those of the Piasina and the Khatanga. He states that several specimens were obtained by Schmidt for the Zoological Museum of the Russian Academy of Sciences.

"Typical locality apparently Verkhoyansk Mountains, between Yana and Lena Valleys; Matschie gives Byrranga Mountains, south of Taimyr Peninsula, between Lena and Yenisei Valleys" (Lydekker, 1913c, vol. 1, p. 122). Here both Lydekker and Matschie are unquestionably in error.

Yablonoi Bighorn

OVIS NIVICOLA POTANINI Nasonov

Ovis nivicola potanini Nasonov, Bull. Acad. Impér. Sci. [Petrograd], ser. 6, vol. 9, pt. 2, p. 1599, 1915. ("La chaîne de montagnes Jablonovoj" = Yablonoi Mountains.)

FIGS.: Nasonov and Dorogostajskij, 1915, p. 1605, fig. 2, and fig. 3, facing p. 1616.

Practically all the information on this sheep, including the original description, is sequestered in the Russian literature.

Sushkin (1925, p. 150) gives the distribution as "southwestern part of Stanovoi Range." This apparently means the Yablonoï Mountains.

An account of the animal is given by Nasonov and Dorogostajskij (1915).



FIG. 54.—Barbary Sheep (*Ammotragus lervia* subsp.)

Barbary Sheep; Arui; Aoudad, Audad, or Udad. Mouflon à Manchettes (Fr.). Mähnschaf (Ger.). Arrui (Sp.). Muflone berbero (It.)

AMMOTRAGUS LERVIA (Pallas)

The species as a whole ranges over the Saharan region from the Atlantic to the Red Sea, north to the Barbary states and south to the bend of the Niger and to Kordofan; it is also reported as formerly occurring in Palestine.

Separate and detailed accounts will be given of four out of the six described subspecies. The other two require no more than brief mention here.

The typical Barbary Sheep (*A. l. lervia*¹) is still rather widespread and moderately common. It ranges from Morocco through Algeria to Tunisia. The subspecific status of the animal of Rio de Oro and Mauretania remains to be determined.

Although the Sudan Arui (*A. l. blainei*²) seems to have suffered some reduction in range, and probably in numbers as well, it is not yet to be classed among the vanishing forms. It ranges west of the Nile through the Anglo-Egyptian Sudan (Dongola, Kordofan, and Darfur). Some form of *Ammotragus lervia* (perhaps *blainei*) is also common in Ennedi and Tibesti, French Equatorial Africa, while a few of the animals are found as far south as Wadai, below latitude 15° N. (Malbrant, 1936, p. 49).

Egyptian Arui. Mouflon à Manchettes (Fr.)

AMMOTRAGUS LERVIA ORNATA (I. Geoffroy Saint-Hilaire)

Ovis ornata I. Geoffroy Saint-Hilaire, Dict. Class. Hist. Nat., vol. 11, p. 264, 1827. ("Near the gates of the city of Cairo.")

FIG.: Savigny, Descr. Égypte, Hist. Nat., Atlas, vol. 1, Mammif., pl. 7, fig. 2, 1818(?).

Some years ago this sheep was apparently brought to the verge of extinction by extended drought and by hunting, but more recently good rainfall and a measure of protection have considerably improved the animal's status.

General color reddish fawn; dorsal line brownish; under parts and inner surfaces of limbs white; a median longitudinal black spot between the legs; fringe of hairs on lower neck 12-13 inches long, on forelegs 6-7 inches long; beard on each jaw 2-4 inches long; tail with a terminal brush. Horns at base somewhat quadrangular; tips directed inwards and tapering to a point; wrinkles little developed, and only toward the base. (I. Geoffroy Saint-Hilaire, *op. cit.*, pp. 264-265.)

The Egyptian Arui is now confined to the region between the lower Nile and the Red Sea. There are also unverified reports of

¹ *Ant[ilope] Lervia* Pallas, Spicil. Zool., fasc. 12, p. 12, 1777. ("Africae borealiori propria"; type locality restricted by Harper (1940, p. 327) to "Department of Oran, western Algeria.")

² *Ovis lervia blainei* Rothschild, Novit. Zool., vol. 20, no. 2, p. 460, 1913. ("Border of Dongola Province and Kordofan," Anglo-Egyptian Sudan.)

the former occurrence of some form of the Barbary Sheep in Palestine; this would be either *ornata* or some undescribed subspecies.

Egypt.—Heuglin (1861, p. 16) reports the Arui at least as far south as latitude 24° N.

The only locality that Schweinfurth knew for this animal in 1893 was the Wadi El Gos, east of Minieh. There are also records from Sarras (on the Nile, about lat. 21° 40' N.) and from near the Wadi Medisa (about lat. 27° N., long. 33° 10' E.). (De Winton, in Anderson and de Winton, 1902, p. 335.)

Flower (1932, p. 435) gives the following account:

More than one form occurs in Nubia, the *ornata* once to be found within a day's ride of Cairo has vanished, and the affinities of the sheep from southern Upper Egypt have yet to be determined. . . .

Between 1900 and 1909 Arui Wild Sheep were reported to have been seen on both sides of the Nile in Upper Egypt, but they were very much rarer than the Ibex, which occurred east of the Nile only. By 1910 the sheep had become really scarce. From 1912 onwards various projects for their protection were under consideration, but, for many reasons, the subject was a very difficult one.

Capt. G. W. Murray, M. C., of the Survey of Egypt, writing to me, 3 April, 1920, of the country between the Nile and the Red Sea in Upper Egypt, said:—

"1. A pair of wild sheep existed for a long time at Bir Abu Shaar (about 33° 40' E. by 27° 20' N.)—two heads offered to me for sale at Jemsa in 1910 probably represented the end of them.

"2. The Arabs of Dr. Hume's party saw tracks and droppings at Bir Laseifa (about 32° 30' E. by 26° 50' N.) in 1912.

"3. Nimr eff. Ali, of the Coast Guard, now the Frontier District Administration, shot and killed one near Wadi Tarfa (about 31° 50' E. by 28° 20' N.) some years ago. On my recent trip the Maaza Arabs declared that several still existed near Wadi Tarfa.

"4. I saw fresh tracks and droppings which my guide declared to be *wild* sheep—and they were certainly not ibex—at near Gebel Aradia (about 33° 30' E. by 26° 20' N.) in March 1920."

"Barbary Sheep might be obtained in the isolated gebels to the north of the Port Sudan-Khartoum railway, but of this the writer has no experience. They are not found south of the railway and do not belong to the mountain area." (Maydon, 1932, p. 194.)

"H. M. the King of Egypt . . . has given orders for . . . areas to be dedicated as sanctuaries for the few Barbary sheep that are still to be found in the Assiuti wadi 200 miles south of Rishrash" (Russell, 1934, p. 18).

"I managed to get local Arrêtés passed by all Upper Egypt provinces making it illegal to kill ibex and Barbary sheep in the Eastern desert i. e. between the Nile and the Red Sea.

"The sheep were on the verge of extinction a few years ago owing to lack of rain (i. e. grazing) and hunting.

"The sheep area is not a big one, being about 100 miles in length from North to South with an average width of about 80 miles: outside this area sheep do not exist at all. Twenty five

years ago they were quite numerous as we had rain up there most winters. Till last winter however we had had no real rain for some seven years and the sheep population had dropped to nearly nil. Bedouin hunting with dogs was taking its toll of the sheep and snaring over the few water holes was killing large numbers of ibex (incidentally the sheep never go to the water holes and exist on the dew).

"Then last winter . . . three big rains . . . brought to life all the dormant plant seeds in the wadis. . . .

"I sent a patrol up in August and the reports were most encouraging. . . . Quite a number of sheep tracks in the smaller and more inaccessible wadis where the grazing had not been good enough for camels but amply good for game." [Sheep will not stay in the Ibex reserve about 50 miles south of Cairo.]

"The secret of the Assiuti sheep country is the western face of the Wadi Qena: for 100 kilometers it consists of a steep precipice 1000 feet high with only two or three passes from the top to the bottom of Wadi Qena. This forms the refuge for the sheep; when things are quiet they work out over the plateau and feed to within thirty miles of the Valley but when the country is disturbed or grazing nonexistent they go back into the cliffs of Wadi Qena for safety and for certain shrubs there which survive the drought. No other part of the Eastern desert has a similar inaccessible refuge area. . . . The sheep panics at the slightest sign of man or camels." (T. W. Russell, *in litt.*, October 27, 1935.)

Palestine.—"No more wild Bovidae live in Palestine to-day. Up to a quarter of a century ago *Ammotragus lervia* still lived in the Wadi Arabah. The Bedouins hunted it under the name of 'el-Kebsh' ('the sheep'). It was already extremely rare when I came to Palestine 29 years ago." (Aharoni, 1930, p. 328.)

"The Barbary Wild Sheep . . . may have lived in the mountains around—and south of—the Dead Sea up to the beginning of this century. However, more reliable data are needed before this determination can be definitely accepted." (Bodenheimer, 1935, p. 116.)

Libyan Arui

AMMOTRAGUS LERVIA FASSINI Lepri

Ammotragus lervia Fassini Lepri, Atti Pontif. Accad. Sci. Nuovi Lincei, Anno 83, p. 271, 1930. (Garian range, northwestern Libya.)
Fig.: Zammarano, 1930, p. 26, fig. (subsp.?).

This Libyan subspecies is considered a very rare animal (Zammarano, 1930, p. 26).

In comparison with *A. l. lervia*, the horns taper more suddenly and are more divergent at the base; the tips are more distinctly inclined backwards; pelage slightly more reddish; head with mixture of brown and reddish hairs; chin black; a dark triangular spot below the ears; beard mixed with tawny and brown, and widely margined with dark brown; a short dorsal mane extending from the nape to the lumbar region, the tips of the hairs dark brown; setting off the mane from the light color of the body (Lepri, 1930, p. 270).

The present form occurs in the Libyan hinterland, especially between Murzuk and Sokna, in the west central part of the country. When introduced into Italy, it flourishes either in captivity or in reserves. (Zammarano, 1930, pp. 25-26.)

"I understand from Western Arabs that the great field for game nowadays is in the 'Harush' [apparently in central Libya]. . . . There considerable numbers of . . . Barbary sheep exist." (Colonel Green, *in litt.*, March 13, 1933.)

This animal is rare and of rather uncertain distribution in Libya. Reduced rainfall is a cause of depletion. Hunting is allowed only on permit from August 15 to October 14. Permits may be issued no more than twice per year to a given person. (Ministry of Colonies, Rome, *in litt.*, March 5, 1937.)

Saharan Arui. Mouflon à Manchettes (Fr.). Mähnschaf (Ger.)

AMMOTRAGUS LERVIA SAHARIENSIS (Rothschild)

Ovis lervia sahariensis Rothschild, Novit. Zool., vol. 20, p. 459, 1913. ("Oued Mya" between El-Golea and In-Salah, southern Algeria (approx. lat. 29° N., long. 3° E).)

This subspecies occurs rather widely in the west-central Sahara, but in probably limited and decreasing numbers.

"Horns strongly depressed, turning sharply down before bending backwards. Uniform pale rufous sand-colour all over; a whitish patch below and somewhat behind the ear, no trace of a median facial stripe." (Rothschild, 1913a, p. 459.)

Since the southern and western limits of *sahariensis* have not been precisely determined, the animals of the Timbuktu region and of Mauretania and Rio de Oro are only provisionally referred here.

"The 'Barbary Sheep' . . . extends into the Sahara, at least as far as Aïn Guettara [lat. 28° N.], and, according to hearsay, even to the Hoggar mountains. . . . We saw a very old male at Aïn Guettara. . . .; but we found many traces and droppings in the little affluents and side-valleys of the Southern Oued Mya, and in

the latter itself. . . . A fine male was shot in the Oued Mya at dusk; its meat was excellent." (Hartert, 1913, p. 36.)

In southern Algeria, in 1913-14, a good many tracks and a few animals were seen between Temassinin and the Ahaggar Plateau (Geyr von Schweppenburg, 1917, pp. 260, 266, 267, 276, 300).

Some form of the Barbary Sheep occurs near Timbuktu, on the heights adjacent to Lake Faguibin, descending there to latitude 17° N. More to the west, it lives in the north of Tagant, the Mauretanian Adrar (region of Atar), the "koudiat" of Idjil and all the mountainous massifs of Rio de Oro (Zoug, Adrar Sotof, etc.). Within the vast Saharan range of the species as a whole, there is no rocky summit that does not serve as a refuge for it; but in the erg, the reg, the hammada, the chott, the species is generally lacking and it is only accidentally that it penetrates such environments, where it is in a poor position to resist the pursuit of its enemies. (Joleaud, 1927, p. 44.)

Seurat (1934, p. 12) reports the Saharan subspecies from the Tademaït, the Mouydir, the Hoggar, and the Tefedest.

Heim de Balsac (1934, p. 489) records two specimens from Tin-Aberda (just north of Adrar), and remarks that probably here and in the neighboring Massif des Ifohras a distinct race exists.

The same author (1936, p. 311) states that the Barbary Sheep ranges over all the Saharan hills whence man has not driven it. In the south it reaches the bend of the Niger and even crosses the river and inhabits the declivities on the opposite side. This last area is identified by the General Government of French West Africa (*in litt.*, November, 1936) as the cliffs of Bandiagara.

Buchanan's Arui

AMMOTRAGUS LERVIA ANGUSI Rothschild

Ammotragus lervia angusi Rothschild, Novit. Zool., vol. 28, p. 75, 1921.
("Tarrouaji Mt., Asben, 3,100 ft.," French West Africa.)

This subspecies is apparently confined to the region of Asben and Aïr in the south-central Sahara, where it was reported in 1920 in moderate numbers.

"Differs from . . . other forms . . . in the horns being much more upright on the head, and curving farther backwards and inwards. General colour very deep rufous, darker than in *l. ornatus*; no dark face stripe; dorsal crest mixed with black, more strongly on front half. Beard on sides of lower jaw cinnamon-rufous; long hair on legs and knee tufts, apparently more sparse and restricted than in the other forms." Height at shoulder, 36 inches. Horn, 21 inches over curve. (Rothschild, 1921, p. 75.)

Practically all our information on this Arui is owed to Capt.

Angus Buchanan (1921), who discovered it in 1920. At Tegguidi cliff, south of Agades, "a few Barbary sheep are to be found" (p. 132). In Baguezan, Asben, two animals were killed (p. 156). "Four animals were seen late in morning far up the mountain side of Aouderas, but we were unable to get near them. Signs of sheep are plentiful enough, but, so far as I can judge at present, they are very wary and wild and secretive in their movements, resting and hiding in the dark mountain caves by day, and coming out to feed in late evening and through the night." (Pp. 160-161.)

"Fresh tracks of wild sheep were numerous" on a mountain in the Aguellal range, Aïr (p. 202). "In the country east of Baguezan . . . there are Wild Sheep on the mountain faces; but . . . the rugged western side of the mountain is much the better hunting-ground" (p. 216). "In the Aouderas neighbourhood [Asben], I had the good fortune to kill three wild sheep" (p. 225). "Those [Tarrouaji] hills . . . are seldom, if ever, entered by natives, which accounts, no doubt, for the number of Barbary Sheep which I found inhabiting this range On this day I killed no fewer than four animals, and looked upon half a dozen others within range." (P. 230.)

Pyrenean Ibex. Bouquetin des Pyrénées (Fr.). Steinbock der Pyrenäen (Ger.). Cabra montés (Sp.)

CAPRA PYRENAICA PYRENAICA Schinz

Capra pyrenaica Schinz, Neue Denkschr. Allg. Schweiz. Ges. Naturw., vol. 2, p. 9, 1838. ("In den spanischen Pyrenäen, auf den Gebirgen der Sierra de Randa und der Königreiches Granada"; type locality restricted by Harper (1940, p. 327) to "the vicinity of the Maladetta Pass, in Huesca, Spain.")
 FIGS.: Geoffroy and Cuvier, Hist. Nat. Mammif., pl. 396, 1833; Schinz, 1838, pls. 1, 2; Lydekker, 1898c, pl. 22, and 1901, pl. 3, fig. 8; Gourdon, 1908, pl. 1, fig. A; Cabrera, 1911, p. 968, fig. 195 A, and 1914, p. 312, fig. 81 A.

Only eight or nine survivors of the Pyrenean Ibex were reported in 1907, and it is probably now extinct.

"The species, as a whole [*C. pyrenaica*], may be described as a pale brown animal with the outer side of the limbs black, a black band on the lower part of the flanks, and a short black mane, continued along the back by a narrow stripe. The forehead and the beard are blackish or very dark brown, and the belly and inner part of the limbs white. In winter pelage there is a whitish underfur, quite absent in summer, when the general colour is browner and the black areas become more abruptly definite. The females lack at all seasons the mane and the black markings of the head and body, presenting only a blackish tint on the anterior face of the limbs, and it is the same with young males." (Cabrera, 1911, p. 967.)

In the typical subspecies "the dorsal line appears considerably broadened on the withers, . . . in old specimens . . . coming downwards to coalesce with the black of the fore limbs." Length of horn on outside curve up to 1020 mm. (Cabrera, 1911, pp. 967, 974.) Height at shoulder, 2 feet 8 inches (Schinz, 1838, p. 15).

"There are . . . strong reasons for believing that in the past Ibexes [*C. pyrenaica* subsp.] inhabited every suitable point of almost every mountain ridge in Spain." The typical subspecies occupied the "Pyrenean area, comprising the Spanish side of the Pyrenees and, in former times, the eastern part of the Cantabrian chain." (Cabrera, 1911, pp. 964-966, map.)

In 1838 it was said to be no longer present in the French Pyrenees, but only on the Spanish side. It was then known to the Toulouse botanist, Moquin Tandon, from only a single locality, near the Maladetta Pass, and even there it was very rare and difficult to obtain, so that its early extinction was feared. However, during the preceding year five specimens reached various museums. (Schinz, 1838, pp. 16-18.)

"This animal does not now occur anywhere in the Cantabrian range In the Cuevo de la Mora . . . we found a quantity of bones which are referable to this Spanish Wild Goat. The former existence of this species in the Cantabrian range is therefore proved, and its absence nowadays is probably due to extermination." (Gadow, 1897, pp. 372-373.)

In 1908 Gourdon wrote (pp. 4-10) that the massif of Maladeta, in Huesca, was formerly a favored resort for the Ibex, but not one had been recorded for 15 or 20 years previously. One was killed there by an avalanche in 1876. The Val d'Arras (or Ordesa Valley), on the French side of the massif of Mont Perdido, in the Hautes Pyrénées, was expected to be the last resort of this Ibex. Sir Victor Brooke killed one there in 1878 and another in 1879. Some years later he estimated that 40 head remained on the precipices of Arras. As late as 1907 one or two were killed there annually.

"It may be considered as practically extinct, being today found only in the northern extreme of the Huesca Province, about the Mount Perdido. Two old bucks, three females, and three or four half-grown individuals remained there in 1907. In a recent letter . . . the Count of San Juan . . . informs me: 'I think that probably no more than ten or twelve Ibexes remain in all the Pyrenean chain. A pair survived recently in the Maladeta; somebody shot the female, and the male sought refuge among a herd of domestic Goats and was subsequently killed by the goatherd.'" (Cabrera, 1911b, p. 966.)

In the fourteenth century this Ibex abounded on both slopes of the Pyrenees. Now, of all the mammals of the Iberian fauna, it

seems to be the one that is condemned to disappear in the shortest time. A slow persecution, but continued over many centuries, has been driving out this interesting creature from all those mountains in which it was comparatively common two or three hundred years ago. (Cabrera, 1914, p. 316.)

Portuguese Ibex. Cabra montez de Portugal; Cabra do Gerez (Port.). Cabra montés portuguesa (Sp.). Bouquetin du Gerez (Fr.)

CAPRA PYRENAICA LUSITANICA França

Capra lusitanica "Boc." França, Bull. Soc. Portugaise Sci. Nat., vol. 2, fasc. 1-2, p. 144, (1908) 1909. (Based upon the "cabra-montez da serra do Gerez" of Du Bocage, Mem. Acad. Real Sci. Lisboa, Cl. Sci. Math., Phys. e Nat., n. s., vol. 2, pt. 1, p. 1, 1857; type locality, Serra do Gerez, Minho, Portugal.) FIGS.: Du Bocage, 1857, pls. 1, 2; França, 1909, p. 144, fig. 1; Cabrera, 1914, p. 313, fig. 81-bis D; França, 1917, pls. 1, 3-6.

The Portuguese Ibex became extinct about 1892.

In pelage it is intermediate between *C. p. victoriae* and *C. p. hispanica*, but nearer to the former; belly, inside of limbs, space about eyes and near muzzle, isabelline; front of limbs dark brown, slightly more intense in winter than in spring; male with a slight brown mane and a short, dark brown beard, both longer in winter; at this season it also has a dark brown dorsal stripe, reaching the tail; a large dark area on breast. Horns shorter and less curved than those of other Iberian forms, but of greater circumference and closer together toward the base; most similar to those of *victoriae*; length along outside curve, up to 570 mm. Height of male at shoulder, up to 740 mm.; of female, up to 700 mm. The winter pelage of the female has the same blackish markings as the male's, but less intense and less clear. (França, 1917, pp. 32-42.)

Du Bocage (1857, pp. 4, 15, 17) records five specimens taken in the Serra do Gerez, northern Portugal, in 1852, and quotes Link and Hoffmannsegg (1808) to the effect that this is the only area in the country where the species is found. He also mentions two additional specimens in the Museum of Coimbra. He attributes the survival of this Ibex to the difficulties and perils of the chase.

Gadow writes (1897, pp. 372-373) of "its regular occurrence in the Serra de Gerez, in the northern corner of Portugal. Formerly more common, the species is now, in the Serra de Gerez, reduced to a small herd of perhaps only half a dozen. One specimen was shot there a few years ago by the King; a young one was caught alive in 1891 [=1890], a photograph of which I owe to the kindness of . . . Mr. A. Tait of Oporto. In the summer of 1885 I made an unsuccessful attempt to stalk these cabras bravas, as they are called

by the Portuguese. . . . From information received at the Sierra de Picos, I think that this goat occurs also on the Sierra da Pena negra, to the south-west of Leon."

Cabrera writes (1911, p. 966) that the Ibex of the mountains of Galicia and northern Portugal "is well-nigh extinct, only a few specimens, if any, remaining in the Portuguese mountains of Gerez"; and also (p. 964) that "in 1861, the date of Seoane's 'Fauna mastológica de Galicia,' a few individuals remained in the mountains of that region."

In former times its range probably extended to all the large mountains in the northwest of the Iberian Peninsula, and about the middle of the last century a few individuals still existed in Galicia. It is very likely that this subspecies is completely extinct; at least there is no record of any specimen taken since a female was captured in 1890, so that if it has not disappeared entirely, it must be very rare or have taken refuge in places that are inaccessible and never visited by hunters. (Cabrera, 1914, pp. 324-325.)

From the excellent monograph of França (1917) the following information is derived. During the eighteenth century the animal was doubtless still represented by numerous examples. In a work of this century the supposed therapeutic value of its bezoar-stones is discussed. Another work of this period describes a trap used by the shepherds of Gerez for capturing the Ibex. Link shows (1803) that it was still abundant at the end of the eighteenth century, and that its range then extended from Borrageiro to Montalegre. It was much hunted by the inhabitants. A hunter who would gladly sell the hide esteemed the flesh too highly to part with it. Coverlets were made of the hide, and the horns were used for ornament in the houses. In later times the use of the horns as trumpets is mentioned.

This Ibex commenced to disappear during the first half of the nineteenth century. By 1870 it was very rare. Single males were killed in 1874, 1876, and 1885. A dozen animals were seen in 1886. The last one to be captured was an old female taken alive in September, 1890; it died a few days later. Two others were found dead in 1890 and 1891; the latter was the victim of an avalanche. The final ones were seen in 1892 near Lomba de Pau.

Hunting was especially destructive in May, when the young were small and the animals descended to lower levels. The Wolf and the Golden Eagle must have contributed to the diminution. Some were victims of avalanches. Disease and a disproportion of the sexes (fewer females than males) are considered additional factors in the extinction of the Portuguese Ibex.

França considers the Portuguese Ibex a distinct species, not merely a subspecies of *Capra pyrenaica*.

Ibex of Central Spain; Gredos Ibex. *Cabra montés* (Sp.)

CAPRA PYRENAICA VICTORIAE Cabrera

Capra pyrenaica victoriae Cabrera, Proc. Zool. Soc. London 1911, p. 975, 1911.

("Madrigal de la Vera, on the southern slope of the Sierra de Gredos," Province of Cáceres, Spain.)

FIGS.: Chapman and Buck, 1910, pls. facing pp. 140, 152 (figs. A, C), 216, 220; Cabrera, 1911, pls. 53, 54, p. 968, fig. 195 A, p. 970, fig. 196; Cabrera, 1914, pl. 19, p. 312, fig. 81 B.

This Ibex is "in danger of disappearing and worthy of special protection" (Director General de Montes, Pesca y Caza, *in litt.*, 1933).

"An intermediate form, in size and in the extent of the black markings, between *C. p. pyrenaica* and *C. p. hispanica*, rather browner than *hispanica* in the summer coat, and with horns similar in size to those of that race, but comparatively broader and flatter." Height at shoulder, 700 mm. Length of horn on outside curve, up to 815 mm. (Cabrera, 1911, pp. 974-976.)

The range includes "the Sierra de Gredos and, in the past, the ridges of El Barco, Bejar and Francia, and the hills of Toledo." The subspecies is "at present reduced to a single colony in the highest peaks of Gredos." (Cabrera, 1911, p. 966, and map, p. 965.)

The following information is derived from the excellent account by Chapman and Buck (1910, pp. 139-146):

In the Spanish ibex Spain possesses . . . a game-animal of the first rank. . . .

Since we first wrote on this subject in 1893 the Spanish ibex has passed through a crisis that came perilously near extirpation. Up to the date named, and for several years later, none of the great landowners of Spain . . . had cherished either pride or interest in the Spanish wild-goat. Some were dimly conscious of its existence on their distant domains; but that was all. . . . These mountain-ranges are so remote and so elevated as often to be almost inaccessible. . . . Their sole human inhabitants are a segregated race of goat-herds, every man of them a born hunter, accustomed from time immemorial to kill whenever opportunity offered—and that regardless of size, sex, or season. That the ibex should have survived such persecution by hardy mountaineers bespeaks their natural cunning. Their survival was due to two causes—first, the antiquated weapons employed, but, more important, the astuteness of the game and the "defence" it enjoyed in the stupendous precipices and snow-fields of those sierras. . . .

But no wild animal . . . can withstand for ever perpetual, skilled human persecution. During the early years of the present century the Spanish ibex appeared doomed beyond hope. . . .

We rejoice to add that at this eleventh hour a new era of existence has been secured to *Capra hispánica*. . . . The change is due to graceful action by the landowners in certain great mountain-ranges. . . .

In certain sierras . . . the owners have undertaken the preservation of the ibex partly from their realising the tangible asset this game-beast adds to the value of barren mountain-land, and partly in view of the legitimate sport that an increase in stock may hereafter afford.

But the main factor which has assured success . . . took origin in the great Sierra de Grédos. . . .

In 1905, when the ibex were about at their last gasp, the proprietors of the *Núcleo central*, which we may translate as the *Heart* of Grédos, of their own initiative, ceded to King Alfonso XIII. the sole rights-of-chase therein, and His Majesty commissioned the Marquis of Villaviciosa de Asturias to appoint an adequate force of guards.

The ceded area comprised all the best game-country [of the Sierra de Gredos].

In 1896 we estimated the stock of ibex at fifty head, and during the following years it fell far below that—by 1905 almost to zero. In 1907, after only two years of "sanctuary," it was computed by the guards that the total exceeded 300 head. . . .

Though the hill-shepherds in summer drive out their herds of goats to pasture on the higher sierra, when they may come in contact with their wild congeners, yet no interbreeding has ever been known; nor can the wild ibex be domesticated. Wild kids that are captured invariably die before attaining maturity. . . . The ibex . . . can never have been the progenitor of the race of goats now domesticated in Spain.

Chapman and Buck also remark (1910, p. 219): "When Don Manuel Silvela . . . was here twenty years ago [1876], some 150 ibex were driven past his post above the Laguna de Grédos. Not a quarter of that number now [1896] survive in all the range."

"The . . . Sierra de Francia in the Salamanca Province, and the Toledo Mountains, where it does not exist to-day, formed parts of its range sixty years ago, and it has been found in the Sierra de Bejar, between the Sierras of Francia and Gredos, so recently as 1897" (Cabrera, 1911, p. 964). "The colony [on the Sierra de Gredos] consists of about three hundred and fifty head, and having been under royal protection since 1905 it is rapidly improving" (Cabrera, 1911, p. 966). Now [1914] their number is probably about 500 head (Cabrera, 1914, p. 320).

Of late years the prospects for the remaining Ibex in Spain seem to have become very discouraging. "I hear privately from a friend who has just come back from Spain that the situation [in regard to Ibex] is extremely bad and that no effort is being made to check poaching" (Martin Stephens, *in litt.*, May 25, 1936).

No more recent information is at hand. It may be remarked, however, that the aftermath of wars usually creates a difficult period for the game of any country.

Mediterranean Ibex. *Cabra montés* (Sp.)

CAPRA PYRENAICA HISPANICA Schimper

Capra hispanica Schimper, Comptes Rendus Acad. Sci. [Paris], vol. 26, p. 318, 1848. ("Picacho de Veleta et du Mulahacen," in the Sierra Nevada, southern Spain.)

Figs.: Rosenhauer, 1856, pls. 1, 2; Chapman and Buck, 1910, pl. facing p. 152, figs. B, D; Cabrera, 1911, pl. 52, and p. 968, fig. 195 C; Cabrera, 1914, p. 313, fig. 81-bis C.

Some years ago this Ibex appeared to be in better status than any of the other Spanish subspecies. Now, like the form of central Spain, it is said to be in danger of disappearing (Director General de Montes, Pesca y Caza, *in litt.*, 1933).

It is smaller than *C. p. victoriae*, with the black markings still more reduced; summer pelage more rufous and horns less curved and more widely spreading; dorsal stripe not broadened anywhere; black of the forelimbs reaching at most the lower shoulder and chest, and on the haunches narrowed to a mere band. Height at shoulder, 655 mm. Length of horn on outside curve, up to 850 mm. (Cabrera, 1911, pp. 967-974, and 1914, pp. 321-322.)

This Ibex once inhabited all the large mountains parallel to the Mediterranean littoral of the Iberian Peninsula, from the Strait of Gibraltar to the mouth of the Ebro, including the Sierra Morena. At present this distributional area seems reduced to seven isolated colonies, viz.: one in Sierra Morena, about Fuencaliente; one in the Sierras of Ronda and Bermeja, from their connection with that of Tolox; one in the Sierra Nevada, whence it extends, by way of the Alpujarras, as far as the Sierras of Frigiliana and Alhama; a fourth in the Sierra of Cazorla (where the author believed, in 1911, it had become extinct, but a specimen was taken later and sent to the Madrid Museum); a fifth in the Sierra Martés, in Valencia; a sixth in the Sierra de Cardó and the Mountains of Tivisa; and a seventh on the other side of the Ebro, on Monte Caro. (Cabrera, 1914, p. 322.)

Schimper (1848, p. 318) believed the Ibex did not exist in the Sierra Morena, but this was evidently an error.

According to Rosenhauer (1856, p. 4), it is rare in the Sierra de Ronda, but somewhat common in the Sierra Nevada. In the course of four weeks 15 of the animals were brought to Granada for sale.

Chapman and Buck (1910, p. 152) state:

The "defences" of the ibex in the Sierra Quintána [a range in the Sierra Morena] lie among some fairly big crags forming the eastern and southern faces of the range. The shooting at that time [1901] was free; hence the goats were never left in peace by the mountaineers, who all carried guns, and used them whenever a chance presented itself. The result was that the few surviving goats had become severely nocturnal in habit

At this period (1901) the surviving ibex had fallen to a mere handful. Fortunately here, as elsewhere in Spain, there was aroused, within the next five years, the tardy interest of Spanish landowners to save them.

These authors also (p. 153) quote the Marquis del Mérito to the effect that the Ibex kids "have a terrible enemy in the golden eagles, since their birth coincides with the period when these rapacious birds have their own broods to feed, and when they become more savage than ever."

“The main chain of the Sierra Neváda constitutes one of the strongholds of the Spanish ibex Though totally unprotected, they yet hold their own—a fair average stock survives along the line of the Veleta, Alcazába, and Mulahacen. This survival is due to the vast area and rugged regions over which (in relatively small



FIG. 55.—Mediterranean Ibex (*Capra pyrenaica hispanica*). After Lydekker and Ward.

numbers) the wild-goats are scattered; but even more to the antiquated muzzle-loading smooth-bores hitherto employed against them. That moment when cheap, repeating cordite rifles shall have fallen into the hands of the mountain-peasantry will sound the death-knell of the ibex.” (Chapman and Buck, 1910, pp. 302-303.)

Cabrera remarks (1911, pp. 965-966) on the Spanish Ibex being “now reduced to a number of small isolated colonies by continued persecution from the Middle Ages, when wild-goat meat was a very favoured dish at every Spanish table.”

The same author states (1914, p. 322) that, although not abundant, the Mediterranean Ibex does not seem so directly threatened with extinction as that of the Pyrenees, nor as that of Gredos was a few years ago. In the Sierra Morena, where it was becoming rare, it is now under the protection of the Marquis del Mérito.

At present, while precise information is lacking, it is to be feared that conditions of the past several years have not been, and those of the near future will not be, at all favorable to the preservation of the two remaining forms of Ibex in Spain.

**Alpine Ibex. Bouquetin des Alpes (Fr.). Steinbock (Ger.).
Stambecco (It.)**

CAPRA IBEX Linnaeus

[*Capra*] *Ibex* Linnaeus, Syst. Nat., ed. 10, vol. 1, p. 68, 1758. ("In Walliesiae praeruptis inaccessibleis" = Alps of Valais, Switzerland.)
FIGS.: Fitzinger, Bilder-Atlas, Säugthiere, fig. 211, 1860; Royal Nat. Hist., vol. 2, pl. facing p. 247, 1894; Lydekker, 1901, pl. 3, fig. 9, and p. 165, fig. 39; Gourdon, 1908, pl. 1, fig. B; Martin, 1910, pl. 46; Colosi, 1933, pl. 2; Didier and Rode, 1935, p. 335, fig. 197.

Formerly ranging through the Alps of Switzerland, France, Italy, and Austria, this Ibex was gradually exterminated in all but a few specially protected localities. What may be the original stock still survives in the Gran Paradiso National Park in the Italian Alps, and recently some colonies have been established in Switzerland by reintroduction. Perhaps a small colony remains in Salzburg, Austria.

"Height about 32 to 34 inches. Horns inclining backwards in a bold scimitar-like sweep, distinctly triangular in section, with the front surface broad, flattened, and carrying a number of bold transverse knots or knobs. Beard, which is confined to chin, moderate. General colour dusky grey, darker on chin, upper portion of throat and under-parts; blackish below and along anterior surface above, this dark area not noticeably contrasted or sharply defined; tail . . . blackish at tip. Fine horns measure from 30 to 44½ inches along front curve." (Lydekker, 1913c, vol. 1, p. 141.)

Lydekker (1901, pp. 163-164) gives the following general account:

Originally inhabiting all the higher Alps of the Tyrol, Savoy, and Switzerland, the ibex, after the wild ox and the bison, seems to have been one of the first of the wild ruminants of continental Europe whose range and numbers were seriously affected by human persecution. And, always excepting the wild ox, it is actually the first which has become practically exterminated as a wild animal. For ibex-shooting, save to a few fortunate individuals who receive special royal permission, has become a sport of the past; this handsome and interesting animal being now represented only by a few small herds which, under the protection of Government, survive in certain carefully-guarded Alpine valleys on the Italian side of Monte Rosa. As might be expected, the members of these herds appear to be of much smaller bodily dimensions than

their ancestors who roamed at will over the Alps; and, judging from specimens which occasionally reach England, it would seem highly probable that some at least of these protected herds have a strain of the blood of the domesticated goat in their veins. . . . As early as the sixteenth century the numbers of this animal had been so reduced that it was even then regarded as rare and local in most parts of Switzerland. The year 1540 is stated to have witnessed its final disappearance from the valley of Martinswand, while it only survived another decade in Glarus, and by 1574 had become extremely scarce in Graubünden. In Bergell and the Upper Engadine the species survived till a somewhat later date, laws for its protection being propounded in 1612 and again in 1633. And even so late as the latter part of the eighteenth century ibex were to be found in the mountains bordering the Val de Bagnes (Bagnethal), a tributary of the Rhone in the south of Valais (Wallis), while in other districts of the same canton a few lingered on as late as the commencement of the nineteenth century. These, however, were the last survivors of the species in Switzerland. In Salzburg and the Tyrol the species had become scarce by the middle of the sixteenth century In Salzburg ibex horns, as well as other parts of the animal, were much esteemed as medicine, and in 1584 the Archbishop made great endeavours to save the species from extermination. . . . In 1666 a few ibex still remained in the Zillenthal. And about that period further steps were taken to protect the ibex in these districts, the peasants being paid a certain sum annually in order to refrain from pasturing their cattle on the high Alps. The ibex being thus undisturbed, accordingly increased somewhat in numbers up to the year 1698, at which date the flocks comprised seventy-two bucks, eighty-three does, and twenty-four kids. But with this increase in numbers shooting and trapping were once again permitted, with the usual inevitable result; and in 1706 the Tyrol flock was reduced to five bucks and seven does, and with these the record of the species closes in this district. The year 1699 seems to have been the one in which the ibex were most numerous in the mountains of the Tyrol and Salzburg, more than one hundred and fifty having in that year been counted in the Floienthal alone.

On the southern, or Piedmont, side of the Alps, where the ibex appear to have been moderately abundant throughout the eighteenth century, a very serious diminution in their numbers was reported in 1821. This led to the enactment of rigorous laws for their protection; and it is owing to these laws that the ibex has not long since been numbered among the species that have disappeared for ever from the world. By 1865 a large number of old bucks had reappeared on the flanks of Monte Rosa in spots where not a single head had been observed for some fifty years previously.

In 1838 Schinz (p. 9) considered this species restricted to the chain of Mont Blanc and Monte Rosa.

Switzerland.—Since 1869 attempts have been made to reintroduce the Ibex, the stock being obtained from the Italian National Park. By 1927 it had spread out from seven centers of distribution, and its numbers were estimated at 120. (Boubier, 1927.)

In the Alps of Valais the last Ibex (or one of the last) was killed in 1809. As a result of successive releases since 1911, the number in nine localities in Switzerland had increased to an estimated total of 338-380 by the end of 1934; and to 410-470 by 1937. Hunting of this species is absolutely forbidden; furthermore, all the Ibex colonies are located in reserves where no hunting of any kind is

permitted. (Federal Forest, Game, and Fish Inspection, *in litt.*, June, 1936, and March, 1937.)

Germany.—The species has been exterminated here since the fifteenth century but has lately been reintroduced into the Bavarian Alps, where it is protected by law (Internationale Gesellschaft zur Erhaltung des Wisents, *in litt.*, October, 1936).

France.—The date of the disappearance of the Alpine Ibex in this country does not seem to be definitely fixed. Schinz writes (1838, p. 20) that the high prices offered for museum specimens have contributed to its decrease in Savoy. Trouessart states (1884, pp. 279-280) that it has become very rare and is scarcely found save on the massif of Monte Rosa, Italy; also that the female, at need, defends its young with its horns against the attack of Eagle or Lammergeyer. Later Trouessart writes (1910, p. 237) that it is exterminated in Savoy.

E. Bourdelle writes (*in litt.*, March, 1937) that the Ibex still existed in the highest parts of the Alps in very small numbers at the end of the last century, but can now be considered extinct in France. Perhaps the restocking of certain areas in the former range of the species could be considered.

Italy.—At the beginning of the nineteenth century some individuals were still found in the vicinity of Monte Rosa and the Cervino. The reserve of Gran Paradiso was established by Victor Emanuel II and completed in 1854. Thus protected, the Ibex increased to about 600 in 1879 and 3,020 in 1914. In 1922 Gran Paradiso was made a National Park. Through relaxed supervision during the World War some of the Ibex had been killed off, but by 1927 their numbers had risen again to 2,800. Some are found outside the park in adjacent territory. (Colosi, 1933, pp. 34-35.)

"The ibex in the Piedmontese Alps is holding its own, largely because when Dr. Zumstein contrived [in 1816] to have it made Royal Game he knew nothing of the modern 'control-methods,' and a vanishing species re-established itself so firmly by a natural process that it should survive for an indefinite period" (H. W. Shoemaker, *in litt.*, November 18, 1932).

"At Abruzzi in Italy . . . a large national reserve has been established chiefly for sub-alpine plants and animals and now contains ibex, chamois, brown bears, and wolves" (Mitchell, 1931, p. 36).

The Field (October 7, 1933) announced that by order of the Italian Ministry of Agriculture and Forests "the male ibex may be shot from now until the end of the year. The shooting fee is lire 8,000 (about 130 pounds) for the first head, and lire 6,000 (about 100 pounds) for additional heads, so it would not appear that any great inroads will be made on the existing herds. . . . It is estimated that there are at present" in the Gran Paradiso area "about

3500 head of ibex . . . , for whose protection there is a special corps of Royal Hunt Guards."

The Alpine Ibex is also found on the royal hunting grounds of S. Anna di Valdieri and will be introduced into the Stelvio National Park (Laboratorio di Zoologia Applicata a Caccia, *in litt.*, September, 1936).

Austria.—To judge by the horns found, the Ibex occurred in Carinthia very long ago. In Nieder-Österreich (where it has perhaps been absent throughout historical times) introduction was tried in 1936 in the region of Schneeberg-Rax, but the result is not known as yet. In Salzburg the species was certainly common in former days, and now a colony of about 30 head is found in Blühnbachtal. In the Tyrol it was generally distributed in the fifteenth century, but was greatly reduced in numbers during the next century, and the last ones were observed in 1706 in the Floitental, a tributary of the Zillertal. Efforts are now being made to reintroduce it in that region. In Vorarlberg the Ibex has been exterminated since the sixteenth century. Here as well as in the Tyrol extinction was due to poaching by the local residents, who superstitiously believed in the medicinal properties of certain parts of the animal. These were considered "sympathetic" remedies against illness and were also used to increase generative faculties, etc. (G. Schlesinger, *in litt.*, March, 1937).

Yugoslavia.—An introduced herd exists on the property of Baron Born at Sveta Ana, south of Loibl Pass on the Carinthian frontier. Before the World War the stock was 38 head, but then became reduced to 6. This herd is said not to be pure-blooded, but interbred with domesticated goats. (G. Schlesinger, *in litt.*, March, 1937.) By 1936 the herd had increased again to about 20 head (M. Hirtz, *in litt.*, November, 1936).

Rumania.—Remains in the Carpathians indicate that Ibex co-existed with man in prehistoric times (R. J. Calinescu, *in litt.*, September, 1937).

Extinction through dilution?—There is apparently some possibility of the extinction of the Alpine Ibex as a purebred species. If the Italian stock (at one time practically the last remnant of the species) is not pure, probably no other stocks of the present day are. In 1886 P. L. Selater wrote (p. 315): "Whether the pair of this species presented to us by the late King of Italy in 1862 were really perfectly pure was, I have always thought, a little doubtful; at all events it is well known that the Alpine Ibex breeds freely with the Domestic Goat, and I have seen many such hybrids." Still earlier Schinz had remarked (1838, p. 6) on the long-known fact that the

Alpine Ibex interbred with the domestic goat in complete freedom and produced fertile crosses.

Nubian Ibex; *Beden*

CAPRA NUBIANA NUBIANA F. Cuvier

*Capra nubiana*¹ F. Cuvier, in Geoffroy and Cuvier, Hist. Nat. Mamm., "vol. 3, livr. 50, pl. 347 (399) in Brit. Mus. copy, 1825" (Flower, 1932, p. 435). (Type locality "not known. The species was described in June 1825 from a young male received in the Jardin des Plantes Menagerie, Paris, which had been sent from Egypt by M. Drovetti, French Consul at Alexandria, to H. R. H. the Duke d'Angouleme." (Flower, 1932, p. 436.))

FIGS.: Geoffroy and Cuvier, *op. cit.*, pl. 347; P. L. Selater, Proc. Zool. Soc. London 1886, pl. 32; Lydekker, 1908, p. 90, fig. 30; Brocklehurst, 1931, p. 81, fig., pl. facing p. 82; Ward, 1935, p. 275, fig.

This Ibex appears to have suffered severely from persecution throughout its range along the Red Sea littoral, but it has at least one stronghold in the shape of a national reserve about 50 miles southeast of Cairo.

Knots on the horns more strongly developed and more regularly arranged in this subspecies than in *C. n. sinaitica*; general color of upper parts brownish or yellowish fawn; muzzle, chin, beard, flanks, chest, nape-tuft, dorsal line, and outer side of legs (except knees and pasterns) blackish brown or black; inner sides of thighs and buttocks, a streak on the abdomen, inner sides and back of hind legs below the hocks, most of the corresponding surfaces of the forelegs above the knees, and a band above each hoof, white or whitish; horns black (Lydekker, 1908, p. 90). Height of male at shoulder, 33 inches (Brocklehurst, 1931, p. 81). Record length of horns on front curve, 47½ inches (Ward, 1935, p. 272). "So far I have been unable to find any constant points of difference between the Ibex of Sinai and those of Upper Egypt and Nubia" (Flower, 1932, p. 436).

The Nubian Ibex ranges from Lower Egypt to northern Eritrea, and is confined to the east side of the Nile. Old reports from Morocco and Senegambia are undoubtedly erroneous.

Heuglin (1861, p. 16) speaks of this animal as occurring in numerous families on the Egyptian coast of the Red Sea, south as far as the Tropic of Cancer.

In 1886 Floyer (1887, pp. 671-680) reported Ibex as rather plentiful in the Kittar mountain region, between Kena and the Gulf of Suez. The Bedouin were said to fire from rude shelters at the Ibex coming to water-holes.

"The natives use dogs for hunting the ibex, which is very common in the Erba Mountains [northwest of Port Sudan] and all along the

¹ Not listed by Sherborn (Index Animalium).

range from the Amara Asortriba [near Port Sudan] to Abu Darag, near Suez. The general way of hunting ibex is to surround a mountain and let the dogs go; they chase the ibex, which invariably makes up the hill at first; the dogs follow till they run them to bay on some crag or boulder, and the Arabs surround the animal and then spear it. Four or five big ibex are sometimes taken like this in a morning." (Wylde, 1888, p. 215.)

Burckhardt wrote in 1819: "I frequently saw mountain-goats of the largest size brought to the market of Shendi [about lat. 17° N.]; . . . their flesh is esteemed a great dainty." Schweinfurth in 1893 reported Ibex "just opposite Nagi Hamada, near Farchoût [about lat. 26° N.], on the eastern side of the Nile." (De Winton, in Anderson and de Winton, 1902, p. 333.)

"The Nubian Ibex is common on most of the large mountains at the back of Souakin" (Cotton, 1912, p. 51).

Flower (1932, pp. 436-437) gives the following account:

The large numbers of Ibex heads and horns that used to be offered for sale in Suez as from "Mount Sinai" might be from anywhere on either side of the Gulf of Suez or the Red Sea. . . .

Ibex inhabited the hills on the east side of the Nile from Cairo and Suez southwards to the Sudan frontier. During my time I saw two individuals that had been caught alive in the El Saff country, the district of Giza Province that lies on the right bank of the Nile, but most specimens came from the Assiut, Girga, and Qena Provinces. Englishmen employed on the construction of the railway between Luxor and Aswan in the last decade of the nineteenth century told me that in the Aswan Province the Ibex came right down to the river to drink

Throughout the area, in spite of several attempts at protection by legislation, by watchmen, and by stopping the sale of horns, this fine animal became very rare in all districts of easy access, owing to much persecution from men with firearms who waylaid the Ibex at the water-holes. Capt. G. W. Murray, M. C., wrote, 3 April, 1920:—"Ibex tracks and dung are rare in the big hills, except on the almost inaccessible Gebel Shayeb (about 33° 30' E. by 27° N.), where I saw fresh dung in every nook and corner from 4000 feet to the very summit of the mountain, 7200 feet. They must be very numerous, but I saw none of them."

By 1922 the Ibex in Upper Egypt appeared to be in great danger of extermination; but fortunately there were, and are, some men in leading positions in Egypt doing all they could to save the species.

"Eritrea contains a very few Nubian Ibex in the extreme north." Some years prior to 1932, in the Red Sea Hills near Tokar, "there were plenty of Ibex." (Maydon, 1932, pp. 194, 201.)

Thirty years of preservation on the Wadi Rishrash, about 50 miles southeast of Cairo, have prevented the annihilation of the local Ibex. This was a private shooting reserve about 20 miles long and 10 miles wide, established by the late Prince Kamal el Din Hussein. It is now maintained as a national reserve by King Fuad. Forty Ibex were seen there at one time. (Russell Pasha, 1934, pp. 16-18.)

The following account is furnished by T. W. Russell (*in litt.*, October 27, 1935):

"I managed to get local Arrêtés passed by all Upper Egypt provinces making it illegal to kill ibex and Barbary sheep in the Eastern desert, i. e., between the Nile and the Red Sea.

"Ibex are still numerous in all the mountainous parts of the desert, i. e., parts where grazing and refuge are to be found. . . .

"Bedouin hunting with dogs was taking its toll of the sheep and snaring over the few water holes was killing large numbers of ibex. . . .

"I then got the Government to appoint a special Camel Corps police patrol for that area, got out local game laws and put it across the poaching Arabs.

"Last winter . . . three big rains . . . brought to life all the dormant plant seeds in the wadis. . . .

"I sent a patrol up in August and the reports were most encouraging. . . . Large quantities of ibex . . . in the smaller and more inaccessible wadis where the grazing had not been good enough for camels but amply good for game. . . .

"The ibex don't seem to need such a refuge [as serves the Egyptian Arui on the western face of the Wadi Qena]; much smaller rough country does for him; he trusts to cunning whereas the sheep panics at the slightest sign of man or camels."

"A mountainous area of about 400 square miles in the Red Sea province has been dedicated as a sanctuary for ibex" (Hobley, 1933, p. 45).

"The Ibex in the Sudan is confined to the Red Sea Hills, where it is comparatively common, especially in the Karora District, bordering the frontier of Eritrea. . . .

"Their chief enemies are Leopards, which abound in the Red Sea Hills

"Ibex have lately been introduced into the Shabluka Hills about sixty miles north of Khartoum, . . . and, up to the time of writing, they are doing very well." (Brocklehurst, 1931, pp. 81-82.)

"The Red Sea tribes, who hunt on foot, drive herds of Ibex up a narrow gully until the animals are forced to walk in single file.

"Natives, previously concealed behind rocks, pelt them with stones, and later kill the cripples with knives." (R. S. Audas, in Brocklehurst, 1931, p. 161.)

"In the Red Sea province several hills were declared as sanctuaries for ibex, but it was found that the stock in these sanctuaries decreased rather than increased. The reason for this was found to be that the native took care to preserve the ibex in the neighbourhood of his village in order to encourage the visiting sportsmen, from whom he derived considerable benefit. He considered the sanc-

tuaries as 'no man's land,' where he could hunt the ibex himself or drive them into a more profitable area." (Brocklehurst, 1933, p. 740.)

De Beaux writes (1935, pp. 7-10) that two specimens were killed in Eritrea in 1932 by Capt. Arnaldo Bizzarri. The only herd that he found (composed of 8 individuals) was in the mountains near the valley of Sciancolet, on the Eritrean-Sudan boundary. The specimens proved to be *Capra nubiana*, and northeastern Eritrea is definitely the present southeastern limit of this animal. The Italian Minister of Colonies instructed the Governor of Eritrea to take measures for the preservation of the Ibex in that colony.

The causes of depletion in Egypt are injudicious hunting and reduced rainfall. The skins and horns have been sold, and the meat has been used for food. Shooting is prohibited by Frontiers Department Decision of 6.V.1930. (Ministry of Agriculture and Zoological Garden, Cairo, *in litt.*, January, 1937.)

"The Nubian Ibex . . . also in our judgment calls for attention. The type locality of this species is given as Nubia and its range includes the high ground of Upper Egypt and the mountainous region of the Red Sea Littoral. This species, both on account of its rarity and interest, as fully deserves protection as the Abyssinian Ibex, . . . which already figures in Class A of the Annex. We hope that before the next Conference, the Egyptian Government will give consideration to the question of including also the Nubian Ibex in that Class of the Annex." (Hemming et al., 1938, pp. 12-13.)

Sinaitic Ibex. Sinai-Steinbock (Ger.)

CAPRA NUBIANA SINAITICA Hemprich and Ehrenberg

Capra sinaitica Hemprich and Ehrenberg, *Symbolae Physicae, Mamm.*, decas 2, pl. 18, 1833. ("Ex Aegypto superiore et e montibus sinaiticis"; type locality later restricted (*op. cit.*, p. *kk* and p. following *nn*, 1833) to "montem Sinai," and perhaps more particularly to "Wadi Hebran," in the southwestern part of the Sinai Peninsula.)

FIGS.: Hemprich and Ehrenberg, 1833, pl. 18; Tristram, 1884, pl. 2; Bryden, 1899, p. 130, fig. 21; Anderson and de Winton, 1902, pl. 58 (*cf.* Flower, 1932, p. 436); Beddard, 1902, p. 325, fig. 175; Carruthers, 1915*a*, pl. 8, upper fig.

Although this Ibex was formerly common, conditions since World War I have affected it adversely, and it stands much in need of better protection.

Color yellowish dusky; hair short; female beardless; adult male with long, graceful horns, extending in a curve exceeding a semi-circle and almost in the same plane; horns quadrangular at base, triangular in middle, two-sided at tip, and furnished with convex knobs; legs blackish, much variegated with white (Hemprich and

Ehrenberg, 1832, p. following *nn*). Knobs on horns narrower, taller, and more irregularly disposed than in *C. n. nubiana*; good horns measuring from 30 to 38½ inches along front curve (Lydekker, 1913, vol. 1, pp. 154-155).

The range includes mountainous or rugged parts of the Sinai Peninsula, Palestine, and Trans-Jordan. The southeastern limits of the subspecies, where it presumably intergrades with *C. n. mengesi*, have not been accurately determined.

Hemprich and Ehrenberg (1832, p. *kk* and p. following *nn*) reported seeing many in the Sinai mountains, in flocks of 4 to 20.

"The Syrian Ibex, or Beden, is still found, not only in the ravines of Moab, but in the wilderness of Judaea, near the Dead Sea. I have procured several specimens on both sides of Jordan. . . . The Beden . . . is the 'Wild Goat' of Scripture. I obtained it twice at Engedi, where it is mentioned in connection with David's wanderings." (Tristram, 1884, pp. 6-7.)

John C. Phillips writes (in G. M. Allen, 1915, p. 14):

The Sinai Ibex still persists over all the rugged parts of the Sinai peninsula, near Akaba and up at least as far as the northeast end of the Dead Sea. Although undoubtedly greatly reduced in numbers since Tristram's time (1884), it manages to persist in spite of the fact that every hand is against it during the entire year, and its freshly dropped kids are eagerly hunted by the natives with dogs. I hunted three days and saw only four smallish animals, but signs were fairly numerous. . . . The leopard hunts these Ibexes and presumably kills a good many, as various sportsmen have testified.

Carruthers (1915*a*, pp. 23-26) gives the following account:

[This Ibex ranges] northwards as far as the upper end of the Dead Sea [On the plateau of Moab] the ibex find a very safe and rarely-disturbed retreat. . . . The streams which come down from the plateau of Moab have cut deep trenches, which are a favourite retreat for the ibex in localities where there are no natives. But in other districts the ibex has left the higher and more rugged country to the Arab shepherds and retreated down to the most barren hills in the lowest part of the Dead Sea depression. . . .

They are also found in small numbers on the west side of the Dead Sea Southwards they range without a break to the Gulf of Akaba, and thence extend into the Peninsula of Sinai. . . .

The easiest conditions under which to find these ibex are when they inhabit secluded desert ranges where they are not harassed by native hunters. Some sort of protection is needed, and in these days it is either the very rugged country, such as Sinai, or very featureless and apparently inadequate hills situated in uninhabited localities.

In 1909 Carruthers (1935, pp. 60, 64, 70, 82) found Ibex of an undetermined subspecies "in considerable numbers" on Jabal Tubaïq, approximately 150 miles east of the head of the Gulf of Akaba. Farther south, at Jiraniyat, "I witnessed the unusual sight of two Ruwalla youths hunting the wild-goats on foot; with the aid of falcons and long-dogs they literally ran them down!"

This Ibex is still comparatively common in the vicinity of the Dead Sea, and often wanders to the mountains of Ber-Seba. A specimen from the latter area seems to differ from typical *sinaitica*. (Aharoni, 1930, p. 328.)

The animals are found "on rocky mountains around the Dead Sea, in the Negeb and in Sinai. . . . Occasionally they may be found even near Jerusalem. They live usually in small troops led by an old male The Beduins of the desert mountains hunt them and the wide distribution of modern rifles is one of the main reasons for their decrease. The long period of extreme dryness, which we are experiencing at present, has been another reason for the diminution in their numbers. They still inhabit the steep mountains near Engeddi as in Biblical times." (Bodenheimer, 1935, p. 112.)

Prof. Bodenheimer writes more recently (*in litt.*, March, 1937) that this Ibex is officially protected in Palestine as well as in Sinai. But its remote habitat and the bitter armament of the Beduins prohibit any real enforcement of the laws.

In Sinai "ibex became extremely scarce after the War, as every Arab in the Mid-East had obtained possession of at least one modern rifle and unlimited ammunition. To protect the few remaining specimens, keepers were appointed to guard six of the most important mountain ranges in the south, the sale of . . . ibex meat was prohibited, and rifles and ammunition were confiscated." (Jarvis, 1935, p. 16.)

Jarvis also says (1932, pp. 201-202): "In the summer the Arabs constructed hides round the water-holes [in Sinai] and shot them as they came down to drink. . . . What really put an end to the wholesale slaughter was the running low of the stock of ammunition, and the deplorable state of the Arab rifles after a few years' neglect."

[The South Arabian Ibex (*Capra nubiana mengesi* Noack) occurs in southern and southwestern Arabia, and to an undetermined distance toward the northwest. In 1915 Carruthers (p. 33) regarded it as plentiful. Later information is lacking. It appears to be almost unknown to European hunters.]

· Abyssinian Ibex; Wali

CAPRA WALIE Rüppell

Capra walie Rüppell, Neue Wirbelthiere zu der Fauna von Abyssinien gehörig, Säugethiere, p. 16, 1835. ("The highest rocky mountains of Abyssinia, . . . in the Provinces of Simien and Gojjam"; type locality restricted by Lydekker (1913c, vol. 1, p. 156) to "mountains of Simien, Abyssinia.")
 FIGS.: Rüppell, *op. cit.*, pl. 6; Lydekker, 1908, p. 93, fig. 31; Selous, 1914, pl. 63; Maydon, 1932, pls. 51, 55, 57; Ward, 1935, p. 270, fig.; Field Mus. News, vol. 7, no. 2, p. 3, fig., 1936.

The restricted range of this Ibex in Ethiopia, and the persecution to which it has been long subjected by the natives, render it of particular concern to conservationists.



FIG. 56.—Abyssinian Ibex (*Capra walie*). From photograph, Field Museum of Natural History.

It differs from other Ibexes by its strongly convex facial profile and by a conical hump between the horn bases; horns with two right angles in front, but rounded behind; a short beard on chin. Front and upper side of head, neck, and back chestnut-brown; nose, a streak between eye and ear, and sides of neck and body reddish umber-brown; area beneath eye and ear, chin, throat, chest, inner side of the upper half of the legs, and posterior half of the belly dirty white; outer side of limbs and flanks ashy gray; lower parts

of limbs whitish, with broad black stripes in front, extending down to the fetlocks; base of tail chestnut-brown, tip black; inner surface of ears white, border and outer surface reddish brown. (Rüppell, 1835, pp. 18-19.) Height at shoulder about 38 inches; record length of horns on front curve, 44 inches (Ward, 1935, p. 271).

P. H. G. Powell-Cotton (as quoted by Lydekker, 1908, pp. 91-92) writes as follows:

This ibex . . . is said to exist only in the mountains of Simien. I shot four specimens. [On June 26] I saw two large males . . . with thirteen females. . . . The natives hunt these animals persistently for their flesh, skins, and horns (which they use for tumblers), and now that they are so much better armed, I believe in a very few years the animals will be extinct. . . .

I found the ibex on the eastern slope of Mount Buiheat, one of the highest in the Simien range. . . .

I found numerous traces of where native shikaris had lain up to get a shot at them, generally overlooking a drinking-place or a favourite shelter.

A. M. Bailey (1932, pp. 69-74) describes the exceptional difficulties of hunting this Ibex on the great cliffs in the mountains of Simien. Several specimens were secured, and one band numbering a dozen or more animals was sighted.

Maydon writes (1933, p. 738):

Extremely rare and so far only located in the Semien mountains n. e. of Lake Tsana in a 40 mile area. On the north side there is a huge scarp, in places 14,000 feet high and dropping sheer precipices to the lowlands of 3000 ft. alt. On this scarp the Ibex live. They are much harried by the Abyssinians for the meat and sale of the horns (to make cups, etc.).

In 1925 Capt. G. Blaine and I saw only about a dozen herds in 6 weeks' hunting and after exploring most of the scarp. . . . (Note: At present I see no possible means of trying to preserve game in Abyssinia.)

The species is accorded complete protection under the London Convention of 1933.

Sind Wild Goat; Sind Ibex

CAPRA HIRCUS BLYTHI Lydekker

Capra Blythi Hume, Proc. Asiatic Soc. Bengal 1874, p. 240, 1875 (*nomen nudum*).

Capra hircus blythi Lydekker, Wild Oxen, Sheep, & Goats, p. 264, 1898. ("Sind"; the type specimen is later shown by Lydekker (1913c, vol. 1, p. 160) to have come from the Eric Hills in Sind.)

FIGS.: Lydekker, 1900, pl. 4, figs. 1, 1a, and pp. 98, 99, figs. 13, 14; Kennion, 1911, pls. facing pp. 34, 59 (subsp.?); Lydekker, 1913c, vol. 1, p. 159, fig. 39; Stockley, 1928, pl. facing p. 122; Jour. Bombay Nat. Hist. Soc., vol. 36, no. 4, suppl., pl. 13, 1933; Ward, 1935, p. 274, fig.

This Wild Goat is sadly reduced in numbers; of late years it seems to have received insufficient protection from poachers.

It is smaller than the Persian Wild Goat (*C. h. aegagrus*); the front edge of the scimitar-shaped horns of the males either totally devoid of knobs, or with only a very few and these very small; ground color very much paler, but the face markings darker and more sharply defined; the bucks often showing a large patch of dirty white on each side of the neck, and having the greater part of the body behind the dark brown shoulder collar nearly pure white (Lydekker, 1898c, p. 264, and 1900, p. 100). Length of horn on front curve up to 52 $\frac{3}{8}$ inches (Ward, 1935, p. 274).

"Within Indian limits, this wild goat is found on the barren hills of Baluchistan and Western Sind, but not east or north-east of the Bolan Pass and Quetta, as it is replaced by *C. falconeri*." It occurs "in herds of varying numbers." (Blanford, 1891, p. 503.) The northwestern limits of this subspecies, where it presumably intergrades with *C. h. aegagrus*, have not been accurately determined, but they may lie somewhere in Persia. The Ibex that Kennion (1911, pp. 34-61) found rather common on the ranges of Seistan, in eastern Persia, are apparently intermediate between *aegagrus* and *blythi*.

C. H. Stockley writes (*in litt.*, December 12, 1933) of a recent visit to "the Kirchat preserve in W. Sind. I have been to it three times before, since the War, and estimated that there were between 400 and 500 Sind Ibex . . . and 80 to 100 orial on the preserve, which is about 90 miles north of Karachi. I have met and conversed with others who were there in 1927 & 1929, and they said that the stock was then fully up to this level. In 1931, for motives of economy, the watchers were all discharged, though the place nominally remained a reserve, and the local native gentry swarmed in and slaughtered the animals. . . . I reckon the stock is now under 200 ibex and 30 orial. There is not a full grown buck ibex on the ground (except perhaps one . . .). . . . They are supposed to carry a gall bladder of exceptional medicinal value.

"The Kirchat preserve could be efficiently kept by 4 men @ 15 rupees per month, which equals £54 per annum."

The Bombay Natural History Society writes (*in litt.*, December, 1936): "In the Khirtar range in Sind the animal has been seriously reduced in numbers particularly in the Karachi Dudu section of the range where it is being rapidly exterminated. In the Kohistan section conditions are better mainly owing to rigid protection by private agency. . . . The Khirtar range lies outside forest administration and though some efforts have been made to stem the destruction of these animals in British Territory, they have not been successful. This species was particularly recommended for protection by the All India Wild Life Conference. Effective warding supported by special legislation is necessary to protect the animals in this zone."

[The Persian Wild Goat (*Capra hircus aegagrus* Erxleben) ranges "from the Daghestan district of the Caucasus through the mountains of Asia Minor and Persia, including the Kopet Dagh, to the confines of Baluchistan and Sind" (Lydekker, 1913*c*, vol. 1, p. 158). Though considerably persecuted, it has evidently survived, in at least some parts of its range, in more satisfactory numbers than the Sind Wild Goat.

Another subspecies, *C. h. neglectus* Zar. and Bilk., has been described from intermediate territory in Seistan, Persia. Ognev and Heptner (1928, p. 266) consider this very close to, if not identical with, *C. h. blythi*.]

Astor Markhor

CAPRA FALCONERI FALCONERI (Hügel and Wagner)

Aegoceros (Capra) falconeri Hügel and Wagner, Gelehrte Anzeigen K. Bayer. Akad. Wissen. [München], vol. 9, no. 183, p. 430, 1839. (No type locality stated except as implied in incidental references to "Kashmir" and "the highest parts of the Tibetan Himalayas"; type locality restricted by Lydekker (1913*c*, vol. 1, p. 162) to "Astor.")

FIGS.: Schreber's Säugthiere, Supplementband 4, pl. 287 E, fig. 2, 1844; Hügel, Kaschmir, vol. 4, pl. facing p. 579, 1844; Lydekker, 1898*c*, pl. 25 and pp. 289, 290, figs. 54, 55; Lydekker, 1900, pl. 4, fig. 3, and p. 111, fig. 16; Lydekker, 1913*c*, vol. 1, p. 163, fig. 40; Van der Byl, 1915, pls. 41, 44; Stockley, 1928, pl. facing p. 126.

The Astor Markhor, like the several other subspecies, has declined to at least some extent from overshooting; but detailed information on its numerical status is not available.

The size is large, probably fully equal to that of the Pir Panjal Markhor; hair short in summer, long and silky in winter, with little or no underfur; in old males at all seasons a profuse beard extending from chin to chest and sides of neck; beard black in front, light gray behind; general color in winter gray, in summer rich reddish brown, but in old males whitish throughout. Horns of males forming an extremely open spiral, more divergent than in any other race, and perhaps never exceeding one and a half turns; length on outside curve up to about 60 inches. (Lydekker, 1898*c*, pp. 286-291.)

Statements in the literature indicate that the ranges of the Astor and the Pir Panjal Markhors overlap or interdigitate in a most confusing manner. Some of these statements are probably entitled to no more than provisional acceptance until the taxonomy of the group is better worked out.

Lydekker (1898*c*, p. 288) gives the range of the present subspecies as "Astor and Baltistan; apparently intergrading with the next race [*cashmiriensis*] on the confines of Hazara and Gilgit."

Burrard (1925?, p. 175) describes its distribution as follows:

The valley of the Astor River is its stronghold, but heads of this type are also found farther north in Baltistan, as well as nearer its home in two or



FIG. 57.—Markhor (*Capra falconeri* subsp.). After Cassell.

three valleys to the south of Astor, all of which join the Indus on its left bank. It has been stated that the variety is never, or at any rate rarely, found on the right bank of the Indus, but this is not correct, as it occurs in almost all the nullahs running into the Indus on its right bank from Rondu in Baltistan down to Chilas. It is true, however, that heads of this type are in the minority in these nullahs. It is also sometimes found in the Gilgit Agency.

Blanford writes (1891, p. 508) of the species as a whole: "It generally occurs in herds, and keeps much to steep rocky cliffs. . . . Wherever it inhabits high ranges it is usually driven to the valleys when heavy snow falls The markhor is in appearance by far the grandest of all wild goats, and . . . no species excels it in agility and skill in climbing difficult and dangerous ground."

Arbuthnot says (in Burrard, 1925?, p. 181): "In some nullahs in Astor and Haramoosh they may be seen in large herds, but the old veterans generally live apart."

C. H. Stockley (*in litt.*, May 29, 1933), without particularizing subspecies, writes of "the rapid decrease of that very fine animal the markhor. I fear they are likely to disappear entirely on the N. W. Frontier and are terribly reduced in Kashmir."

Stockley also remarks (1936, p. 142) on the confusing distribution of the Astor and the Pir Pinjal types of horns:

There is . . . a curious difference in the majority of the heads from the two areas [Baltistan and the country farther west]; those of the right bank nullahs above Haramosh often looking just as if they came from the Kaj-i-Nag, their close spiral contrasting with the very open curve of the Haramosh and Astor heads, in which the first outward turn of the horns just above the skull, is almost at right angles to the base of the horn, and the next rising turn almost square again with the first. I have seen a head of 53 inches from the Turmik nullah of the right bank which had a closer spiral than most heads from the Kaj-i-Nag, while of over forty bucks which I saw in the Mushkin nullah on the left bank every one was of the very open type.

There is a further note by Stockley (1936, p. 144) on the present subspecies: "The nullahs on the Astor river rarely produce a good head nowadays, but it is well worth while doing the few extra marches beyond Bunji and trying Jutyal, Khaltar, or the Haramosh Nullah."

The Game Warden of Kashmir (*in litt.*, May, 1937) writes optimistically concerning the Astor and the Pir Panjal Markhors together, stating that they are plentiful and show no decrease. The shooting of a limited number of fixed horn length is permitted on a shooting license.

Pir Panjal Markhor

CAPRA FALCONERI CASHMIRENSIS Lydekker

Capra falconeri cashmirensis Lydekker, Wild Oxen, Sheep, & Goats, p. 290, 1898. ("The Pir-Panjal and Kajnag ranges on the south side of the valley of Kashmir, unknown on the northern side of that valley, and not extending farther east than the Chinab; to the north-west in Hazara and Gilgit"; type locality restricted by Lydekker (1913c, vol. 1, p. 164) to "Pir Panjal Range.")

FIGS.: Blanford, 1891, p. 506, fig. 165; Lydekker, 1898c, p. 292, fig. 56; Lydekker, 1900, pl. 4, fig. 4, and p. 114, fig. 17; Stebbing, 1912, p. 239, fig.; Lydekker, 1913c, vol. 1, p. 165, fig. 41; Jour. Bombay Nat. Hist. Soc., vol. 36, no. 4, suppl., pl. 14, 1933; Ward, 1935, p. 266, fig.

In at least parts of its range the Pir Panjal Markhor has suffered severely from overshooting. During recent years, however, better protection in some areas has brought an improvement in the animal's status.

"Size large, the height reaching to 40 or 41 inches at the shoulder. Horns of males with the spiral less open than in the typical race, and showing in fine examples from one to two complete turns. As observed by Mr. Blanford, the horns of this race pass into those of the last [*falconeri*] and the next [*megaceros*], by every conceivable gradation, probably on the confines of their respective distributional areas." (Lydekker, 1898c, p. 290.) The record length of horn along the outer curve is here given as 59 inches, but Burrard mentions (1925?, p. 176) a later record of 65 inches.

Lydekker's original statement of range is quoted above. In Gilgit the Astor and the Pir Panjal races "seemingly intergrade, so that no hard-and-fast lines can be drawn between their respective habitats" (Lydekker, 1900, p. 113). Burrard (1925?, pp. 175-176) writes of the distribution:

This variety is found, as its name indicates, in the Pir Panjal Range, but only where that system lies in Kashmir proper; it also occurs in the Kaj Nag and Shamsberi systems, both of which lie entirely within the vale of Kashmir and are off-shoots of the Pir Panjal Range, and even in some of the nullahs which run down into the lower part of the Kishengunga Valley on the left bank of the river. In addition to being a feature of the grounds in Kashmir, the Pir Panjal type is the common variety which occurs throughout Baltistan, Gilgit and Chitral, and it is also found in the nullahs of the Astor Valley, but here it is not as common as the Astor variety. Its northern limits appear to be: in the Lutkho Valley at a point halfway between Drusp and Shogot; in the Chitral main valley and valleys joining it on the left bank at Mori (about 10 miles above Chitral). In Chitral proper its southern limits are said to be on the right bank of the Kunar River at Chigar Serai, and on the left bank at Nari (Narsat).

"The Pir-Panjal markhor is one of the animals in imminent danger of extermination in its typical habitat, unless the new forest laws of the Kashmir Government are sufficiently stringent to enable it to recover its numbers" (Lydekker, 1898c, pp. 291-292).

"In the old days markhor-shooting . . . was one of the finest of Kashmir sports, but the numbers of old bucks with fine horns have been grievously reduced in recent years" (Lydekker, 1900, p. 115).

"Markhor are still fairly plentiful in Chitral and Chilas, and round the slopes of Mount Nanga Parbat . . . Following up the Indus Valley from its junction with the Astor River, Haramoosh is famous for big markhor, and they inhabit most of the nullahs on either bank as far east as Rondu." (Arbuthnot, in Burrard, 1925?, p. 178.)

The following remarks by Stockley (1936, pp. 140-144) apply, at least for the most part, to the present subspecies:

The markhor of the Pir Panjal were the first to receive the attentions of the Nimrods of last century, and shooting ethics being in a crude state . . . , they suffered severely and were reduced almost to vanishing point. The Maharajahs of Poonch State, the north-eastern boundary of which is the crest of the Pir Panjal, began to preserve them strictly, and they are now once more in considerable numbers and would be plentiful if it were not for poaching Gujars. The heads from this area have also begun to improve greatly, and three over 50 inches were shot in 1932 and '33. . . .

Going north again, the next range holding markhor is the Samshibri, with the Slakalla spur on its north side. Unfortunately neglect to carry out real, as opposed to nominal, preservation, has led to the practical extermination of the markhor in this area at the hands of local poachers, and it is not until the Indus is crossed, and Chilas reached, that there are markhor in any numbers. Nanga Parbat may be considered the hub of the markhor world, and this grand and forbidding mountain has markhor on every side of it. . . .

The left bank nullahs [on the Indus] from Rondu to Bulachi have been almost cleaned out by poachers, as there is a village in, or at the mouth of, every one

Gilgit is almost entirely a close preserve of the garrison there, and few outside that small and select body have had the opportunity to a shoot in that excellent district.

The Bombay Natural History Society writes (*in litt.*, December, 1936) that Markhor, while still plentiful, have suffered in certain areas in Kashmir. A survey in the Mogi Nullah, Kaj-i-nag Mountains, carried out by a reputable observer and naturalist in 1924 and again in 1934, revealed that a serious depletion had taken place there.

Cabul Markhor

CAPRA FALCONERI MEGACEROS Hutton

Capra Megaceros Hutton, Calcutta Jour. Nat. Hist., vol. 2, p. 535, 1842. (From Hutton's account it is difficult to make out any more definite type locality than Afghanistan; this is restricted by Blanford (1891, p. 507) to "near Cabul.")

FIGS.: Hutton, *op. cit.*, pl. 20; Wolf, Zool. Sketches, ser. 2, pl. 20, 1867; Blanford, 1891, p. 507, fig. 166; Royal Nat. Hist., vol. 2, p. 251, fig., 1894; Lydekker, 1900, p. 117, fig. 19; Proc. Zool. Soc. London 1902, vol. 2, pl. 27 (intermediate between *megaceros* and *cashmiriensis*); Lydekker, 1913c, vol. 1, p. 168, fig. 43; Ward, 1935, p. 266, fig.; Pocock, 1937, p. 680, fig.

This Markhor, having escaped the attention of European hunters over much of its range in Afghanistan, perhaps survives in better numbers than the other subspecies. Definite information, however, is lacking.

"The horns . . . diverge gradually from the base so as to form the capital letter V. They are spirally twisted, but differ much in

the closeness of the volutions, some turning round a straight and direct axis from the base to the apex, others taking a wider or more circular spiral sweep.

"The colours of the male are very similar to those of the female . . . , but he possesses a long black beard, which in her is wanting; the colour of the upper parts is a yellowish brown, yielding to greyish with age. Along the dorsal ridge is a narrow pale stripe . . . ; the forepart of the limbs are deep brown, of a chestnut hue, and the tail is of the same colour; the belly white. . . . The tail is about six inches long." (Hutton, 1842, p. 538.) The record length of horn in a straight line is 39½ inches (Ward, 1935, p. 265).

Lydekker (1913c, vol. 1, p. 167) gives as the distribution of this subspecies "the mountain ranges of Northern Afghanistan," and refers to its specimens from such widely distant points as Chitral in the North-West Frontier Province and Quetta in Baluchistan. It is unknown in northeastern Persia (Kennion, 1911, p. 37).

Animals of the Cabul type "are first found in the hills on the northern edge of the Peshawar district, and they are the variety which occurs in the Kabul Valley and all the hill ranges of the North-West Frontier of India down to the Gomal River, which may be said to be its southern limit" (Burrard, 1925?, p. 176).

It is presumably this form of Markhor that occurs in extreme southeastern Russian Turkestan. W. G. Heptner writes (*in litt.*, December, 1936) that it exists only in a very limited area in the mountains on the right bank of the Amu Daria and in the most remote regions. It does not seem to be threatened.

On the popular utilization of this animal, Hutton writes (1842, p. 539):

The name of "Markhore," or "Snake-eater," is given to the animal by the Afghans from an idea, that it has an instinctive feeling which prompts it to seek for and devour snakes. Hence it is believed also, that if a man be bitten by a snake, the wound may speedily be healed, and the poison neutralised by eating of the flesh of the Markhore. The hunters also declare, that the fat of the stomach is so excessively nutritious, that it enables them to pursue the chase with greater vigour than any other food, and even after a meal of it, to endure a fast of several days.

The "bezoar" is said to be often found in the stomach of this animal, and is thought to be efficacious in drawing out the poison from a snake bite, and it is applied for this purpose to the wounded part.

Chialtan Markhor

Lydekker (1913c, vol. 1, p. 171, fig. 45) has described *Capra falconeri chialtanensis* from "the Chialtan Range, near Quetta, Baluchistan," adding that "the race is believed to be extinct." The horns form an open spiral of rather more than one complete turn,

and at the completion of the first turn the hind keel is situated on the inner border, whereas in all other Markhors this position is occupied by the front keel.

Burrard writes (1925?, p. 177) that this "is the characteristic type for the area comprising the Chialtan, Takatu and Zarghan Ranges, and almost all the hill systems situated between Quetta and Chilas. . . . It has been stated that the Chialtan variety is a hybrid between markhor and domesticated goats, but this is not the case."

On the other hand, Ward remarks (1935, p. 264): "May perhaps turn out to be a hybrid between the Markhor and domesticated goat; some Chialtan specimens being almost certainly of this nature."

If it is a thoroughly wild animal, and if the distribution given by Burrard is correct, the Chialtan Markhor occupies an intermediate geographical position between *megaceros* and *jerdoni*, yet its taxonomic characters are not at all intermediate between those of the other two. Furthermore, Lydekker (1913c, vol. 1, p. 169) records specimens of *megaceros* from Quetta, close to the type locality of *chialtanensis*. Thus the position of the latter is decidedly anomalous, unless it is either a hybrid or specifically distinct from the other Markhors.

Suleman Markhor

CAPRA FALCONERI JERDONI Hume

Capra Jerdoni Hume, Proc. Asiatic Soc. Bengal 1874, p. 240, 1875. ("Suleyman Range.")

Figs.: Blanford, 1891, p. 507, fig. 167; Lydekker, 1898c, p. 295, fig. 57; Lydekker, 1900, pl. 4, figs. 5, 5a, and pp. 119, 121, figs. 20, 21; Stebbing, 1912, p. 246, fig.; Lydekker, 1913c, vol. 1, p. 170, fig. 44; Ward, 1935, p. 266, fig.

This Markhor, with its headquarters in the Suleman Range, has suffered severe persecution, and its numbers are apparently more seriously reduced than those of any other subspecies.

Height at the shoulder not exceeding 38 inches; horns comparatively short (up to about 48 inches in length in a straight line), forming a perfectly straight cone, upon which the front and hind keels are wound in a sharp spiral, forming in good specimens two to three complete turns. Beard said to be less developed than in the Astor and Pir-Panjajal subspecies. (Lydekker, 1898c, p. 294; 1900, p. 120.)

The ranges of the various subspecies of Markhor are difficult to define. The horns, upon which the classification is chiefly based, exhibit considerable variation even in a single area, and consequently our knowledge of subspecific limits is none too exact. "These 'types,' as laid down in the average book of museum origin, are by no means

constant and must only be taken as the more usual form of the horns of the particular local race after which they are named; for museum workers still fail to realize that naming new races of ungulates on the strength of differences in horn of one or two specimens, is a very unsound proceeding" (Stockley, 1936, p. 140).

Lydekker (1898c, p. 295) gives the distribution of *jerdoni* as "the Trans-Indus hill-ranges of the Punjab frontier, Afghanistan, and Baluchistan, extending in the Suleman range as far south as the neighbourhood of Mithankot, and also found in the Quetta district." He quotes Colonel Percy to the effect that it "is found all over the low ranges that run parallel to the right bank of the Indus below Attock; it used to be found in fair numbers near Sheik Budin, a small station near Dera Ismail Khan, and in the hills, or rather the steep ravines, in the plateau behind Dera Ghazi Khan."

"South of the Gomal River we have a few markhor of the pure Suleiman type But generally speaking the markhor found to the southward throughout the mountain ranges of Baluchistan, as far as Quetta, are curiously enough of two mixed types—one resembling the Astor . . . , and the other the Pir Panjal." (Burrard, 1925?, pp. 176-177.)

"The Government of Baluchistan issue cartridges at the rate of 30-50 a month to the posts of the Zhob Militia in order that the men may shoot markhor and oorial for meat. I was commanding at Fort Sandeman in '29 and '30 and saw every post had its walls lined with heads of small markhor and oorial while 3 trips I made to various ranges of hills showed not a single adult male. I heard in May last from an officer just returned from the Zhob Militia that the same system still persists. . . . It would appear that the saving effected by not providing the men of the Zhob Militia with a meat ration is more important than the survival of the animal life of the country." (C. H. Stockley, *in litt.*, September 16, 1933.)

Stockley also contributes (1936, pp. 145-147) the following information:

Bucks from the Takht-i-Suliman of Baluchistan, which massif is over 11,000 feet in height and is well-wooded, are bigger and heavier in coat than those from Sheikh Budin and the Isa Khel Hills, which live at under 6,000 feet. . . .

Although the markhor of Kashmir has some sort of protection, his unfortunate relation of the Frontier hills is persecuted by all and sundry at all times of the year, while the local inhabitants are well-armed, and the peace which has lately invested that country has only given the tribesmen more leisure to hunt. Small wonder that the markhor have decreased almost to vanishing point and are likely to decrease still further unless measures are adopted for their protection. Such measures are difficult to enforce in country where my last four trips have had to be carried out with an escort of forty rifles, but at least the authorities might make some effort in places immediately under their control, instead of encouraging the local soldiery to shoot markhor and oorial for meat in lieu of meat rations, using government ammunition to do it.

Recent reports from Baluchistan are more encouraging, and the preserves established near Ziarat will save markhor for many a day and give many a sportsman the thrill of climbing on the cliffs of Khilafat; but in the North-West Frontier Province the case of the markhor seems almost hopeless.

The Government of the North-West Frontier Province writes (*in litt.*, December, 1936) that this Markhor is now reduced in that province to a few specimens on the Sheikh Budin Range in the Bannu district. The cause of depletion is overshooting; there is no legal protection.

Sumatran Serow

CAPRICORNIS SUMATRAENSIS SUMATRAENSIS (Bechstein)

Antilope sumatraensis Bechstein, Pennant's Übersicht vierfüß. Thiere, vol. 1, p. 98, 1799. (Sumatra.)

FIGS.: Geoffroy and Cuvier, Hist. Nat. Mammif., vol. 4, livr. 27, pl. 160, 1821; Hamilton Smith, 1827, pl. facing p. 276; Jardine, Nat. Libr., vol. 22, Mamm., Ruminantia, pt. 2, pl. "1" [=2], 1836; De Tropische Natuur, vol. 7, p. 132, fig., 1919; Mjöberg, 1930, pl. 18; Mohr, 1934, figs. 1-8, and 1936, figs. 1-9.

Although recent investigation indicates that the Sumatran Serow is not quite so rare as formerly supposed, nevertheless its need of better protection is shown by its generally decreasing numbers.

The general color of two adult males from the Korinchi Valley, West Sumatra, is black; a short dense black crest on median line of back; tail black; under parts of body, inner sides and lower parts of limbs brownish black; area above hoofs ochraceous-tawny; mane composed of black, white, drab, and ochraceous-tawny bristles; lips and patch on chin and throat buffy white (Robinson and Kloss, 1918, pp. 66-67). Length of horn, 6 inches (Schneider, 1905, p. 141). Height at shoulder about 3 feet.

Bock states (1879, p. 308) that this Serow is sparingly distributed in the Padang highlands, the best district being Lolo.

Schneider (1905, pp. 138-140) gives it a similar status in the Battak and Simbolon Mountains, where it occurs in troops of three to six individuals on the steep, thickly grown slopes. The Battaks capture the animal in snares and pitfalls. They utilize the bones and marrow for food, and the horns as containers for charms.

According to Mjöberg (1930, pp. 45-49), this timid creature appears "on the summits of Sumatra's sulphurous volcanoes and in the most difficult districts of the Karo-Batta Plateau

"Many Sumatra sportsmen have made lengthy expeditions to the Sibayak Volcano, but their pursuit has been to no purpose. . . .

"The 'serow' is still in existence, although in our days it has retreated into the most impenetrable tracts surrounding the sum-

mits of the volcanoes, where neither tigers nor men—the two most formidable of all beasts of prey—can get at it.”

Dammerman (in Skottsberg, 1934, p. 422) considers the animal “threatened with extinction.”

Heynsius-Viruly and Van Heurn (1936, pp. 52-53) give the following account:

Although serows still occur in many places in Sumatra, their number decreases rapidly, especially in the vicinity of population centers. . . . They



FIG. 58.—Sumatran Serow (*Capricornis sumatraensis sumatraensis*).
After Mohr, 1934.

are very shy, but with the aid of dogs they are easily shot. They are frequently caught in snares This method of catching them is so successful that in the last ten years the mountain antelope has been exterminated on Merapi, Singalang, and Tandikat. In contrast with past years, live mountain antelope or their horns are no longer offered for sale at Fort de Kock.

Small herds are yet to be found on the steep slopes of Sarogodoeng, from Sipirok to Hoeta Gadoeng (Baringin), Saroloengoen, Bangko, the Doeabelas Mountains and Korintjih. . . . This animal occurs in the reserve of the Gajo and Alas districts. Let us hope that it will hold its own also in the other above-mentioned localities.

A number of Government foresters in Sumatra have kindly contributed (*in litt.*, February to June, 1937) the following information: The Serow seems to vary from rare to common on steep, rocky mountains over a considerable part of the island; among these are

the mountains of Djambi, Toba, Karo, Barisan, Singkel, Groot Atjeh, Tapanoeli, Pesagi, and Way Paja. It is nominally protected by law, but there is a certain amount of poaching both by natives and by Europeans, and reserves are essential for the preservation of the species. It is hunted with dogs and snares. The horns, hide, and flesh are prized, and the animals are sometimes offered for sale. The nature of the Serow's habitat gives it some protection from man, and the Tiger is said not to occur there. The Serow's shyness is such that it seems to disappear from some areas because of the establishment of cultivation in the vicinity.

White-maned Serow

CAPRICORNIS SUMATRAENSIS ARGYROCHAETES Heude

Capricornis argyrochaetes Heude, Mém. Hist. Nat. Empire Chinois, vol. 2, p. 4, footnote, 1888. ("Montagnes du Tehé-Kiang," China; type locality later restricted by Heude (1894, p. 228) to "hautes montagnes de la sous-préfecture de Tchou-ki, province de Tche-kiang.")

FIGS.: Heude, 1894, pl. 31, figs. 1-4, 7, 8, 10, 11.¹

This Serow of southeastern China is considered in danger of extinction.

Size large²; face and ears dusky rufous; a white stripe at the angle of the mouth and a white patch on the throat; space between the maxillaries brownish; a long, thick mane, entirely dirty white, extending to the middle of the chest; a straight dorsal stripe and the short tail blackish brown; sides and back with mixed black and dirty white hairs; thighs and shoulders black; legs marked with brown and light rufous. Horns black, with straight, deep cancellations; diverging at first, but slightly converging at the tips. (Heude, 1894, pp. 228-229.) Length of horn about 9 inches (Ward, 1935, p. 254).

Heude's description, quoted above, is of the female type. An aberrant specimen is noted by G. M. Allen (1930a, p. 4): "One of the Chekiang skins has the body, legs, and feet deep black throughout."

Owing to the state of confusion that prevails in the taxonomy of the genus *Capricornis*, the distribution as well as the characters of *C. s. argyrochaetes* can be stated only provisionally. The name will be here restricted to the animal occurring in the mountainous areas of southeastern China, west as far as eastern Szechwan. More or less white-maned individuals (presumably of the subspecies *milne-edwardsii*) are found also in the mountains of western Szechwan and Kansu.

¹ It is doubtful whether various other published illustrations of "*argyrochaetes*" are actually of the subspecies of southeastern China.

² A related form of western China stands about 44 inches at the shoulder.

"The type-locality is the mountains of Chekiang, hence four specimens in the collection from Tunglu and Mokanshan of that province may be taken as typical. I can find no differences of moment that would distinguish these from a series of skins and skulls from Fukien and eastern Szechwan." (G. M. Allen, 1930a, p. 4.)

"This subspecies is distributed throughout the mountainous districts of Southeastern China. It may be found in the T'ien T'ai Shan, Chekiang. About five years ago one was secured from Pai Mai Shan, south of Wu-hu. The present specimen came probably from Huang Shan, which is in Southern [part] of Anhuei." (Ho, 1935, p. 176.)

Arthur de C. Sowerby writes (*in litt.*, April 24, 1937) as follows: "The white-maned serow, properly speaking, is confined to East China south of the mouth of the Yangtze River, that is to say, to the highest mountains of Chekiang, Fukien, Southern Anhuei and Kiangsi." He adds, concerning the five Chinese forms of Serows that he recognizes: "All of these are persistently hunted by the natives for medicinal purposes, the horns, skins and other parts being believed by the Chinese to have great healing virtue. The serows haunt high rocky heavily wooded ridges Wherever they exist the natives keep noose-traps set constantly along the paths used by these animals, with the result that in the aggregate considerable numbers are caught annually, and nowhere are serows at all plentiful. They are doomed to extinction in the not very distant future unless protected in some way."

Malayan Serow

CAPRICORNIS SUMATRAENSIS SWETTENHAMI (Butler)

Nemorhaedus swettenhami Butler, Proc. Zool. Soc. London 1900, p. 675, 1900. ("Larut Hills, Perak," Malay Peninsula.)

SYNONYM?: *Capricornis sumatraensis robinsoni* Pocock (1908).

FIGS.: Sketch, April 26, 1899, p. 22, fig.; Proc. Zool. Soc. London 1908, p. 186, fig. 35 (*robinsoni*).

The Malayan Serow is "much less numerous than formerly" (F. N. Chasen, *in litt.*, May 5, 1937) and is "on the danger list despite protection" (Comyn-Platt, 1937b, p. 48).

Butler (1900, pp. 675-676) gives the following description of the female type: "General colour black, the back strongly and the sides slightly grizzled with grey Along the lips whitish grey; the posterior portion of the upper lips, a patch on each side of the lower jaw and one on the throat rusty red. . . . Mane black, mixed with whitish . . . and with reddish hairs Insides of the thighs rusty red. Remainder of head, neck, chest, belly, and legs black. Tail black.

"Height at shoulder $36\frac{1}{2}$ inches Length of horns 6 inches." Other horns are recorded up to about 8 inches in length.

Butler adds (p. 676): "Although this Serow is so little known to Europeans the horns are occasionally obtained from the Sakai tribes of the hills It is found on the mountains of the Peninsula from 2000 ft. to 4000 ft. altitude, and is said also to occur on various isolated limestone hills of much lower elevation."

"The black Wild Goat . . . inhabits the isolated patches of limestone rocks which flank at intervals the main granite chain of the Peninsula. Though apparently not rare in these places, it has never been shot by any sportsman, and the only specimens I have seen are skeletons and a head in the Perak Museum." (Ridley, 1895, p. 163.)

"The *kambing gurun* is . . . quite a common animal in suitable localities throughout the Peninsula, though no more than one specimen has ever been shot by a European. . . . It was not uncommon on Bukit Besar By offering a liberal reward we managed to persuade some of the Biserat natives to snare us two specimens." (Robinson, in Bonhote, 1903, p. 41.)

Hubback (1932, vol. 2, p. 214) gives the following information:

"One witness . . . stated that serow (*Kambing grun*) were getting very scarce [in Perlis] and considered that this was due to the trapping of animals which were sold to shop-keepers in Kangar who attempt to export them alive. This witness added 'The *Kambing grun* almost always dies in captivity.'

"The whole country might be looked upon as a Reserve for serow . . . and I recommend that their shooting or trapping in the State of Perlis should be entirely prohibited."

Hubback also (p. 136) reports Serow on Gunong Sembilu, in the proposed Gunong Tahan National Park.

"All the forms are very local in their distribution and need fostering" (F. N. Chasen, *in litt.*, May 5, 1937).

"Many with whom I talked [in Malaya] . . . were insistent that such animals as the . . . serow are to-day practically non-existent" (Comyn-Platt, 1937b, p. 48).

It is quite possible that this subspecies ranges northward from the Malay States into Peninsular Siam, but its limits in that direction have not been determined. Lydekker (1913c, vol. 1, p. 189) refers to *C. s. robinsoni* (type locality Selangor) as perhaps inseparable from *swettenhami*.

Tonkin Serow

CAPRICORNIS MARITIMUS Heude

C[apricornis] maritimus Heude, Mém. Hist. Nat. Empire Chinois, vol. 2, p. 4, footnote, 1888. ("Les rochers de la baie d'Along, au Tonquin," French Indo-China.)

FIGS.: Heude, 1894, pl. 32, figs. 1-8.

This Serow has virtually disappeared from the coast of Tonkin and Annam. In Laos Serows of undetermined identity, but possibly belonging to this form, are represented by a small but almost unknown stock.¹

According to Heude's inadequate description (*op. cit.*, p. 4, and 1894, p. 227), *C. maritimus* is a brownish animal, smaller than *C. s. argyrochaetes*. The horns are flattened transversely at the base, and laterally in the distal half; they converge slightly at the tips.

Information on the range and numbers of this Serow, as well as on its taxonomic status, is very meager.

André Kieffer writes (*in litt.*, November 21, 1936) as follows: "Thirty-five years ago, when I first arrived in Indo-China, Serows were widely distributed on the isles and promontories of the littoral of the China Sea, from the Bay of Along on the north to southern Annam (Cape Varela). I have seen this animal decrease with an extraordinary rapidity. It was hunted under the name of 'Mouflon.' An island in the Bay of Tourane had received the name of 'Île aux Mouflons.' Nothing was easier than drives in an area as restricted as the coastal islands of Annam. Fifteen years ago I could not find a trace of 'Mouflons' on the island of Cac-Ba (Bay of Along), where they formerly abounded. I consider that there is not a single individual left in French Indo-China, save perhaps in the mountainous regions bordering Burma and Yunnan."

P. Vitry writes (*in litt.*, December, 1936) of an animal (evidently a Serow) called "Nhuang" by the natives throughout Laos. He has seen specimens in the upper Nam-ou on the upper Mekong, at Saravane in 1910-12, at Paksé on several occasions, and has killed three himself in 1932-33 south of Saravane; these were all of the same species. Two specimens were sent to the Paris Museum. The animal ranges throughout Laos, but occurs only in wooded ravines with dense undergrowth and on steep mountain slopes with sufficient shade and water. M. Vitry formerly considered it very rare, but now believes that the total stock in the country must be more than 200. However, the animal is very seldom seen; for example, only three out of more than a hundred inhabitants of a village, close to which his first specimen was killed, had ever seen the species

¹ Heude has applied several additional names to the Serows of Indo-China (*cf.* Lydekker, 1913c, vol. 1, p. 202).

before. The tongue and the horns are used for medicinal purposes. Certain Kha of the upper basin of Sekong use the hides for their bucklers. The meat is excellent. Practically no destruction is carried on; the species is well protected by its environment and by its extreme shyness.

Other Serows

As far as information is obtainable, the remaining Serows of the Asiatic mainland have maintained a more satisfactory status than those discussed above. They include the following subspecies:

- C. s. milne-edwardsi* David, of western China and eastern Tibet.
- C. s. montinus* G. M. Allen, of the Lichiang Range, Yunnan.
- C. s. jamrachi* Pocock, of the Darjeeling district, northern Bengal.
- C. s. thar* (Hodgson), of Nepal.
- C. s. rodoni* Pocock, of Chamba, northern India.
- C. s. humei* Pocock, of Kashmir.
- C. s. rubidus* Blyth, of Burma.
- C. s. annectens* Kloss, of western Siam.

Concerning the Formosan Serow (*C. swinhoii* Gray), we have no recent information.

Japanese Serow

CAPRICORNIS CRISPUS (Temminck)

Antilope crispus Temminck, Fauna Japonica, Mamm., p. 56, 1845. ("Nippon (Hondo), Japan" (fide Lydekker, 1913c, vol. 1, p. 200).)

SYNONYM?: *Capricornis pryerianus* Heude (1894).

FIGS.: Temminck, 1845, pls. 18, 19; Heude, 1894, pl. 33, figs. 1-8 (*pryerianus*), fig. 9 (*crispus*); Cambridge Nat. Hist., vol. 10, Mammalia, p. 326, fig. 176, 1902.

Some years ago the range of this animal had become greatly restricted, and its numbers very few. Under recent protection, however, it has shown a very gratifying increase.

It is smaller than the mainland Serows, without heavy mane, and with a thicker and more woolly coat and more bushy tail; coat long, harsh, and crisp; general color varying in winter from blackish gray to rufous brown, becoming whitish on the under parts; cheeks white; legs blackish brown (Lydekker, 1913c, vol. 1, p. 200).

"The Japanese serow is believed to inhabit the high mountains of the islands of Nipon and Sikok, but definite information on this point is much wanted" (Lydekker, 1901, p. 175).

Thomas (1906, p. 357) records two specimens from Washikaguchi, Nara Ken, Hondo, and quotes M. P. Anderson as follows: "The Goat-Antelope is exceedingly rare in Nara Ken, and probably every-

where, for this is but the second place where I have heard of its existence. I was told that 5 to 7 are killed yearly in Nara Ken. It inhabits dense forested heights, and when pursued seeks the rockiest and most precipitous places where it can find cover."

The species "is confined to Hondo and Kiushu" (Hatta, 1928, p. 1032).

T. Inukai (*in litt.*, March 20, 1933) comments as follows: "Rare. Only on high mountain in southern Japan."

"Among the nature reserves already designated, Kamikōchi, an extensive valley situated near the centre of the Japanese Alps and at an elevation of about 1,500 metres above sea level, is by far the most notable from the scientific point of view. . . . Of mammals, the most important forms are the goat antelope (*Capricornis crispus*), the Siberian ermine (*Mustela erminea kanei*), and the brown-toothed shrew (*Sorex shinanensis*)." (Kaburaki, 1934, pp. 4187-4188.)

The taking of the Japanese Serow is absolutely prohibited by law. The reserve in Nagano Prefecture is for protecting this animal. (Uchida, 1935, pp. 4, 12.)

"When I was in Nikko in 1906 there were lots of skins in the fur market there but I understand now that they don't turn up often" (J. C. Phillips, *in litt.*, July 27, 1936).

"Range: Hondo, Shikoku, Kiusiu only. As the species decreased once, it is now prohibited to capture the species all the year. Consequently it has remarkably increased in number, and it is said that even a troop of one hundred (usually observable about 3 or 5 individuals) can be seen in Miye Prefecture, Hondo. The flesh tastes better than *Sika nippon*, and the fur is valuable as a carpet." (Nagamichi Kurōda, *in litt.*, July 5, 1938.)

The same writer (1938, p. 8) gives the following locality records for Hondo: Shimotsuke, Shinano, Musashi, Hida, Kaga, Yamato (N. Okada), Aomori, Tochigi, Saitama, Nagano, Gifu, Ishikawa, Toyama, Nara, Wakayama Prefectures (Kishida); Ōkuradake, Aichi and Yokohama in Pref. Aomori (Wada, 1937). For Shikoku: Tosa (N. Okada), Kōchi (Kishida). For Kiusiu: Hiuga (N. Okada), Miyazaki (Kishida).

Bubal Hartebeest. Bubale (Fr.). Búbalo (Sp.)

ALCELAPHUS BUSELAPHUS BUSELAPHUS (Pallas)

Antelope buselaphus Pallas, Misc. Zool., p. 7, 1766.¹ ("Typical locality probably Morocco" (Lydekker and Blaine, 1914, vol. 2, p. 5).)

¹ Type "fixed here on the Vache de Barbarie, pl. xxxix. ('Memoires pour servir a l'histoire des animaux,' ii, p. 24)" (Ruxton and Schwarz, 1929, p. 575). This is apparently the same as the "Barbary Cow," Memoirs for a Natural History of Animals, p. 127, pl. facing p. 126, 1701, London.

SYNONYM: *Bubalis bubastis* Blaine (1914).

FIGS.: Schreber, Säugthiere, pl. 277B, 1787; Geoffroy and Cuvier, Hist. Nat. Mamm., vol. 6, pl. 390, 1824; Schinz, Naturg. Säugethiere, ed. 2, pl. 126, 1827; Wood, Bible Animals, p. 145, fig., 1876; Sclater and Thomas, 1894, vol. 1, pl. 1; Bryden, 1899, pl. 4, fig. 1; Ward, 1935, p. 47, fig.; Powell-Cotton, 1937, pl. facing p. 65, lower fig.

This Hartebeest is regarded by several authorities as extinct, although a few others maintain that a bare remnant lingers on in the hinterland of Algeria.

"Colour uniform pale rufous or fawn . . . ; there is, however, an ill-defined patch of greyish on each side of the muzzle above the nostrils. . . . Tail black on the terminal tuft only." Height at shoulder about 43 inches. Horns forming a U when viewed from the front. (Sclater and Thomas, 1894, vol. 1, pp. 8-9.) Record length of horns on front curve, 15½ inches (Ward, 1935, p. 43).

The former range of the Bubal extended across North Africa from Morocco to Egypt. There have also been reports, none too well substantiated, from Arabia and Palestine.

While this Hartebeest was long regarded as a distinct species, it is treated by Ruxton and Schwarz (1929) as conspecific with various other Hartebeests, ranging from Senegal and Gambia to the Anglo-Egyptian Sudan, Somaliland, and Tanganyika Territory (*cf.* G. M. Allen, 1939*b*, pp. 470-474).

Morocco, Algeria, and Tunisia.—In 1738 large herds were reported on the north of the Atlas, but since then "the Bubal has retired far beyond the Atlas into the recesses of the desert, and has become a difficult animal to meet with" (Sclater and Thomas, 1894, vol. 1, p. 9).

In 1850 Barth encountered what may have been this Hartebeest in the mountain region of Anahef, which lies in the central Sahara at about latitude 23° 15' N., longitude 8° E. He remarks (1857, vol. 1, p. 263): "The country . . . is covered, as well as the whole centre of the desert, with large herds of wild oxen (*Antilope bubalis*) Our men tried to catch them, but were unsuccessful, the animal . . . climbing the rocks with much more ease than men."

According to Loche (1867), it is found in Algeria only in the south; it occurs in fairly numerous bands in the mountainous parts of the Sahara, the Souf, and the country of the Tuaregs. It appears much rarer than the Addax in Algeria, and perhaps it is completely lacking in Tunisia. (Lataste, 1885, p. 292.)

The species was still found in 1870 in the mountains in the south of Tunisia, on the Algerian frontier, but has now completely disappeared. Some individuals may perhaps still be found in the Saharan mountains and in the Hammada between Bir-Aouïne and Ghadames. One was killed in 1902 at Bir-Ksira, 150 km. southwest of Foum-Tatahouïne. (Lavauden, 1924, p. 22; 1932, p. 21.)

The Bubal still existed in 1925 in the region of Missour (eastern Morocco), in 1900 between the Chott Tigri and Méchéria, in 1888 in the environs of Ain Sefra (western Algeria); perhaps it still lives south of Geryville (Algeria); as well as on the south of the Moroccan



FIG. 59.—Bubal Hartbeest (*Alcelaphus buselaphus buselaphus*). After photograph in Brehm.

High Atlas, among the Ait Merrad (north of Tafilalet) and the Ait Ounir (west of Tafilalet) (Joleaud, 1929, p. 448).

Ruxton and Schwarz (1929, p. 575) state:

The typical race of this species has, in former years, been a frequent inhabitant of menageries. But we have seen no skin or skull of a wild-killed specimen. There are none in the British, Paris, and Berlin Museums. As a matter of fact, it appears highly probable that this form is utterly extinct. All inquiries have proved fruitless in Algeria and Tunisia, as well as in Morocco. . . .

A private communication from Dr. E. Hartert of Tring speaks of the occurrence of *A. b. buselaphus* in the valley of the Muluya River, Morocco, but, according to Dr. Russo, chief of the Hydrological Service at Rabat, Morocco, it is no longer found there. A specimen . . . has been obtained near Geryville, south of the Chott Chergui, in the Saharan Atlas, Algeria.

"The Bubal Antelope . . . is now extinct. The last survivor, a female, died in Paris in 1923." Another individual, that died in Paris in 1916, had lived in captivity for almost 19 years. (Flower, 1931, pp. 211-212.)

Cabrera (1932, pp. 336-339) gives the following account for Morocco:

The range includes the east central part of the country, at the extreme eastern base of the Grand Atlas, in the region comprised between the upper Muluya, the sources of the Guir, and the small rivers which give rise to the Wadi Ziz. Thence it extends to the south of Oran.

It was recorded from Barbary as early as 1573 by Mármol, who spoke of it as occurring in herds of one or two hundred. At that time it ranged from the Atlantic coast of Morocco to Tunisia.

Its complete disappearance, in a little more than three centuries, from localities in Morocco where Mármol reported it in large herds, is the more interesting because it relates to regions where European civilization has penetrated only very recently. Since practically no trustworthy traveler of the nineteenth century mentions the Bubal, this seems to indicate that it disappeared from the more frequented zones over a hundred years ago, to remain exiled in the interior of the empire, then impenetrable. Bédé (1926), after a careful investigation, records the killing of a Bubal in the region of Misur in 1925, and the extinction, about the same date, of the last examples that lived in the territory of the Ulad-el-Hach.

Though perhaps not completely gone, it is quite evident that the Bubal has reached the verge of extinction, and it is probably too late to adopt any measure for warding off that fate.

Maydon reports (1933, p. 738) that careful inquiries in Algeria and Tunisia have failed to reveal any trace of it.

On the other hand, Joseph I. Touchette, American Vice Consul at Algiers, writes us (*in litt.*, March 28, 1933) that according to Prof. L. G. Seurat, of the University of Algiers, the Bubal still exists in very limited numbers in certain protected valleys south of the Department of Oran. It is seen particularly between the Geryville region and the Chott Tigri, whence it occasionally migrates to the eastern Moroccan mountains.

It is decidedly rare at present in Barbary, but half a century ago it was widely spread on the high plateaus and on the hills at the edge of the Sahara (Heim de Balsac, 1936, p. 101).

"It existed not very long ago (1870) in all the South Algerian and Tunisian mountains. It prefers a rocky country and is not an animal of the sandy desert as it has sometimes been wrongly described.

"It has at the present time practically disappeared from the northern border of the Sahara, and has entirely disappeared from the Aures and South Tunis The species still exists in the south of Oran, in the large hollows which open into Chott Tigri from the south of Geryville." (Gruvel, 1937, p. 63.)

Powell-Cotton (1937, pp. 65-66) gives the following account of two quests in Morocco:

[In 1930] Caid Krit, a great hunter, whom we met at Outat [on the Muluya, at the southeastern base of the Middle Atlas], told us he had shot many in the past, but the last herd that he had found, in the plain some 70 kilometres south-east of Outat, numbered fifteen, and of these he had shot five males . . . and seven females . . . ; this was in the autumn of 1917, since when he had neither seen nor heard of the beast. . . . According to him fifteen was an exceptionally large herd; three or four the usual number and occasionally he had come across a solitary male.

A doctor quartered at Outat showed us a couple of horns—the right of a male and the left of a female—both of which had been shot by the Caid.

[In 1936, in extreme southwestern Morocco,] Caid Aied at Talaint . . . eagerly recognized the photo of the Bubal, and said that some twenty years previously he had a living pair of them sent him from the south

At Talsint, some 90 kilometres south of Outat, the Caid's of three different districts assured us they had never heard of the beast. . . .

At Outat itself we found a tribesman of Caid Krit who confirmed that some twenty odd years before, herds of Bubal, up to twenty animals, existed in that region among the foothills, but all had now disappeared, and no one knew whither.

Thus ended a journey of some 2,700 kilometres by motor and mule, and the question still remains whether any Bubal exist further south among the rough country on the northern frontier of the Sahara.

Pease (1937, p. 80) contributes the following information: In Algeria, in years gone by, "I . . . talked to many Frenchmen and Arabs who had known the Bubal to be very numerous in Algeria and Tunisia, and to one or two French colonels who had shot them in the great battles of game, which massacres were organized in the early days of the French occupation. . . . I . . . collected evidence that they were still to be found in the Hammada, south of Geryville, and towards the Moroccan frontier as late as 1895-6."

In 1905 the Academy of Natural Sciences of Philadelphia received an adult female from the Zoological Society of Philadelphia. The mounted skin and the skeleton represent perhaps the only specimen in America. The mount stands $38\frac{1}{4}$ inches at the shoulder.

Libya and Egypt.—Outside of Barbary the Bubal is found in North Africa as far as Egypt (Lataste, 1885, p. 293).

"From the Algeria Sahara the Bubal extends no doubt into . . . Tripoli In Egypt . . . the Bubal appears to be now quite extinct." (Selater and Thomas, 1894, vol. 1, p. 10.)

"The Bubaline Antelope . . . formerly found in Tunisia is now quite extinct there, I hear, though it is still found in Southern Algeria and in the Tripolitaine. It must have extended its range once into Central or even Northern Tunisia, judging by the frequency of its appearance in Roman frescoes and mosaics. I am informed by a German naturalist, Mr. Spatz, that in the districts where it still lingers in Tripoli it affects plateaux with a fair amount of vegetation, rather than the sandy desert which is the home of the Addax." (Johnston, 1898, p. 352.)

Cabrera (1932, p. 337) includes the interior of Tripoli in the range.

Enders (1927, pp. 293-296) records a Hartebeest's horn and attached fragment of a skull, excavated in 1924-25 at "the mound of Kom Aushim on the northern border of the Fayûm province of Egypt This mound was formed by the ruins of the ancient town of Karanis." The specimen belongs "to the period between the middle of the second and the middle of the fourth century after Christ." Although the horn is very doubtfully referred to *A. lichtensteini*, it is much more likely, on zoögeographical grounds, to be *buselaphus*.

"The specimens from the Egyptian Tombs at Abadiyeh, near Kairo, and from the Fayum, described by Blaine as *Bubalis bubastis*, are, however, very similar [to *buselaphus*], and the same is true of the two splendid specimens from the Tombs of Sakkara, near Thebes From the general appearance of these skulls and from the measurements taken there can be little doubt that they are true *buselaphus*." (Ruxton and Schwarz, 1929, p. 575.)

"There is no evidence of the occurrence of Hartebeestes as wild animals in Egypt, though the bones of these antelopes have been found in the process of excavating ancient Egyptian tombs" (Flower, 1932, p. 437).

"A hundred years ago the Western Desert of Egypt contained a number of species of antelope such as the . . . hartebeest" (T. W. Russell, MS., September 12, 1934).

Palestine and Arabia.—"The Bubale I never saw in Palestine; but it certainly exists on the eastern borders of Gilead and Moab, and is well known to the Arabs, who assure me it sometimes comes down to drink at the headwaters of the streams flowing into the Dead Sea, where they not unfrequently capture it. It roams through Arabia and North Africa." (Tristram, 1884, p. 5.)

"It reappears in Arabia and extends even up to the confines of Palestine. . . . Canon Tristram has kindly allowed one of us to examine a pair of horns obtained from the Arabs in this locality [Dead Sea region], which are apparently referable to a female of this species." (Sclater and Thomas, 1894, vol. 1, p. 10.)

On the other hand, Lydekker and Blaine (1914, vol. 2, p. 6) are "unable to find any other testimony that this, or any other, hartebeest inhabits south-western Asia."

"No recent specimen has ever been studied from the alleged eastern range of this form [in Asia]" (Ruxton and Schwarz, 1929, p. 575).

The last example disappeared from Palestine about 25 years ago (Aharoni, 1930, p. 329).

"A less common intruder from the Arabian deserts [than *Oryx leucoryx*] is the *Bubalis* . . . Both these species were probably more common in the deserts of Transjordan and S. Palestine in earlier periods." (Bodenheimer, 1935, p. 116.)

"There is not one shred of evidence to show that the Bubal Hartebeest ever existed out of Africa . . . The one pair of horns, said to have been obtained by Tristram from the Arabs of Syria, is not sufficient evidence to go on. There is no record by any traveller, at any date, in Syria or Arabia of this most unmistakable species." (Carruthers, 1935, pp. 163-164.)

There seem to be no game reserves within the recent range of this species. It is completely protected in Africa under the London Convention of 1933.

Cape Red Hartebeest. Rooi Hartebeest (Boer)

ALCELAPHUS CAAMA CAAMA (Cuvier)

Antilope caama Cuvier, Dict. Sci. Nat., ed. 1, vol. 2, p. 242, 1804. ("Cap" = Cape of Good Hope.)

FIGS.: Buffon, Hist. Nat., Suppl., vol. 6, pl. 15, 1782; Schreber, Säugthiere, vol. 5, pl. 277, 1787; Selater and Thomas, 1894, vol. 1, pl. 4.

Some of those who recognize the distinctness of the subspecies *caama* and *selbornei* agree that the former is extinct; however, Capt. G. C. Shortridge (*in litt.*, 1936) regards *caama* as still represented by a herd of about 55 animals on Moe's Farms at New Hanover in Natal.

According to Cuvier's type description (*op. cit.*, pp. 242-243), the color is a fawn bay, browner on the back; a large black spot about the base of the horns; a black band on the lower two-thirds of the face; a straight line on the neck, a stripe on each leg, and end of tail black. In the female these markings are brown rather than black, and the horns are a little smaller.

Lydekker (1913*d*, p. 821) defines the present subspecies as follows: "General colour rich rufous-brown; face-blaze black and extending, with the exception of a narrow fawn band between the eyes, from horns to muzzle; limb-markings plum-colour, and forming a continuous stripe on front of fore-legs." There is very meager

information on shoulder height and horn length; but reference may be made to these measurements in *A. c. selbornei*.

In view of the uncertainty concerning the limits of the original range of the present subspecies, we may provisionally restrict it to the Southeast Veldt District of Bowen (1933, pp. 256, 260). "The range originally extended from the Cape Town district as far north as the Limpopo on the eastern side of the continent" (Lydekker and Blaine, 1914, vol. 2, p. 27).

According to Sclater and Thomas (1894, vol. 1, pp. 35-37), at the close of the eighteenth century "the Hartebeest was very abundant all over the Cape Colony, and was found in large troops even in the immediate vicinity of Cape Town.

"In 1811 . . . the Hartebeest appears to have become already much less abundant." By 1876 it had become one of the rarest animals in the Cape Colony.

"In Natal the hartebeest is now very rare, and is only to be seen here and there on certain farms, where it is carefully protected" (Bryden, 1899, p. 152).

It "once inhabited Basutoland, although it is doubtful if any survive to-day in that locality" (Haagner, 1920, p. 159).

"Not long ago there used to be six or seven hundred of these animals in the Natal Midlands" (E. Warren, in Shortridge, 1934, vol. 2, p. 453).

"Cape Hartebeest was formerly abundant in the midlands of Natal, but the farmers have now destroyed them all, with the exception of a small herd of about 25 on a farm owned by Messrs. Moe Bros., who do everything possible to protect them against the blood-lust of neighbouring farmers and the savage attacks of dogs owned by the natives" (corresponding member of the International Office, Brussels, *in litt.*, January 24, 1933). "A few Cape Hartebeest also survive in the Giant's Castle Reserve on the slopes of the Drakensberg in Natal" (E. L. Gill, *in litt.*, December 13, 1932).

According to G. C. Shortridge (*in litt.*, February 9, 1938), the Moe farm was to be divided up and sold in the near future, and that event would mean the extermination of its historic herd of Hartebeest, then numbering under 100 head. "If only the Union Government can be induced to do something about these hartebeest, every one of the remaining game animals of the Union of S. Africa will be receiving some measure of protection in one or other of the Reserves."

Northern Red Hartebeest. Rooi Hartebeest (Boer)

ALCELAPHUS CAAMA SELBORNEI (Lydekker)

Bubalis caama selbornei Lydekker, Abstr. Proc. Zool. Soc. London, no. 119, p. 19, 1913. ("The Transvaal" (*loc. cit.*); "in the neighbourhood of Kimberley" (Lydekker, 1913*d*, p. 819); "Kimberley Game Farm," Griqualand West, "the herd there having apparently been imported from the Transvaal" (Lydekker and Blaine, 1914, vol. 2, p. 27) (*cf.* Shortridge, 1934, vol. 2, p. 451).)

FIGS.: A. Smith, 1849, pl. 30; Lydekker, 1913*d*, fig. 135; Lydekker and Blaine, 1914, vol. 2, p. 26, fig. 4; Shortridge, 1934, vol. 2, pls. opp. pp. 449, 450, 454.

Although virtually or wholly exterminated in its former haunts in the Transvaal, Orange Free State, and Cape Province, this subspecies seems to survive in fair numbers in the Kalahari Desert region of the Bechuanaland Protectorate and in the eastern parts of South-West Africa.

It is distinguished from *A. c. caama* as follows: "General colour yellowish fawn; face-blaze mingled with tawny, stopping short of horns and muzzle, and interrupted by a long interval in region of eyes; limb-markings mingled with tawny, interrupted above knees, on which they form a cap, and represented by a small patch on front of shanks" (Lydekker, 1913*d*, p. 821). These alleged subspecific characters "seem to be abnormal or due to immaturity, as other heads from the Kimberley herd show full development of the face-blaze" (Lydekker and Blaine, 1914, vol. 2, p. 27). The validity of this subspecies is denied by Capt. Guy Dollman (*in litt.*, 1936).

If it can be accepted provisionally, its original range may be said to have corresponded roughly to the Kalahari Arid District of Bowen (1933, pp. 256, 259) : *i. e.*, from the northern and northwestern parts of Cape Province north to the Lake Ngami region, and from the western Transvaal and western Orange Free State to the eastern parts of South-West Africa.

About 1835 "the Hartebeest had retreated still further into the interior" of Cape Province. But it was still met with on the plains beyond the Orange River in immense herds. In 1881 F. C. Selous reported it fairly plentiful in Griqualand West; found all along the eastern border of the Kalahari; plentiful about salt-pans between the Botletlie River and the road from Bamangwato to the Zambesi; but not known farther north. (Selater and Thomas, 1894, vol. 1, pp. 35-37.)

By the close of the nineteenth century the Cape Hartebeest was found, south of the Orange River, only "in the parched deserts of the Bushmanland country, in the far north-west of the old colonial limits. Here a few troops are now and again to be encountered. . . .

"These animals are to be found in troops ranging from a dozen to fifty. In recent years I have seen troops of eighteen or so in

British Bechuanaland, and as many as thirty or forty in the North Kalahari thirstlands. Occasionally troops are to be met with numbering as many as eighty or a hundred." (Bryden, 1899, pp. 152, 156.)

"It is still found in the parched and arid district known as Bushmanland in the north-west of the Cape Colony" (Selous, 1914, p. 66). By 1920 the species was said to be restricted, in Cape Colony, to Little Namaqualand (Haagner, 1920, p. 159).

In South-West Africa the Red Hartebeest is more or less numerous in Ovamboland, the Etosha Pan, the Kaukauveld, and the Grootfontein, Otjiwarongo, Gobabis, and Gibeon Districts, but less numerous in other areas (Shortridge, 1934, vol. 2, pp. 450-451 and map opp. p. 452). The more northerly of the areas just mentioned may be occupied by the subspecies *evalensis*.

"It is said that the last preserved herd of Cape hartebeest in the Transvaal was annihilated about 1922 when the wholesale slaughter of the wildebeeste was permitted owing to the suspicion that they were carriers of a disease the Boers called 'snotsiekte.'

"This unfortunate permission was rescinded after a few months for it was found that the disease occurred where there were no wildebeeste or other wild animals." (C. W. Hobley, *in litt.*, January 4, 1934.)

"The preservation of the Red Hartebeeste in the Kimberley District has had the attention of this Society and the Animal Welfare Society of South Africa. Joint representations on the subject to Messrs. De Beers Consolidated Mines have elicited the information that the Red Hartebeeste in several hundreds are carefully preserved on the farm 'Klipfontein' 40 miles west of Kimberley where a strictly limited amount of hunting occasionally takes place under permit from the Provincial Secretary." (Ann. Rept. Transvaal Branch Comm. Wild Life Protection Soc. South Africa, 1935.) This herd was apparently imported originally from the Transvaal (Lydekker and Blaine, 1914, vol. 2, p. 27).

The Red Hartebeest "is still comparatively plentiful in Northern and Central Bechuanaland, and in the North-eastern parts of South West Africa—to as far north as the Angola border" (G. C. Shortridge, *in litt.*, 1936).

In the future the species will probably receive adequate protection in the Gemsbuck National Park in the Bechuanaland Protectorate, where it is still fairly numerous. A few are preserved on farms in Cape Province. (J. Stevenson-Hamilton, *in litt.*, February 22, 1933.)

Economic uses.—"The skin is, and always has been, in great demand among the various Bechuana tribes for making the handsome cloaks affected by these people.

"The flesh of the hartebeest . . . is fairly good eating. . . . It is used a good deal as bultong, and in that form . . . is very palatable. A hartebeest stew is by no means bad." (Bryden, 1899, pp. 151, 156.)

This species must have suffered, like other South African mammals, from the vast hide-hunting operations of the Boers a century ago. In the Kalahari it is still being shot by poachers, who can now penetrate to the waterless areas in motor cars without trouble (J. Stevenson-Hamilton, *in litt.*, February 22, 1933).

Factors in preservation.—"Hartebeests are extremely wary antelopes; they are possessed of marvellous powers of scent and hearing, and . . . they have managed to maintain their ground against the many hunters . . . at least as well as most other South African beasts of chase. . . . The desert nature of much of their habitat has, no doubt, enabled them thus to prolong their unequal combat against the advances of civilization and the increasing plenty of arms of precision." (Bryden, 1899, p. 156.)

Angolan Red Hartebeest

ALCELAPHUS CAAMA EVALENSIS (Monard)

Bubalis caama, sb. *evalensis* Monard, Bull. Soc. Neuchateloise Sci. Nat., vol. 57, p. 64, figs. 9-10, 1933: (Evale, 200 km. south of Vila da Ponte, southern Angola.)

This subspecies was based upon only two specimens from Evale, and the meager additional records indicate a probable scarcity in Angola.

Pelage almost the same as in *A. caama caama*, but horns of the male distinctly different; pelage brownish rufous, darker on the head, neck, front of shoulders, and median dorsal line; black markings on legs; chin black; muzzle yellowish; face and forehead black, interrupted by brown at the level of the eyes. Viewed from in front, the horns form three-quarters of a circle, its interior diameter 16 cm.; they are then bent backward for 20 cm., where they are parallel. The female is colored like the male, except that all the marks are paler. This subspecies is much more distinct from the two others than they are from each other. (Monard, 1933, pp. 64-66.)

In a later paper (1935, pp. 266-267) Monard discards the horn characters as individual variations, but maintains the subspecies on the basis of slight differences in coloration. He also records a third specimen from the vicinity of Fort Roçadas on the middle course of the Cunene River, and speaks of having seen the animal in fairly numerous bands in that region.

In Angola "the Hartebeest seems to be restricted to a triangle bounded by the Cunene, the Chitanda (an eastern affluent of the

Cunene), and the Okavango" (Baum, 1903, as quoted in Shortridge, 1934, vol. 2, p. 451). The range of this subspecies lies in the extreme western part of the Rhodesian Savanna District of Bowen (1933, pp. 256, 259). Possibly it extends south to about the Grootfontein District of South-West Africa, where the transition from the Rhodesian Savanna District to the Kalahari Arid District seems to take place.

For the status of the species in northern South-West Africa, see the preceding account of *A. c. selbornei*.

Bontebok

DAMALISCUS DORCAS (Pallas)

Antilope Dorcas Pallas, Misc. Zool., p. 6, 1766. (Type locality not given; restricted by Harper (1940, p. 329) to "Kaffir Kuils River, in the Riverdale district, Cape Province.")

SYNONYM: *Antilope pygargus* Pallas (1767).

FIGS.: Schreber, Säugthiere, pl. 273, 1784; Harris, 1840, pl. 17; Gray, Gleanings Knowsley Menagerie, pl. 22, figs. 2-3, 1850; Millais, 1895, p. 235, fig.; Selater and Thomas, 1895, vol. 1, pl. 8, p. 77, fig. 10; Bryden, 1899, pl. 5, fig. 5; W. L. Selater, 1900, vol. 1, p. 139, fig. 4; Elliot, 1907, p. 57, fig. 12; Lydekker, 1908, pl. 5, fig. 4; Maydon, 1932, pl. 107; Ward, 1935, p. 68, fig.; Illus. London News, vol. 99, no. 2583, p. I (insert), 1936; Pocock, 1937, p. 667, fig.; Leister, 1938, p. 77, fig.; Unspoilt Africa, Union National Parks, p. 7, fig., 1938.

Throughout historical times the Bontebok has apparently been restricted to the southwestern corner of the Cape Province. It is now extinct in a wild state, and only about a hundred individuals survive in the Bontebok National Park near Bredasdorp and on a few adjacent farms. (Warden of Kruger National Park, *in litt.*, 1937; Kaffrarian Museum, *in litt.*, March, 1937.)

Anterior half of back rufous fawn; crown, sides of face and neck, flanks, thighs, anterior half of rump, and upper part of limbs varying from very rich dark brown to blackish; whole front of face covered with a white blaze (brown in immature animals), narrower above the eyes; rump-patch, belly, and lower limbs (except dark line in front), white. Height at shoulder, 40 inches. Horns black, sublyrate, with 15-16 ridges; record length, 16 $\frac{3}{8}$ inches. (Selater and Thomas, 1895, vol. 1, p. 74; Selous, 1914, p. 84; Ward, 1935, p. 66.)

Selous (in Bryden, 1899, pp. 175-179) was the first to point out that the ranges of the Bontebok and the Blesbok are entirely distinct; previously there had been much confusion in the names of these two very similar species.

Selous writes (1914, pp. 83-86):

Agés ago, no doubt, the common ancestors of the bontebok and the blesbok had a continuous range over all the open plains of South Africa from Cape

Agulhas to the territories now known as Bechuanaland and the Transvaal. The gradual desiccation, however, of the Karroo in the south-western portions of the Cape Colony . . . no doubt caused the withdrawal of these animals to the north and east from those parched and waterless plains. Those individuals of the species, however, which had reached the neighbourhood of Cape Agulhas, where there is plenty of water, would have had no reason to move, and thus a portion of the race became isolated, and in course of time differentiated, from the original stock. This isolated race of antelopes confined within very narrow geographical limits on the plains bordering the sea near Cape Agulhas . . . was first met with by the early Dutch settlers at the Cape in the latter half of the seventeenth century, and named by them "bonteboks"

Had it not been for the protection which has long been afforded by the Cape Government, there can be little doubt that the bontebok, owing to the very small area of its range, would long since have disappeared Even in spite of stringent laws, this dire calamity might have happened had it not been for the action of Mr Alexander Van der Byl, who, in 1864, whilst enclosing the extensive area known as Nachtwacht Farm, near Bredasdorp, managed to drive something like three hundred bonteboks within the enclosed space. There they have been carefully preserved and protected ever since, and though they have not increased in number, it is said that they are not decreasing. Another herd of bonteboks is preserved on a neighbouring farm belonging to Dr. Albertyn In addition to these bonteboks now carefully preserved on enclosed farms, there are also still a few surviving on the unenclosed plains, both in the neighbourhood of Bredasdorp and near the village of Swellendam. It is doubtful . . . whether more than three hundred bonteboks are in existence to-day. . . . No doubt, before the advent of Europeans in South Africa, bonteboks once congregated in large droves, but to-day they can only be seen in small herds of from half-a-dozen to twenty or thirty individuals.

"Formerly the bontebok was somewhat more widely spread throughout the south-western corner of the Colony. Sparrman [1785] mentioned seeing a herd near the Bot River in Caledon and Smuts [1832] notes it from the Breede River in Swellendam." (W. L. Sclater, 1900, vol. 1, p. 140.)

"They are confined to . . . the 'Strand Veldt' . . . bordered by the sea on the south-west, south, and south-east, and by a range of undulating country or low hills rising to the Caledon Ranges and Zwart Bergen on the northern side" (E. L. Layard, Proc. Zool. Soc. London 1871, p. 625, 1872). Curiously enough, in all the literature there seems to be no definite, reliable record of the Bontebok ranging north of this "Strand Veldt" even as far as the Little Karroo.

The Bontebok reserve was proclaimed in July, 1931, and included then only 17 animals. Now they have increased to 44. (Herbert Lang, *in litt.*, January 23, 1935.)

In 1936 the number in the reserve was reported as 57 (C. W. Hobley, *in litt.*, August 18, 1936).

"The Magistrate at Bredasdorp . . . tells me the bontebok are doing splendidly and multiplying fast." A person who shot one from

a motor car was fined two hundred pounds. (T. Barbour, *in litt.*, December 28, 1936.)

"It has been preserved entirely as a result of the foresight of the Van der Byl family, who have for generations preserved it on their



FIG. 60.—Bontebok (*Damaliscus dorcas*). After Brehm and Lydekker.

properties—often at great risk from unscrupulous poachers" (Roberts, 1937, p. 776).

The Bontebok National Park is "an area of approximately 850 morgen." "In it are especially preserved a herd of 69 Bontebuck, the only surviving members of this species, except a few others on another farm in that vicinity." (Unspoilt Africa, Union National Parks, p. 7, 1938.)

The Bontebok is accorded protection as a Class B species under the London Convention of 1933.

Blesbok

DAMALISCUS PHILLIPSI Harper

Damaliscus phillipsi Harper, Proc. Biol. Soc. Washington, vol. 52, p. 90, 1939. (Orange Free State.) Hitherto known (erroneously) as *Damaliscus albifrons* (Burchell, 1824).

Figs.: Harris, 1840, pl. 21; Gray, Gleanings Knowsley Menagerie, pl. 22, fig. 1, 1850; Millais, 1895, pl. facing p. 234, fig. on p. 235; Selater and Thomas, 1895, vol. 1, pl. 9, p. 82, fig. 11; Bryden, 1899, pl. 5, fig. 5; W. L. Selater, 1900, vol. 1, p. 142, fig. 42; Lydekker, 1908, pl. 5, fig. 5; Selous, 1914, pl. 22; Maydon, 1932, pl. 108; Ward, 1935, p. 69, fig.; Pocock, 1937, p. 666, fig.

The Blesbok, while extinct in the wild state, is preserved on a number of farms in Orange Free State and the Transvaal as well as in the Somerville Reserve in the former state.

This species is very similar to the Bontebok, but is of a generally lighter color and lacks the prominent white rump-patch of the latter; also the cream-colored face blaze is generally separated from the buffy-white median stripe on forehead and crown by a narrow chestnut band between the eyes. Rest of head and neck mainly chestnut; median dorsal area Rood's brown, changing on sides to Vandyke brown; triangular rump-patch auburn to Sayal brown, with a narrow posterior border of white; tail mostly black; chest with more or less chestnut; rest of under parts white; legs mainly sepia; horns blackish, the basal two-thirds with 13 more or less complete rings. Male type: head and body, 1,480 mm.; tail, 260; height at shoulder, 1,020. (Harper, 1939, pp. 90-91.) Record length of horns, 18 $\frac{5}{8}$ inches (Ward, 1935, p. 67).

In days long past the Blesbok "was an inhabitant of the plains to the south of the Orange River in the eastern part of the Cape Colony, and of all the open country to the north of that river in the territories now known as the Orange River Colony, the Transvaal and Bechuanaland" (Selous, 1914, p. 84). Selous continues (pp. 86-87):

[The Blesbok,] once undoubtedly the most numerous of all African antelopes, has long been exterminated over the greater portion of its original range, and some twenty years ago had come very near to complete extinction. At that time, the only blesboks in existence were a few herds preserved by Dutch farmers in the Orange Free State and the Transvaal, and of these a large proportion were destroyed during the continuance of the Boer War. Since that time, however, the surviving blesboks have been carefully preserved and have multiplied exceedingly, and as they have lately been introduced into many enclosed areas in the Orange Free State and Transvaal they are likely to increase in numbers rather than to decrease, and, at any rate, the survival of the species seems assured. . . .

Despite the great numbers of blesboks which were annually killed, but little diminution was apparent in their legions until after 1865. Subsequently to that date, however, the value of their skins for export to England, coupled with the fact that the Boer colonists were by that time very generally armed with long-range breech-loading rifles, brought about the extermination

of the blesboks throughout the greater part of their range in a surprisingly short space of time. When I first visited South Africa in 1871, vast numbers of blesboks certainly still existed on both sides of the Vaal River, but some fifteen years later practically none were left anywhere, except on a few farms in the Orange Free State and the Southern Transvaal . . . Whilst travelling from Potchefstroom in the Transvaal to Kronstad in the Orange Free State early in 1875, I met with very large numbers of blesboks. . . .

Two years later, in the neighbourhood of the Hartz River, in the South-Western Transvaal, I for the last time saw blesboks collected together in large numbers. They were then, however, being shot down for the sake of their skins with pitiless persistence, and by 1885 but few were left anywhere but on a few farms The furthest point north where I ever met with blesboks was in the province of Marico, in the north-west of the Transvaal, on the plains to the south of the Dwarsberg.

In 1848, along the Vet River in Orange Free State, Cumming (1850, vol. 2, pp. 242-243) came upon "herds of thousands of blesboks." "The plain exhibited one purple mass of graceful blesboks, which extended without a break as far as my eye could strain: the depth of their vast legions covered a breadth of about six hundred yards."

Bryden (1899, pp. 187-189) writes as follows:

In British Bechuanaland they still ranged freely in small herds until about 1882 But after the expedition of Sir Charles Warren in 1884-85, and the influx of white settlers, blesboks disappeared. . . . A year or two since (1897) . . . a few blesboks were straying back into Bechuanaland. . . .

I myself have seen, three-and-twenty years ago, the waggons rolling down country to Port Elizabeth from the Orange Free State and Transvaal loaded up with the dried skins of blesbok and springbok. And any middle-aged London hide-broker will tell you that from five-and-twenty to forty years ago tens of thousands of blesbok skins, among the pelts of other South African animals, were annually disposed of at the Mincing Lane Sale Rooms.

In the whole of the Orange Free State and Transvaal there are now remaining probably not more than 3000 head of these once innumerable antelopes.

"In actually protected conditions blesbok and springbok exist only in the Sommerville Reserve" in the Orange Free State (Herbert Lang, *in litt.*, January 23, 1935). There are about 6,000 of the former species in this reserve (J. Stevenson-Hamilton, *in litt.*, January 22, 1933).

"It is estimated that there are now over 50,000 on farms in the Orange Free State" (Ward, 1935, p. 67).

The species is "in no danger, owing to the fact that it has a definite market value: Blesbok forms the chief source of the venison supply in the Union, and is bred on farms for the Markets in Johannesburg" (G. C. Shortridge, *in litt.*, October 14, 1937).

There is a herd of ten in the Giant Castle game reserve in Natal (Administrator's Office, Natal, *in litt.*, December, 1936).

**Hunter's Hartebeest; Hunter's Antelope. Damalisque de
Hunter (Fr.). Herola (Galla)**

DAMALISCUS HUNTERI (P. L. Sclater)

Cobus hunteri P. L. Sclater, Field, vol. 73, p. 260, 1889. (North [= east] bank of Tana River, "about 150 miles up," near village of Durani, Kenya; this village shown by Roosevelt and Heller (1914, vol. 1, p. 359) to be "only about 70 miles in a direct line" from the mouth of the Tana.)

FIGS.: P. L. Sclater, 1889, pl. 42, pp. 373-375, figs. A-C; Willoughby, East Africa, pl. 4, fig. 6, 1889; Sclater and Thomas, 1894, vol. 1, pl. 6, pp. 54-55, figs. 7a, 7b, 7c; Bryden, 1899, pl. 5, fig. 1; Lydekker, 1908, pl. 5, fig. 1; Lydekker and Blaine, 1914, vol. 2, p. 47, fig. 7; Zammarano, 1930, p. 176, fig.; Maydon, 1932, pls. 69, 73, 75; Ward, 1935, p. 63, fig.

Although this Hartebeest is fairly numerous where it occurs at all, its very restricted range along the border of Kenya and Italian Somaliland gives it a special interest in the eyes of conservationists.

General color uniform rufous, a little darker above; a curved line between the eyes, area about eyes, inside of ears, tail, and belly white; horns black, rounded, strongly ringed, curving outward and backward, the tips pointing directly upward. Height at shoulder, about 48 inches; female a little smaller. (P. L. Sclater, 1889, pp. 372-373.) Record length of horns on front curve, 27½ inches (Ward, 1935, p. 59).

This species was discovered in 1888 by H. C. V. Hunter, who writes (in Sclater, 1889, pp. 376-377) as follows:

We first met with this Antelope about 150 miles up the Tana River. It is only found for certain on the north bank of the river. . . . It is generally met with in herds of from 15 to 25 individuals. . . .

We did not come across these Antelopes again for some days, but then met with them in large numbers and got several specimens. . . . This species certainly does not extend down to the coast, but we saw them as far as the furthest point we reached (about 250 miles) up the river, at a place called Mussa.

"I believe that it has never been met with during the twenty-five years which have elapsed since its first discovery anywhere but in a small area of country near the north bank of the Tana The range of Hunter's hartebeest does not . . . extend as far north as the Juba River, and in the dry season it is only found in the near vicinity of the Tana." (Selous, 1914, p. 77.)

"North of the Tana River it extends parallel to the coast as far as the latitude of Port Durnford" (Roosevelt and Heller, 1914, vol. 1, p. 359).

"It is efficiently protected" (Hingston, 1930, p. 43).

Ritchie (in Maydon, 1932, pp. 256-257) writes:

These fine-looking animals . . . are found only in a comparatively small part of Kenya and the adjacent Italian Territory. They inhabit a zone some sixty miles broad north of the Tana River, which is, roughly, as follows:

from about Massa Bubu on the Tana, downstream to within some forty miles of the coast, the zone runs for about one hundred and twenty miles, first north-easterly and then northward. Within this area they are fairly numerous, being found in herds of from half a dozen to forty or more, though it is uncommon to see more than twenty together. . . .

Lions are their chief enemy, though doubtless Leopards and Wild Dogs kill a few. Fortunately the Somali do not, I think, kill them at all; and their wildness cannot be attributed to human molestation.

"Very few are ever shot owing to its habitat . . . being so remote and only one is allowed on a full licence" (P. W. Whetham, *in litt.*, March 8, 1933).

"Have been very difficult to reach in former times, but now their country can be approached by car" (Maydon, 1933, p. 738).

The range is said to extend from the Tana River to Lak Dera in Jubaland, about 160 miles (Prentiss N. Gray, MS.).

From the report of the Committee of Experts (1938, p. 12), we read:

Another case of a species of a highly restricted distribution is the Hirola, or Hunter's Hartebeest, . . . which occurs only between the southern border of Somaliland (both British and Italian) and the north bank of the Tana River. To some extent, this species enjoys a natural protection owing to the inaccessibility of its habitat, but with the constant improvement in communications, it cannot be doubted that the stock of this species will decrease unless protective measures are adopted. We are glad to note the assurance of the Italian Representative that special consideration will be given by the Italian authorities to the possibility of affording a regime of protection to this species as soon as the Italian Government receives the report of the East African Scientific Mission The United Kingdom Representatives also have undertaken to give careful consideration to this matter before the next meeting of the Conference.

White-tailed Gnu; Black Wildebeest. Zwart Wildebeest (Cape Dutch)

CONNOCOAETES GNOU (Zimmermann)

Bos Gnou Zimmermann, Spec. Zool. Geogr., p. 372, 1777. (Interior of Africa, between Cape of Good Hope and Tropic of Cancer; type locality restricted by Harper (1940, p. 329) to the "Colesberg district of the Cape Province.")

FIGS.: Buffon, Hist. Nat., suppl., vol. 6, pls. 8-9, 1782; Harris, 1840, pl. 1; Millais, 1895, pls. facing pp. 220, 226, figs. on pp. 222-228, 231; Selater and Thomas, 1895, vol. 1, pl. 12, pp. 115-116, figs. 15, 15a; Bryden, 1899, pl. 3, fig. 6, p. 209, fig. 26; W. L. Selater, 1900, vol. 1, p. 149, fig. 44; Elliot, 1907, p. 59, fig. 13; Lydekker, 1908, pl. 3, fig. 6, p. 131, fig. 35; Lydekker and Blaine, 1914, vol. 2, p. 49, fig. 8; Selous, 1914, pl. 11; Maydon, 1932, pl. 109; Ward, 1935, p. 78, fig.; Field Mus. News, vol. 8, no. 2, p. 1, fig., 1937; Pocock, 1937, p. 664, fig.; Leister, 1938, p. 78, fig. A.

"The Black Wildebeest is extinct in a wild state. There appears to be a fair number of semi-protected herds on farms in the Transvaal and the Orange Free State." (Shortridge, 1934, p. 463.)

General color dark brown or blackish; tufts of long hairs on muzzle, throat, and between forelegs black; mane upright, longer middle hairs black, shorter outer hairs yellowish white; tail reaching nearly to ground, whitish, except for dark brown base. Horns expanded at base, directed at first downward and forward, but finally curving upward; record length on front curve, $30\frac{1}{2}$ inches. Height at shoulder, 46 inches. Females much smaller. (Sclater and Thomas, 1895, vol. 1, p. 112; W. L. Sclater, 1900, vol. 1, pp. 148-150; Ward, 1935, p. 78.)

Selous (1914, pp. 53-54) writes:

This animal was once very abundant on all the open plains and karroos of the Cape Colony from Cape Agulhas to the Orange River, and in all the open grass lands of the Orange Free State, and the high veld of the Southern and Western Transvaal, sometimes ranging beyond the south-western border of that territory into Southern Bechuanaland. I met with them there myself both in 1872 and 1880.

By 1871 . . . black wildebeests had already been exterminated in every part of the Cape Colony with the exception of the district of Beaufort West, where they lingered on for some years longer. But at that time they were still to be seen in great herds in many parts of the Orange Free State and the Transvaal. In 1875 I saw very considerable numbers of these animals between Potchefstroom in the Transvaal and Harrismith in the Orange Free State, and again in 1876 I met with a good many in the Western Transvaal near the Hartz River. But at this time they were being shot down in every part of their range at a terribly rapid rate merely for the value of their hides, and I doubt if there was a single black wildebeest left alive in any part of the Transvaal at the end of the year 1885. By that date the species would no doubt have already become absolutely extinct had it not been for the public spirit of two Boer farmers of the Orange Free State—Messrs Du Plessis and Terblanc—who carefully protected the poor remnants of the once great herds of black wildebeests which were still running on their farms. [There were about 300 of the animals on each of the two farms.] Mr F. E. Blaauw . . . has also introduced some black wildebeests into Holland, where they have thriven exceedingly well on his estate near Amsterdam.

Harris (1839, p. 375) refers to the species as "abundant on the plains south of the Vaal River."

Bryden (1899, pp. 207-213) gives the following account:

The black wildebeest is in its behaviour one of the oddest, most capricious, and most fantastic of all wild creatures. . . . Its sudden and fantastic antics and capers are always a source of wonderment to the onlooker. . . .

If it had not been for a devastating disease known as the "brand-sickte," or burning sickness, which periodically thinned the herds of these and other game, their numbers would have been far too many even for that vast country [Cape Colony] to have supported. . . . Down to the year 1850 an immense amount of slaughter had been performed by the Dutch hunters and farmers for something like eighty or a hundred years among these and other creatures. . . . The range of this wildebeest never seems to have extended eastward in the Cape Colony beyond the Kei River. . . .

The flesh of the black wildebeest is not by any means good eating. . . . The total number now existing in the whole of South Africa is probably . . . well under 600 or 700 head. [The] Boers find that they can easily obtain from rich men at Johannesburg and elsewhere £10 and more for the privilege of shooting . . . a single head of these rare animals. . . . In the old days in Cape Colony the frontier farmers shot black wildebeest and quagga principally for the purpose of supplying their Hottentot herdsmen and servants with a food supply, and thus saving their sheep and goats. . . . They also shot these animals for their skins, which they required for ropes, halters, sacks, *riems*, harness, whips, and other gear. Under this free-and-easy system the game of Cape Colony soon began to vanish. But it remained for the wasteful farmers of the Transvaal and Orange Free State to become mere sordid skin-hunters, and to destroy millions of animals for the paltry value of their hides. These hides were sent down country and shipped to Europe. In forty years even the once apparently inexhaustible herds of the Free State and Transvaal became shot out, and these countries are now all but devoid of the noble game that once gave life and beauty and a perfectly unique charm to many an otherwise dreary landscape.

W. L. Sclater writes (1900, vol. 1, p. 152): "The white-tailed gnu forms the dexter supporter of the arms of the Colony of the Cape of Good Hope . . . , and it would be a thousand pities if so characteristic a form was allowed to become altogether extinct, as seems not unlikely to happen."

"It is at present only found in the Orange Free State (where herds are, amongst other localities, still preserved in the Kroonstad and Winburg districts) and in the South-Western Transvaal. . . . In May, 1918, . . . we saw about 800 of these . . . creatures on a farm near Marquard, in the Winburg district. They consorted in herds of from fourteen to sixty individuals." (Haagner, 1920, pp. 168-169.)

"The species benefited greatly from the breaking down of fences during the Boer War; the herds got mixed and the results of inbreeding were cancelled. Now they are all enclosed again and their continuance depends purely upon the fancy of the owners of the farms. There is a small herd . . . on the outskirts of Cape Town. It numbers 7 at present." (E. L. Gill, *in litt.*, December 13, 1932.)

"Black wildebeest venison may frequently be seen in game shops in Johannesburg and Pretoria" (Shortridge, 1934, vol. 2, p. 463).

"Most of them are kept essentially for lucrative purposes, actual protection is a subterfuge. On account of the sport they offer when pursued on horseback, hunters are willing to pay during the open season the high fees (five pounds) for every animal killed. I see no possibility of definite protection except by buying one or more of the most suitable farms." (Herbert Lang, *in litt.*, January 23, 1935.)

Roberts (1937, pp. 774-775) writes:

So far, I believe, it has not been introduced into the only Government game reserve in the Orange Free State, Somerville Estate, a defect that

should be remedied without delay. Some are preserved on the De Beers Company's property in Griqualand West; but I understand that one estate in the Kroonstad district, where there were a large number, has recently come into the market owing to the demise of the owner, and in such ways the animal may become exterminated should new owners not care to preserve it. It may be stated that such peculiar and rare types are worth a hundred times more than domestic cattle, and if ever there were a need for protecting relict types this is one of the greatest.

"A few recently introduced into the Somerville Reserve, Orange Free State

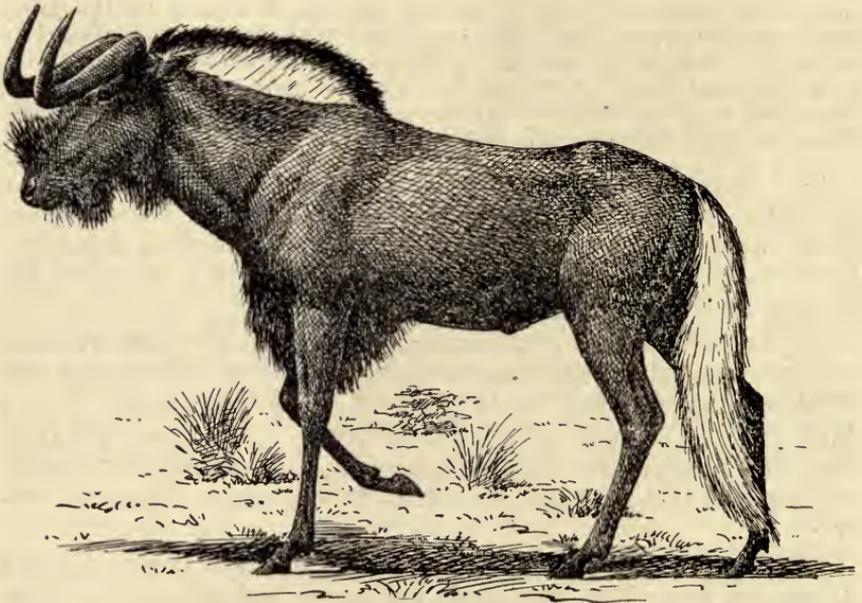


FIG. 61.—White-tailed Gnu (*Connochaetes gnou*)

"Apparently only a few hundred in existence. Should receive careful legislative protection, otherwise its numbers may dwindle to a dangerous degree." (G. C. Shortridge, *in litt.*, October 14, 1937.)

While it is not indigenous to Natal, there are at present a few specimens on private farms in northern Natal, where they are rigidly protected by the owners (Administrator's Office, Natal, *in litt.*, December, 1936).

There are about eighty animals on the De Beers Farm south of Kimberley. Those on farms in the Kroonstad and Odendaalsrust districts of Orange Free State suffered very heavily during the severe drought of 1933. (R. Bigalke, *in litt.*, October, 1936.)

As a Class B species, the White-tailed Gnu is accorded partial protection under the London Convention of 1933.

Yellow-backed Duiker; Bush-goat. Céphalophe à dos jaune (Fr.). Waldbock (Ger.)

CEPHALOPHUS SYLVICULTRIX SYLVICULTRIX (Afzelius)

Antilope Sylvicultrix Afzelius, Nova Acta Reg. Soc. Sci. Upsaliensis, vol. 7, p. 265, 1815. ("Mountains of Sierra Leone and districts adjoining the Souso Rivers Pongas and Quia" [both rivers apparently in French Guinea]; type locality restricted by Lydekker and Blaine (1914, vol. 2, p. 64) to Sierra Leone.)

SYNONYMS: *Cephalophus thomasi* Jentink (1901); *C. sclateri* Jentink (1901); *C. cozi* Jentink (1906).

FIGS.: Afzelius, *op. cit.*, pl. 8, fig. 1; Gray, Gleanings Knowsley Menagerie, pl. 23, fig. 3, 1850; Sclater and Thomas, 1895, vol. 1, pl. 13, pl. 14, fig. 2; Bryden, 1899, pl. 6, fig. 1; Jentink, 1901, pls. 1-2; Lydekker, 1908, pl. 6, fig. 1; Lydekker and Blaine, 1914, vol. 2, p. 65, fig. 10; Maydon, 1932, pl. 128; Ward, 1935, p. 87, fig.; Spl. Publ. Am. Comm. Intern. Wild Life Protection, no. 6, p. 25, fig., 1935.

This Duiker, as a Class B species, is given partial protection under the London Convention of 1933. It has a wide range, from Angola and Northern Rhodesia at least to French Guinea, and, despite serious persecution, seems to maintain itself in moderate numbers.

Form stout and heavy; general color all over, dark blackish brown; crest of elongated hairs about base of horns, blackish in front, reddish brown behind; muzzle, chin, and ear tips whitish; a dorsal ornament extending from middle of the back to the tail; anterior portion an elongated, brownish yellow triangle; posterior portion a broad moon-shaped disk, grizzled with black and yellowish hairs, and separated from the anterior portion by a black band. Height of female at shoulder, 34 inches. Horns long and tapering, rather bowed downwards terminally, those of female much smaller than the male's; record length of latter, $7\frac{7}{8}$ inches. (Sclater and Thomas, 1895, vol. 1, pp. 126-127; Jentink, 1901, pp. 180-184; Ward, 1935, p. 85.)

Miss St. Leger (1936, p. 215) gives the range of *C. s. sylvicultrix* as "Sierra Leone to Gaboon and Angola; Congo Forests to Ituri Valley and North Rhodesia." The following report from Gambia (E. Johnson, 1937, p. 64) perhaps requires verification: "This large Duiker is rarely seen in the Gambia, a few specimens have been shot in the small forest district on the south bank of the river. Protected from 16th June to 31st December. A couple of hundred is the maximum existing in the Gambia now."

The General Government of French West Africa (*in litt.*, November, 1936) reports the species as occurring in French Guinea, the Ivory Coast, and the bend of the Niger River.

In Sierra Leone it occurs generally but is not common. There is no

evidence of depletion, and no protective measures exist. (Colonial Secretary's Office, *in litt.*, July, 1937.)

In Liberia it occurs sparingly on the Mahfa River, but more commonly on the Manna and Solyman Rivers (Jentink, 1888, p. 20). A specimen was received by the Berlin Museum from the vicinity of Schieffelinsville, but Büttikofer (1890, vol. 2, p. 376) could find no trace of it there.

In the Gold Coast it is "still plentiful and in no present danger of extinction" (Director of Agriculture, Gold Coast, *in litt.*, January 22, 1937). It "has probably a similar range to that of the bongo [northern edge of the forest country and the fringing forest of the grass country in north and east Ashanti]. So far it has possibly not decreased much, and it seems that it has never been really common. With the increasing demand for meat it is often killed at night." (Asst. Conservator of Forests, Gold Coast, *in litt.*, July 22, 1937.)

"Herr Matschie has recorded its occurrence in Togoland" (Selater and Thomas, 1895, vol. 1, pp. 129-130).

In the French Cameroons it is normally not common (Inspection of Waters and Forests, Yaounde, *in litt.*, January 12, 1937). It is without any special protection, except that only two head may be killed in one day by a permit-holder (Paris Agency of Cameroons, *in litt.*, November, 1936).

"In Gabun I have met with this Duiker throughout the forest zone, to which it is almost entirely confined. Its habitat scarcely facilitates encounters, however abundant it may be in the forest, where it lives by solitary couples. The natives capture a great many in nets, to judge by the multitude of horns figuring in the 'medicaments' of hunting—kinds of magic altars where the skulls of all the animals captured are hoarded, in order to bring luck in hunting. The various kinds of Duikers inhabit all the high secondary forest, and probably the primary forest—if there is any vestige of it left in the interior, which I doubt. They are hunted very actively, and their meat forms the base of the flesh diet of the forest populations. Despite these inroads, the number of Duikers does not seem to decrease appreciably, owing to their prolificness and to the protection afforded by their forest habitat." (Free translation of letter from A. R. Maclatchy, February 5, 1937).

In the Ubangi-Shari Territory this Duiker occurs in a number of the gallery forests south of latitude 7° N. in the Ubangi Basin, but it is always rare. It is not threatened, and it ought to be common throughout the Great Forest (Middle Congo and Gabun). (L. Blancou, *in litt.*, December, 1936.)

In the Congo Basin skulls are recorded from Ubangi and Uele,

the Equatorial forest (eastern as well as western), Oshwe near Lake Leopold II, Katanga, and northeastern Rhodesia. "The Congo-basin south of the great curvature of the mighty Congo river, west of Luabala and north of Kasai rivers, is inhabited by the largest among the Duikers, *C. sylvicultrix*." (Lönnerberg, 1919, pp. 163, 185.)

The species is still found, though in much reduced numbers, in all the forests and gallery forests of the Belgian Congo. Less rare than the Bongo, it becomes each year the victim of the hecatombs at the time of drives with nets. (A. J. Jobaert, *in litt.*, November 10, 1936.)

The hunting of this species is not allowed in the Belgian Congo (Forest and Game Service, *in litt.*, November, 1936).

In Angola it occurs "in wooded kloofs high on western plateau" (Varian, in Maydon, 1932, p. 379).

It is "scarce in Northern Rhodesia although occasionally found in the country bordering the Congo Free State." It can be gotten round Kasempa (on Governor's license only). (Lyell, in Maydon, 1932, pp. 328, 332.)

In Northern Rhodesia, "owing to its strictly nocturnal habits it is possibly a good deal more plentiful than one would credit, in fact I have been told that in parts of north-western Mankoya in Barotse, there were localities in which it used to be more plentiful than the common duiker. It still occurs not uncommonly in parts of the Mwinilunga, Solwezi and Ndola Districts, particularly near the Congo border, and also very sparingly in the Kawambwa, Fort Rosebery, Kasempa and Balovale (Barotse) Districts, and on the Mankoya-Mumbwa border.

"Special measures for protection are recommended elsewhere.

"Where it occurs the natives trap a fair number on their lands." (Pitman, 1934, p. 18.)

The number of Yellow-backed Duikers in Northern Rhodesia (excluding Barotse) is estimated at about 1,500 (Pitman, 1934, p. 331).

Among the localities from which Lydekker and Blaine (1914, vol. 2, pp. 65-66) record specimens are the following: Sierra Leone; Fanti, Prang, and Bibianaha, Gold Coast; Oban and Lagos, southern Nigeria; Mbaya, southeast Congo; and Kambovi, N. W. Rhodesia.

Ituri Yellow-backed Duiker

CEPHALOPHUS SYLVICULTRIX ITURIENSIS M. Rothschild and Neuville »

Cephalophus ituriensis M. Rothschild and Neuville, C. R. Acad. Sci. [Paris], vol. 144, p. 98, 1907. ("La vallee de l'Ituri," northeastern Belgian Congo.)

Little is known of this subspecies. It is the only one, in addition to *C. s. sylvicultrix*, recognized by Miss St. Leger in her recent monograph (1936, p. 215), where its range is given as "Ituri Valley to British Ruanda."

It is smaller than the typical subspecies, and its general color is much darker than that of "*C. coxi*" [= *C. s. sylvicultrix*]; blackish fawn to light gray on cheeks and chin; forehead and dorsal part of neck nearly black; frontal crest rufous, slightly mixed with black; anterior dorsal patch almost linear, the hairs pale yellowish, tipped with fuscous; posterior patch not clearly separated from the other, semilunar in shape, the hairs black, tipped with white; under parts washed with yellowish. The type is a young male, whose shoulder height is 660 mm.; horns, 41 mm. (Rothschild and Neuville, 1907, pp. 98-100.)

A large number are said to have been collected in the Ituri forest by the American Museum Congo Expedition (1909-1915).

"A yellow-backed Duiker has recently been obtained from the forests of this district [Kigezi District, Western Province of Uganda] by Captain J. E. T. Phillips" (Duke, in Maydon, 1932, p. 281).

The species is said to have been seen on Mount Mikeno, Belgian Congo, by Gyldenstolpe. Baron de l'Epine has sent a specimen from Ruanda. (Schouteden, 1934, p. 302.)

Ward (1935, p. 86) records a specimen from the Sudan-Congo border.

Miss St. Leger (1936, p. 215) mentions three specimens from Mount Sabinio [near the Congo-Uganda-Ruanda boundary] and British Ruanda.

Its existence in the Parc National Albert is doubtful. It is found on the mountain chain forming the Congo-Nile watershed east of Lake Kivu. (Conservator, National Parks, Belgian Congo, *in litt.*, November, 1936.)

It is met with on the slopes of the Virunga, Muhavura, and probably other volcanoes in Ruanda (Verhulst, *in litt.*, January, 1937.)

Jentink's Duiker; Black-headed Duiker. Tapirantilope (Ger.)

CEPHALOPHUS JENTINKI Thomas

Cephalophus jentinki Thomas, Proc. Zool. Soc. London 1892, p. 417, 1892. ("Liberia"; the restricted type locality is apparently Sharp Hill, near Schiefelinville (cf. Büttikofer, 1890, vol. 2, p. 375).)

FIGS.: Notes Leyden Mus., vol. 7, pl. 10, 1885, and vol. 10, pl. 1, 1888; Büttikofer, 1890, vol. 2, p. 374, fig.; Sclater and Thomas, 1895, vol. 1, pl. 15.

This species is noteworthy by reason of its extreme rarity in collections and its restricted range in Liberia. No additional specimens have been taken for more than half a century, and the male is still unknown.

"Colour of head, ears, neck all round as far back as the withers, throat, and a narrow sternal line deep uniform black; of body above and below coarsely grizzled grey; the hairs ringed with black and

white. Lips and chin, a line all round the fore-quarters separating the black from the grey, axillae, groins, fore and hind legs whitish; a rather darker mark running across the outer side of the forearm." Horns of female, 155 mm.; height at shoulder, 770 mm. (Thomas, 1892, p. 417.)

This Duiker was first described by Jentink (1885, p. 272), under the impression that it was identical with *C. longiceps* Gray. He considered it (1888, p. 19) a very rare species, since only three specimens could be procured by the hunters for the Leyden Museum.

A little below Schieffelinville, in the triangle formed by the Junk, Du Queah, and Farmington Rivers, arises Sharp Hill, covered with forest and surrounded by swamps. Here all three specimens collected for the Leyden Museum were secured. The natives hunt the animals in the rainy season, when they can reach the hill in canoes. A fourth specimen was sighted in the forests near Fali, northwest of Monrovia. (Büttikofer, 1890, vol. 2, pp. 375-376.)

"Apparently no other collectors [than Büttikofer and Stampfli] have taken specimens, and the range is probably very limited" (Allen and Coolidge, 1930, p. 610).

Reports of the species in Sierra Leone remain unverified.

"It is only reported from Sierra Leone. But according to Captain Stanley it is quite common there." (Haywood, 1933*b*, p. 24.)

According to the Colonial Secretary's Office (*in litt.*, July, 1937), it is said to occur in Sierra Leone, but must be rare. There are no protective measures.

Miss St. Leger remarks (1936, p. 215): "Apparently confined to Liberia."

Partial protection of this Duiker, as a Class B species, is accorded by the London Convention of 1933.

Brooke's Duiker

CEPHALOPHUS OGLBYI BROOKEI Thomas

Cephalophus Brookei Thomas, Ann. Mag. Nat. Hist., ser. 7, vol. 11, p. 290, 1903. ("Fanti," Gold Coast; the more restricted type locality is "Antrim, Fanti" (St. Leger, 1936, p. 222).)

FIG.: ?Slater and Thomas, 1895, vol. 1, pl. 18, fig. 2 (as *C. ogilbyi*).

This Duiker "must now be very rare or extinct, no specimens having been recorded for a great number of years" (Director of Agriculture, Gold Coast, *in litt.*, January 22, 1937).

General color bright orange to rufous on the hind quarters; nose, nape, and neck brown or blackish; a black median dorsal stripe, with a maximum width of 2-2½ inches, terminating 3 or 4 inches from the tail; tail with a grizzled black-and-white terminal tuft; legs uniformly light to the hoofs. Height at shoulders, 500 mm.

(Thomas, 1903, p. 290.) Record length of horns, $4\frac{5}{16}$ inches (Ward, 1935, p. 85).

This mainland representative of *C. ogilbyi* (known only from Fernando Po) ranges from Liberia to the Cameroons.

According to Büttikofer (1890, vol. 2, p. 377), it appears to be common in the forests of Liberia.

"Specimens . . . are recorded . . . as having been procured on the Du Queah and Farmington Rivers in Liberia by Büttikofer and Stampfli. . . .

"In the Cameroons the present species has been met with by the German collectors Preuss and Morgan, as recorded by Herr Matschie, and in Togoland, on the same authority, by Kling and Büttner." (Sclater and Thomas, 1895, vol. 1, pp. 162-163.)

"Very little is known of it to European sportsmen" (Bryden, 1899, p. 223).

Lydekker and Blaine (1914, vol. 2, p. 85) record specimens from: Fanti and Usshur, Gold Coast; Cape Dikundscha, Cameroons; and the Oban district, southern Nigeria.

Cape Colony Klipspringer. Klipspringer (Ger.)

OREOTRAGUS OREOTRAGUS OREOTRAGUS (Zimmermann)

Antilope Oreotragus Zimmermann, Geogr. Geschichte, vol. 3, p. 269, 1783.

("The highest cliffs at the Cape [of Good Hope].")

SYNONYM: *Antilope saltatrix* Boddaert (1785).

FIGS.: Schreber, Säugthiere, pl. 259, 1785; Steedman, 1835, vol. 2, pl. facing p. 9; Jardine, Naturalists' Libr., Mamm., vol. 7, pl. 30, 1842; Bryden, 1899, pl. 6, fig. 8; W. L. Sclater, 1900, vol. 1, p. 167, fig. 47; Lydekker, 1908, pl. 6, fig. 8; Selous, 1914, pl. 55; Pocock, 1937, p. 674, fig.

This little antelope is easily shot and disappears rapidly before settlement. Some apprehension is felt concerning its survival in the Cape Province.

General color speckled yellow and brown; hair very coarse, flattened in section, wavy, and thick; chin, belly, and inner side of limbs whitish; margin of ears black; tail very short. The animal walks on the tips only of the vertical hoofs. Height at shoulders, 23 inches. Horns short and straight, the basal third ringed; female hornless. (W. L. Sclater, 1900, vol. 1, pp. 166-168.) Record length of horns of *O. o. oreotragus*, $4\frac{1}{2}$ inches (Ward, 1935, p. 108).

The range of this subspecies is here provisionally considered restricted to the Cape Province, British Bechuanaland, and the southern portion of South-West Africa (Great Namaqualand).

"Once extremely abundant in the Cape Colony, it is now daily becoming more rare—the venison being deservedly reputed among the first that the country affords, whilst the elastic hair is sought above all other materials for the stuffing of saddles. . . . Found

usually in pairs among the most precipitous rocks, and inaccessible summits, the Klipspringer would appear in Southern Africa to supply the place of the ibex and chamois." (Harris, 1840, quoted in Sclater and Thomas, 1896, vol. 2, p. 8.)

"In the Cape Colony it is said that the Klipspringer, when taken young, is easily tamed and makes a most sagacious pet; but it does not appear to live long in captivity" (Sclater and Thomas, 1896, vol. 2, p. 10).

"In the Cape Colony they are far less numerous than formerly, but throughout . . . Bechuanaland are still plentiful" (Kirby, in Bryden, 1899, p. 236).

"The klipspringer seems to be recorded from almost every district, where there are rocky hills; the South African Museum possesses examples from . . . Worcester and Beaufort West, and there is still a considerable number of these antelopes on the hills running from Table Mountain to Cape Point in the immediate neighbourhood of Cape Town. . . .

"They can be easily shot, especially if hunted by dogs, when they generally take refuge on some more or less inaccessible pinnacle and form an easy mark for the bullet. . . .

"Mr. Bryden relates a curious story to the effect that the Bechuanas are in the habit of catching the young klipspringers alive and carrying them about, pinching them from time to time to make them squeal; this they do as a charm to bring down rain." (W. L. Sclater, 1900, vol. 1, pp. 168-169.)

Shortridge (1934, vol. 2, pp. 477-479) writes as follows:

Klipspringer from the Orange River Valley and Great Namaqualand are provisionally referred to the typical subspecies. . . .

The Orange River.—Found on rocky plateaux and in comparatively level stony country, as well as among hills, between Kakamas and the coast; but absent from the isolated kopjes that rise out of the plains between Kakamas and Upington. Farther east along the river, klipspringer are said to reappear in Prieska District.

Great Namaqualand.—Klipspringer inhabit the coastal ranges and the few inland mountains, such as the Karas Ranges and Great Bukaros Mountain; said to be scarce in Bethanie District; in Luderitz District, occurring chiefly around Aus; klipspringer are reported from the western parts of Gibeon, Maltahohe, and Rehoboth Districts. . . .

Klipspringer have either died out or become exceedingly rare in most of the farming areas of the Cape Province, except in the sub-coastal region between Uitenhage and Cape Town, where they are partially protected.

"A small antelope that disappears rapidly before settlement. Still fairly plentiful in Little Namaqualand, and probably elsewhere in the thinly populated parts of the N. W. Cape—but rare and rapidly disappearing in the Eastern Cape Province. Extinct in Kaffraria." (G. C. Shortridge, *in litt.*, October 14, 1937.)

Transvaal Klipspringer

OREOTRAGUS OREOTRAGUS TRANSVAALENSIS Roberts

Oreotragus oreotragus transvaalensis Roberts, Annals Transvaal Mus., vol. 5, no. 4, p. 276, 1917. (Rustenburg District, Transvaal.)

Figs.: Millais, 1895, p. 92, fig., p. 93, pl.

This subspecies is becoming very scarce with the advance of settlement in the Transvaal and Zululand, but it survives in moderate numbers in the Kruger National Park.

It differs from the Cape Colony subspecies "in having a very distinct dark-brown or black mark above the hoofs and the under parts of the body white in strong contrast to the upper parts"; and from the Nyasaland subspecies "in having the top of the head of the same colour as the back." Head and body (of female type), 800 mm.; tail, 75. (Roberts, 1917, p. 276.)

The range of this subspecies includes the Transvaal and Zululand (Roberts, 1937, p. 783). The form of eastern Bechuanaland and that of Southern Rhodesia will be here provisionally included with it.

"It is far from common The only part of Natal in which I have personally found it is the . . . Drachensberg range, and, beyond the limits of the colony, in the precipitous faces of the Bombo mountains." (Drummond, 1875, p. 396.)

Chubb (1909, p. 123) records four specimens from Matabeleland, Southern Rhodesia.

"In the country now known as Southern Rhodesia, klipspringers used to be very plentiful throughout the granite formation, not only amongst continuous ranges of hills and in the innumerable rocky kopjes which stud the country, but also amongst the rocks and boulders through which many of the rivers run on their way to the Zambesi or the Limpopo" (Selous, 1914, p. 187).

In Southern Rhodesia "Klipspringers were at one time common wherever hilly country occurred, but native hunting with nets and dogs has seriously reduced their numbers on the small isolated hills. In the more rugged ranges such as the Umvukwes and Matopoe this small antelope is secure. They occur also in all the large ranges such as the Zambesi Escarpment and many other inaccessible parts of the country. Legally considered as 'Ordinary Game.'" (Game Warden, Wankie Game Reserve, *in litt.*, March, 1937.)

"They are reported to be comparatively plentiful in Swaziland and parts of the Transvaal. . . . Klipspringer occur among the hills around Molopolole and elsewhere in Eastern Bechuanaland." (Shortridge, 1934, vol. 2, pp. 478-479.)

"*O. o. transvaalensis* is so easily destroyed that it has rapidly disappeared with the advance of settlement, surviving only where land-owners have specially protected it or where the bush and mountains

have been difficult to hunt in. There are probably more varieties of the species than have so far been named, and it is important therefore to save it from extinction wherever possible." (A. Roberts, *in litt.*, November, 1936.)

It is fairly numerous along the Drakensberg Range and in game reserves in Zululand. There are estimated to be between 200 and 300 of the animals. Depletion results from the gradual occupation of farms. It is completely protected as Royal Game. (Administrator's Office, Natal, *in litt.*, December, 1936.)

Roberts (1937, p. 783) writes:

Formerly plentiful wherever there were hills and bush-clad kloofs, the klipspringer is becoming very scarce with the advance of settlement. It is so easily shot in its haunts by driving or quiet approach of the gunman, legitimate or otherwise, and found everywhere in such limited numbers, that persistence in hunting it soon spells its doom there. I know of places where it was once to be found, but where it was soon exterminated by the establishment of irrigation settlements in the vicinity. In the native territories it has been exterminated, too, by trapping and driving with dogs. What prospect has such a very local animal of surviving against the onslaughts of cunning and unscrupulous men? None whatever, unless the laws are tightened up.

"Their principal enemies are the Leopard and the Caracal, while the young not infrequently fall victims to the larger birds of prey" (S. Hamilton, as quoted in Shortridge, 1934, vol. 2, p. 480).

The remaining subspecies of *Oreotragus oreotragus* seem to have maintained themselves in a somewhat more satisfactory numerical status than the two just discussed. They comprise the following:

O. o. cunenensis Zukowsky.¹ ANGOLA KLIPSPRINGER. Range: Angola and northern South-West Africa.

O. o. aceratos Noack.² NYASA KLIPSPRINGER. Range: southern Tanganyika Territory, Nyasaland, Northern Rhodesia, and presumably southeastern Belgian Congo.

O. o. schillingsi Neumann.³ MASAI KLIPSPRINGER. Range: northern Tanganyika Territory to central Kenya, and west to Ruanda and southwestern Uganda.

O. o. aureus Heller.⁴ MARSABIT KLIPSPRINGER. Range: northwestern Kenya and eastern Uganda.

¹ *Oreotragus oreotragus cunenensis* Zukowsky, Archiv Naturg., vol. 90, Abt. A, Heft 1, p. 124, 1924. (Kambelefall, north bank of Cunene River, Angola.) (*O. o. steinhardtii* Zukowsky (1924) is regarded by Shortridge (1934, vol. 2, p. 477) as a synonym.)

² *Oreotragus aceratos* Noack, Zool. Anz., vol. 22, no. 577, p. 11, 1899. (Mbemkuru region, Lindi Province, Tanganyika Territory.)

³ *Oreotragus schillingsi* Neumann, Sitz.-ber. Gesell. Naturf. Freunde Berlin 1902, nos. 7/8, p. 170, 1902. (Dönje Ngaptuk, northwest of Kilimanjaro, Tanganyika Territory.)

⁴ *Oreotragus oreotragus aureus* Heller, Smithsonian Misc. Coll., vol. 61, no. 13, p. 7, 1913. ("Mt. Lololokwi, north of the Northern Guaso Nyiro," Kenya.)

O. o. saltatrixoides (Rüppell).¹ ABYSSINIAN KLIPSPRINGER. Range: Ethiopia, Eritrea, and eastern Anglo-Egyptian Sudan.

O. o. somalicus Neumann.² SOMALI KLIPSPRINGER. Range: British Somaliland.

O. o. porteousi Lydekker.³ NIGERIAN KLIPSPRINGER. Range: northern Nigeria.

Zulu Suni

NEOTRAGUS LIVINGSTONIANUS ZULUENSIS Thomas

N[esotragus] Livingstonianus zuluensis Thomas, Ann. Mag. Nat. Hist., ser. 7, vol. 2, p. 317, 1898. ("Northern Zululand"; more specifically, "Umkuzi River" (Thomas, 1893, p. 238).)

FIGS.: Thomas, 1893, p. 238, fig.; Sclater and Thomas, 1896, vol. 2, p. 57, fig. 25; Lydekker, 1908, p. 187, fig. 41; Lydekker and Blaine, 1914, vol. 2, p. 165, fig. 17; Roberts, 1936, pl. 12.

This little antelope is nowhere common, it is much harassed by the natives, and it apparently depends for survival upon the protection it receives in several game reserves (Roberts, 1937, p. 783).

General color above rich rufous, verging on chestnut; flanks and legs far brighter and more rufous than in the Zanzibar Suni (*Nesotragus moschatus*); upper side of tail darker than back, under side white. Height at shoulder, $13\frac{3}{4}$ inches. Horns thick and heavy, strongly but closely ridged to within an inch of their tips; length up to about $4\frac{1}{4}$ inches. (Thomas, 1893, pp. 237-238; Sclater and Thomas, 1896, vol. 2, p. 55; Ward, 1935, p. 104.)

Lydekker and Blaine state (1914, vol. 2, p. 164) that "the range extends from Zululand to Tetté, Zambesia." It is doubtful, however, if it extends quite so far to the north, since the type locality of the northern subspecies, *N. l. livingstonianus*, is Shupanga, on the lower Zambesi. The following are among the localities from which specimens are recorded by these authors (pp. 164-165): Coguno, Inhambane, Portuguese East Africa; Gazaland, P. E. A.; Pongola Valley, Zululand.

Neumann, who secured the type specimen, writes (as quoted in Sclater and Thomas, 1896, vol. 2, p. 56): "I have known of the existence of this Antelope in South-eastern Africa for many years, but have only lately had an opportunity of obtaining a specimen. . . . This one was killed in North-eastern Zululand, which district

¹ *A[ntelope] saltatrixoides* Rüpp[ell], in Wagner, Schreber's Säugthiere, suppl. vol. 5, p. 412, 1855. (Abyssinia.)

² *Oreotragus somalicus* Neumann, Sitz.-ber. Gesell. Naturf. Freunde Berlin 1902, nos. 7/8, p. 174, 1902. (Sheikh, Golis Range, British Somaliland.)

³ *Oreotragus saltator porteousi* [misspelling for *porteousi*] Lydekker, Abstr. Proc. Zool. Soc. London, no. 98, p. 38, 1911. ("Northern Nigeria"; later reported by Lydekker and Blaine (1914, vol. 2, p. 131) as "Duchi n'Wai Range, Zaria, Northern Nigeria.")

seems to be the southerly limit of its range. It frequents the densely bushed parts of the low flats between the coast and the Bombo range. How far north it ranges I cannot say, but I first heard of it in the neighbourhood of the Lower Limpopo and Komati rivers."

"It was very common in the neighbourhood of Delagoa Bay, but is getting scarcer every year, owing chiefly to native poachers" (Haagner, 1920, p. 183).

In the Mkuzi Reserve, Natal, "50-100 Suni (Livingstone antelope) are estimated to exist" (Potter, Ann. Rept., 1933).

"The Hluhluwe [Reserve, Natal,] contains . . . the almost extinct Livingstone antelope" (George G. Campbell, *in litt.*, January 9, 1933).

In Natal it is found at present only in the northern part of Zululand, including the Mkuzi and Ndumu Reserves, where there are between 50 and 100 of the animals. The cause of depletion is illegal destruction by the natives. Full protection is given in the game reserves. (Administrator's Office, Natal, *in litt.*, December, 1936.)

It is not recorded from the Transvaal, but occurs across the Lebombo Mountains in Portuguese East Africa. In northern Zululand it occurs in diminishing numbers. (Austin Roberts, *in litt.*, November, 1936.) Elsewhere Roberts (1937, p. 783) says:

This tiny, graceful antelope is a tropical one that comes within our limits only in the scrub of the littoral in north-eastern Zululand, where it is much harassed by the natives, and has a poor prospect of survival if not more rigidly protected than it is. Fortunately, there are the Mkusi and Ndumu Game Reserves, in which it enjoys a great measure of protection; but there has been so much talk of doing away with these game reserves that I feel very uneasy as to its survival if that step is taken. It occurs beyond our limits northwards to East Africa, but is nowhere common. These small antelopes are all easily trapped by natives with nooses and steel gins, and were it possible to stop this method of destruction it would probably increase considerably in numbers.

[Comparatively little information is available concerning the numerical status of the northern subspecies or Livingstone's Suni (*Nesotragus livingstonianus livingstonianus* Kirk¹), but it has apparently fared somewhat better than the Zulu Suni. It ranges north to Nyasaland and the northern part of Portuguese East Africa.]

¹ *Nesotragus livingstonianus* Kirk, Proc. Zool. Soc. London 1864, p. 657, 1865. ("Shupanga and Lupata," Zambesi River, Portuguese East Africa; the type locality is shown by Lydekker and Blaine (1914, vol. 2, p. 164) to be Shupanga.)

Beira; Baira; Beira Antelope

DORCATRAGUS MEGALOTIS (Menges)

Oreotragus megalotis Menges, Zool. Anzeiger, vol. 17, no. 444, p. 130, 1894. (Hekebo Plateau, British Somaliland.)

FIGS.: Sclater and Thomas, 1898, vol. 3, pl. 75, p. 245, fig. 87; Elliot, 1897, pls. 35-36; Bryden, 1899, pl. 10, fig. 8, p. 379, fig. 34; Lydekker, 1908, pl. 10, fig. 8, p. 279, fig. 58; Drake-Brockman, 1910, pl. facing p. 65; Selous, 1914, pl. 57; Lydekker and Blaine, 1914, vol. 2, p. 196, fig. 22; Maydon, 1932, pl. 64.

This comparatively rare little antelope is confined to British and French Somaliland and part of Ethiopia and is given partial protection as a Class B species under the London Convention of 1933.

General color reddish gray; head yellowish red, eyes bordered with whitish; a dark brown stripe on the flanks; sides of belly reddish yellow, middle almost white; limbs yellowish red, inner side yellowish white to white; hair thick and coarse; ears extraordinarily large. Horns widely separated at base, parallel when viewed from in front, curving slightly forward at tips, and weakly grooved toward base; females hornless. (Noack, 1894, pp. 202-204.) Height of female at shoulder, 23-26 inches (Sclater and Thomas, 1898, vol. 3, p. 244). Record length of horns, 5½ inches (Ward, 1935, p. 91).

This species was first reported from the Hekebo Plateau, British Somaliland, by Menges in 1885 (p. 455) but was not technically named by him till 1894. Lydekker and Blaine (1914, vol. 2, p. 197) record specimens from the following localities in this country: Adadleh, Waggar Mountains, Sheitch, Sogsodi, Golis Range, and Berbera. De Poncins (in Bryden, 1899, p. 378) "found these antelopes about eighty miles inland, in the very steep and desert hills of French Somaliland, and only there." The Ethiopian range is given by Ward (1935, p. 91) as "the upper part of the Blue Nile." Archer (in Archer and Godman, 1937, vol. 1, p. lviii) refers to the species as "confined to Somaliland and eastern Abyssinia."

Elliot (1897, p. 135) records two specimens secured from a small band on a peak known as Nasr Hablod, near Hargeisa, British Somaliland. "Of all the antelope we hunted this species is the most difficult to capture. Their color assimilates so completely with the stony ground they frequent that at a hundred yards, unless the animals are moving or stand on the sky line, it is almost impossible to see them This practical impossibility of observing them together with their wonderful speed, accounts for the few that are killed and the rarity of the species in museums." (P. 138.)

"It is perhaps commoner among the Gadabursi Hills than elsewhere, but on the hills to the westward of Bulhar, around Issituggan, on Hegepo and the Dubar Range, and further south on Negebr and

the hills south of Sogsodi, it is frequently met with" (Drake-Brockman, 1910, p. 66).

"The flat-topped hills, preferably isolated and sufficiently extensive, either on the sun-parched maritime plain or high up on the Golis range of mountains, six thousand feet above sea level, are its only haunts in Somaliland. A coastal belt, probably not more than seventy-five miles in width in any part of British Somaliland would, I think, mark its range. . . .

"They are usually seen in herds of four to seven individuals with one or two adult males in the herd. I once found a herd of no less than twelve." (Drake-Brockman, in Maydon, 1932, pp. 246-247.)

"We found that two good places for Beira were: (1) the small detached hills eight miles south of Sheik, not far from the wells at Dubba, and on both sides of the Sheik-Buraa road; (2) the long, flat-topped hills immediately west of and above Lafarug on the Berbera-Hargeisa road thirty miles from Berbera. . . .

"They are generally seen in pairs or threes on bare, stony hill-sides. . . . We never found more than one herd on one small hill." (Maydon, 1932, p. 232.)

Dibatag; Clarke's Gazelle

AMMODORCAS CLARKEI (Thomas)

Cervicapra Clarkei Thomas, Ann. Mag. Nat. Hist., ser. 6, vol. 7, p. 304, 1891. ("Northern Somali-land"; type locality later shown (Thomas, 1891, p. 210) to be "about a day and a half from the Buroa [= Buraa] Wells, Central Somali, about 100 miles south [= southeast] of Berbera.")

FIGS.: Thomas, 1891, pls. 21, 22; Elliot, 1897, pls. 30, 31; Selater and Thomas, 1898, vol. 3, pl. 73, p. 222, fig. 83; Elliot, 1907, p. 79, fig. 17; Lydekker, 1908, pl. 10, fig. 6; Drake-Brockman, 1910, pl. facing p. 83; Lydekker and Blaine, 1914, vol. 3, p. 4, fig. 1; Zammarano, 1930, p. 191, fig.; Maydon, 1932, pl. 65; Ward, 1935, p. 142, fig.

This curious and more or less rare gazelle is confined to the interior of British and Italian Somaliland and southeastern Ethiopia (the Somali Arid District of Bowen, 1933, pp. 256, 258).

The general color is dark purplish rufous; central facial band chestnut-rufous; light facial streaks pure white, extending from ears to nostrils and encircling the eyes; below these, on each side, a dark but not strongly marked streak extending forward from the eye; cheeks and sides of considerably elongated neck pale fawn; ears dark fawn at outer base, black at tip; tail long and thin, blackish above and below; belly whitish. Horns evenly curved upwards and forwards, strongly ridged anteriorly on lower half; female hornless. (Thomas, 1891, p. 208.) Record length of horns on front curve, 12 $\frac{5}{8}$ inches (Ward, 1935, p. 144). Height at shoulder, 35 inches (Drake-Brockman, 1910, p. 84).

The discoverer of the species, T. W. H. Clarke, writes (in Thomas, 1891, pp. 209-210):

"I saw this Gazelle for the first time on December 17th, 1890, about three hours from 'Bairwell,' or about one day from 'Buroa Well, Haberberhagi's country,' and afterwards on the road all the way into the Marchan [=Marehan] district, 8° N. 47° E. . . .

"The new Gazelle . . . is more numerous than any other kind of game, excepting *G. soemmeringi*

"I never saw more than eight in a bunch."

Swayne (1894, pp. 318-319) gives the following account:

The Dibatag is common enough where it is found at all, but it is very local in its distribution.

Since Mr. Clarke first discovered it in the distant Marehan country, to the south-east, and in the Dolbahanta country, a few have been met with and shot by sportsmen in the eastern parts of the Haud Waterless Plateau. . . .

I searched for Dibatag at Tur, a jungle due south of Toyo grass-plains, the distance being some eighty miles from Berbera. . . .

I saw a good many Dibatag, but all were wild and shy. This is their extreme western limit, and they never by any chance come so far south [= north] as the Golis range. Further east, towards Burö, they are more plentiful and less shy. . . .

The Dibatag goes singly or in pairs, or small families up to half a dozen or so.

Elliot (1897, p. 124) secured six specimens south of Toyo Plain in British Somaliland and met with the species from that area "eastward to the land of the Dolbahanta. It does not seem to be very numerous."

Aylmer (in Sclater and Thomas, 1898, vol. 3, p. 224) refers to the Leopard as the Dibatag's deadliest enemy.

Jackson writes (in Sclater and Thomas, 1898, vol. 3, pp. 224-225, map):

I first saw *Dibatag* between Bair and Kirrit. They appear to be scattered all over the country between Bair and Hodayu [Ethiopia], and I found them most plentiful about 25 miles from Kirrit. . . .

Travelling eastward from Hodayu they gradually appeared to grow less plentiful, and the last record I have of having seen one was about 150 miles from Hodayu. After this I saw no more until between Dagma Dalola [Italian Somaliland] and Mudug, about 130 miles from the former, in the Mijourten country. Here I was surprised to find them again very plentiful for three days, and I saw a few on the following three days, after which they again ceased. A week afterwards I found them again plentiful in the Marehan country, gradually diminishing in numbers as we travelled south; the last I saw was about 40 miles before we struck the Webbe Shebeyli. On the homeward journey I came across an odd pair now and then in the south of the Ogaden country [Ethiopia].

"This antelope . . . has been found 30 miles north-east of Ber at Galol Dobleh (Parkinson), but it is more commonly found through-

out the Nogal Valley and the Haud to within a few miles of Obbia on the east coast, Milmil [Ethiopia] in the west, and the Webi Shebeleh in the south" (Drake-Brockman, 1910, p. 84).

Lydekker and Blaine (1914, vol. 3, p. 4) record two specimens from "Darror Wells, Somali Haud" (now in Ethiopia).

In 1915 Zammarano (1919) found small numbers on the left bank of the Webi Shebela in the vicinity of latitude 4° N.

"The Dibatag . . . is only found in the far interior, in a circumscribed area, the greater part of which for years was in the hands of the Mullah and his dervishes. . . .

"Its sole habitat is in a waterless area in the heart of the Ogadan and Dulbahanta country in the very centre of Somaliland, and it appears to have a predilection for the Nogal valley." (Drake-Brockman, in Maydon, 1932, pp. 246-247.)

De Beaux (1935, p. 13) considers the Dibatag everywhere localized and rare, certainly very rare in Italian Somaliland. Among the localities he mentions are the vicinity of Bulo Burti on the left bank of the Webi Shebela and the Candala Mountains in northern Somaliland.

"Those I saw ranged from B.P. 79 to B.P. 96 [west of Bohotleh in British Somaliland, close to the Ethiopian boundary]. . . . I saw one herd of fifteen adults of both sexes." It is probably more abundant than the Gerenuk. (Turner, 1937, p. 59.)

The species is placed in Class B by the London Convention of 1933.

Saiga

SAIGA TATARICA (Linnaeus)

Capra tatarica Linné, Syst. Nat., ed. 12, vol. 1, p. 97, 1766. ("In summa Asia"; type locality restricted by Lydekker and Blaine (1914, vol. 3, p. 15) to "Ural Steppes.")

FIGS.: Schreber, Säugthiere, pl. 276, 1782; Pallas, Zoogr. Rosso-Asiatica, Icones, 1834-42; Proc. Zool. Soc. London 1867, pl. 17; Royal Nat. Hist., vol. 2, p. 298, fig., 1894; Sclater and Thomas, 1897, vol. 3, pl. 49, pp. 35, 40, figs. 49, 51; Lydekker, 1901, pl. 2, fig. 8, p. 189, fig. 43; Elliott, 1907, p. 73, fig. 15; Carruthers, 1913, vol. 2, pl. facing p. 596; Lydekker and Blaine, 1914, vol. 3, p. 15, fig. 3; Morden, 1930, p. 542, fig.; Ward, 1935, p. 148, fig.; Leister, 1938, p. 82, fig.

The demands of the Chinese pharmaceutical trade have set a price upon the head (or rather the horns) of this odd inhabitant of the Asiatic steppes, and its ranks have been decimated accordingly.

"Horns (absent in females) of medium length, . . . somewhat irregularly lyrate, heavily ridged, and . . . amber-coloured or whitish; tail short; nose inflated and prolonged into a kind of downwardly bent proboscis, with the nostrils opening downwards . . .

Shoulder-height . . . about 30 inches. General colour in summer dull yellowish, with the throat and indistinct markings on the face whitish; in winter, when the coat is much longer and thicker, the colour is uniformly whitish throughout." (Lydekker and Blaine, 1914, vol. 3, pp. 12, 15.) Record length of horns, 14 $\frac{3}{8}$ inches (Ward, 1935, p. 150).

An adult male taken in Kazakstan in October is thus described by Goodwin (1935, p. 14): upper parts cinnamon-buff shading into pinkish buff on sides; nose, sides of face, and outside of ears like back; hairs of crown long and grizzled, nearly white; tail above like back, white below; a white patch on rump, broken by a median strip of buff; fore and hind limbs cinnamon-buff; under parts white.

An excellent account by Glitsch (in Bull. Imper. Soc. Naturalists Moscow, 1865) is reported by Selater and Thomas (1897, vol. 3, pp. 34-37) as follows:

In the days of Pallas . . . the Saiga had a wide distribution in Europe, extending from the borders of Poland, all across the Dnieper and the great flat southern portion of Russia to the Caucasus and the Caspian. The European herds of this animal were also often reinforced by large accessions from the steppes of Western Asia, which, driven by stress of famine from their native haunts, crossed the Ural and the Volga by the ice in winter. A hundred years later we find a great change in the range of the Saiga, caused by the increase of cultivation and population in the European portion of its range, which has driven this animal back into the East. On the Dnieper, Herr Glitsch tells us, the Saiga has altogether disappeared, in the Ukraine it is no longer to be found, and even on the Don, where it was formerly so plentiful, it is quite a scarce animal. Nowadays, in fact, in Europe the Saiga is confined to the Kalmuk Steppes between the Don and the Volga, and is found only within the triangle lying between these two rivers, of which Tzaritzyn on the Volga forms the northern point.

On the flat and treeless plains which lie within these limits the Saiga still exists in tolerable abundance, though diminishing in numbers yearly as population increases. In the summer months it is distributed over the whole of this area; in winter . . . it is driven by the snow and cold from its northern resorts towards the south, where it finds shelter in the rich grassy valleys of the Sal and the Manitsch. Here the Saiga passes the winter on ground generally free from snow. . . . In the spring . . . the Saigas go northwards in considerable herds, the bucks first, followed by the does, and by the end of May they have all reached the most northern boundaries of their range. But there are many circumstances which interfere with the regularity of this migration, and at Sarepta, near the north end of their area, there are remarkable variations in their numbers. . . . In very severe winters, when even the most southern districts inhabited by this Antelope are invaded by excessive cold and deep snow, the hungry beasts are driven all over the country in search of food, and stray even as far north as the vicinity of Sarepta. On these occasions whole herds are often entombed in the snow-drifts and fall an easy prey to the natives, who follow them on horseback and slaughter them by hundreds. Under these circumstances it can easily be understood that the Saiga is a gradually vanishing animal in Europe. . . .

Besides mankind, Herr Glitsch tells us, the Saiga Antelope in the Volga district has no special enemy. The wolves and foxes, the only large beasts

of prey of these steppes, can only attack quite young animals, the older ones easily making their escape. They have one great plague in the steppes, however, in the insects, especially a species of *Oestrus*, by which at times they seem to be driven nearly crazy, and with the eggs and larvae of which their skins seem to be almost always infested.

The flesh of the Saiga is said to be particularly tender and well-flavoured, and more like good mutton than anything else.

The favourite mode of chase of the Saiga is . . . to stalk them with a rifle But they are also occasionally taken in steel traps which are set upon their favourite runs. The Kalmuks use leather slings for the same purpose.

Slater and Thomas (1897, vol. 3, p. 37) also quote E. Büchner as follows: "The Saiga is still met with, although very unfrequently, in the country of the Ural Cossacks between the Wolga and the Ural, and extends occasionally into the Government of Samara. East of the river Ural its range extends over the Kirghiz Steppes and the steppe district of all West Siberia—Turgai, Akmolinsk, and Semipalatinsk. South of this the Saiga is also found in the steppes of Russian Turkestan and in the Dsungarian steppes of Western Mongolia, but not in Transcaspia."

Lydekker (1901, pp. 190-193) writes as follows:

According to the excellent account given in Brehm's *Tierleben*, much of which is derived from . . . Pallas, saigas are essentially social animals, associating in herds Towards the beginning of autumn the smaller bands collect together to form immense herds, which may sometimes number thousands of individuals In spite of their speed many are . . . slain by beasts of prey, especially the wolf. . . .

In spite of their aromatic odour of their flesh, saigas are much hunted for the sake of their venison by the Kalmuks and Kirghiz, who pursue them on horseback with greyhounds. . . . Sometimes eagles are employed in their capture. . . . A fly often lays its eggs in such quantities in the hair that the maggots which in due course hatch out cause the death of the unfortunate animal.

The Saiga inhabited the steppes of eastern Poland (*i. e.*, Podolia and the Ukraine) up to the seventeenth century (Niezabitowski, 1934, p. 195).

It was still found in Moldavia and Bessarabia about 1716, but was exterminated during the eighteenth century (R. J. Calinescu, *in litt.*, September, 1937).

It not only visits occasionally the steppes of the northeastern Caucasus but lives throughout the year in the Kuma-Manich Steppe. Here it reaches its western limit and does not cross the Don. (Satunin, 1901, pp. 129, 134.)

Eversmann writes (1823, pp. 22-24) that the Saiga lives in herds in the Kirghiz Steppe. In late summer and fall of dry years it often crosses the Ural River in herds to Russian territory and causes great destruction, especially in the grainfields. It ranges over the entire

Kirghiz Steppe as far as Bokhara, where it is frequently tamed by the Bokharans and kept in the courtyards of the rich. The Kirghiz capture the animals on the steppe by driving them between converging lines of turf against some sharpened reeds, on which they are impaled.

"I never met with this species, except in winter, when it is tolerably common throughout Turkestan, with the exception of the Zarevshan districts and the Kasil-kum steppes, extending as far as the sea of Aral. For the summer it leaves this country for the north." (Severtzoff, 1876, p. 171.)

"Not longer ago than the end of last century the saigak was very numerous in West Siberia; and Pallas mentions having seen herds of this antelope on the Irtish below Semipalatinsk, where it is now never met with and has been completely forgotten. It is even rare at the present day in the environs of Lake Balkash, where not long since it was as numerous as the kulan." (Poliakof, 1881, p. 22.)

In western Siberia the Saiga is said to occur in the basin of the Chulyshman, where it is found along the Kyga River, on Togolok Mountain. It is also reported from Ubagan in the Altai. According to Jablonskij, it is pretty common south of the Altai, in Kazakstan. (Salesski, 1934, p. 375.) Morden (1930, pp. 539-544) says:

Today . . . they are found only in limited areas in Kazakstan The decimation of the once numerous herds is due largely to the fact that the amber-colored horns of the bucks, when ground into powder, constitute a much-prized ingredient in Chinese medicine. A pair of these horns will sell for from \$100 to \$150 (gold) in the bazaars, so saiga hunting has long been a lucrative business in parts of Middle and Central Asia. . . .

In Tashkent we were told that saiga had been seen the previous year on the desert steppes of central Kazakstan Our starting point was to be Kizil Orda

When we arrived there [north of Kizil Orda] we found that we were on the very edge of their range, and it was with the greatest difficulty that we finally located a band of the animals.

Goodwin (1935, pp. 14-15) records six specimens from 250 miles north of Kizil Orda, and adds: "They are seldom seen, in the region visited, in herds that number over five or six." Goodwin also writes (*in litt.*, May 18, 1937): "These animals are rather rigorously protected by the Soviet Government, though there are still a number of so-called *Saiga* hunters. These men make a livelihood by getting *Saiga* horns and selling them to China at around \$250 a pair. The government has done all it can to stop it in a general way. They have made it illegal to ship *Saiga* horns by mail."

Nazároff (1932, pp. 196-197, 208) gives the following account:

In these reed-beds of the Chu [below Pishpek, Russian Turkestan] . . . the saigá . . . seeks refuge . . . from the blinding blizzards of the steppes. . . . Now the saigá is on the verge of extinction, as it is mercilessly persecuted

for the horns, which will fetch as much as four or five hundred gold roubles a pair, say, forty to fifty guineas; they are sold in China

I have kept saigás in captivity; they quickly become tame if caught young, and will breed in captivity. It would pay to breed them in the steppe, just as they do with marals for the same market. . . .

In the steppes around [Lake Balkash] there are herds of . . . saigá.

W. G. Heptner writes (*in litt.*, December, 1936): "At the beginning of the 19th century the Saigas were still found in the whole

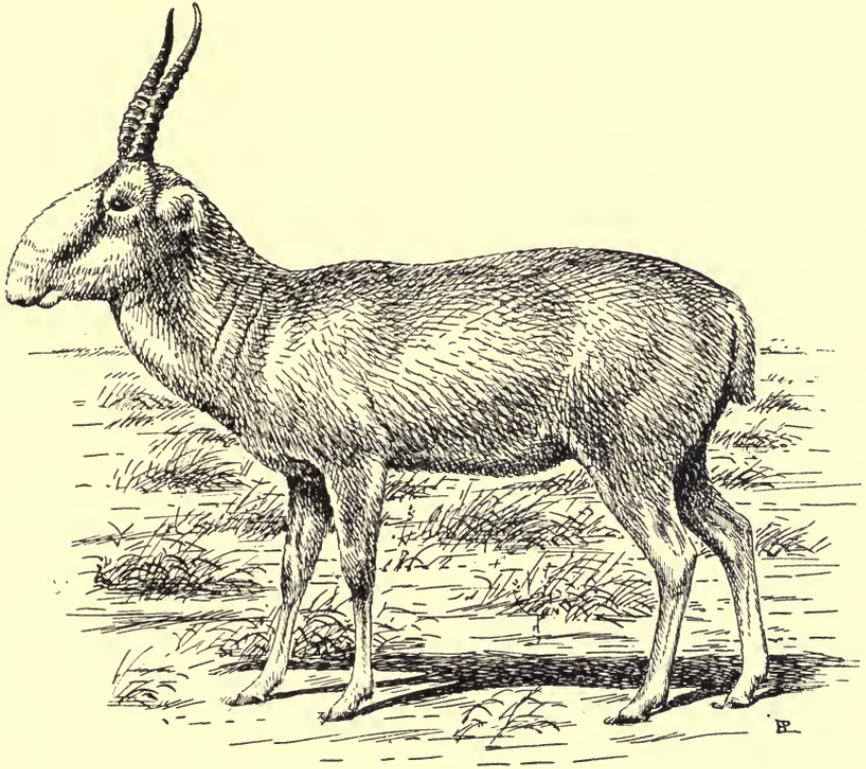


FIG. 62.—Saiga (*Saiga tatarica*). After Brehm.

steppe region, from the Don to the Chinese frontier, and they were very numerous. About the middle of the last century a great number existed on the steppes south of Orenburg and quite near this town. The Saiga is now almost exterminated, and hunting is completely forbidden. The reason for this destruction is the high price of the horns, which were exported in great quantities to China for medicinal use. In the time of sailing vessels the horns were also used for rigging works, as sewing implements. The Saiga now exists in the Kalmuk steppes, in the region between the Volga and the Ural, and in scattered numbers in Kazakstan (including Semi-

retchie). The total prohibition of hunting, ordered since the first years of the revolution, has afforded good protection, and in certain regions an increase in numbers has been observed."

Our information on the Saiga's status in Dzungaria is due chiefly to Douglas Carruthers and J. H. Miller. The latter writes (in Carruthers, 1913, pp. 590-600) :

Its range stretches eastwards, throughout the more desert portions of Russian Turkestan, with the Siberian Railway for its northern limit, and the Trans-Caspian Railway and Tashkent-Kulja post-road for its southern.

In the vicinity of the low depressions of Lakes Balkash and Ala Kul it is said to be numerous. It has for many years been supposed that the Saiga extended over the Russian-Chinese frontier eastwards to Dzungaria, but I am not aware of any one having actually seen, much less shot one, with the exception of that distinguished Russian explorer, Colonel Kozloff, who mentions having come across saiga in the Gobi east of Barkul.

[At Guchen] considerable numbers of its curious amber-coloured horns were hanging up in the Chinese shops . . . for sale. The Chinese consider them to possess valuable medicinal properties, and give as much as fifteen "sairs" for a pair. Every year consignments are sent to Peking The high price put on the head of a saiga induces a small army of hunters, mostly Chantos, to spend the summer months in their pursuit.

[At two days' march north of Ta-shih-tu, at the northern base of the Tian Shan, a native hunter] gave us glowing accounts of his hunting exploits, the number of saiga he had killed, and how at certain seasons they collect into vast herds of as many as a thousand. [Two of the animals were seen here by Miller.]

[The hunter] told me that he had frequently seen several herds of burkark [the local name for Saiga], numbering hundreds, from this very position [a bluff overlooking the plains] during the month of July.

From two Chanto saiga-hunters a day's march farther westward, Miller obtained the following information: "During the winter the burkark collect into vast herds, numbering frequently from eight hundred to a thousand, and retire to the lowest and most sandy and saline portions of the plains In April they split up into small parties of from two to six and spread over the steppes Later in the summer [they] again collect into herds of several hundreds."

Miller also reports (p. 552) sighting three Saigas on a plain north of Ebi Nor, in western Dzungaria.

Carruthers states (1913, p. 628) that "the saiga antelope . . . extends across Dzungaria as far as Long. 92° East, but no farther." (As we have seen above, however, Kozloff reported it in the Gobi east of Barkul.)

"Up to a couple of years before, a large part of the mail coming through Urumchi for transmission to China consisted of the horns of the saiga antelope, which the Chinese use in making medicine. As these were valued at about \$150.00 (Chinese) per pair, the mail carriers were held up and robbed so frequently that the department had finally to refuse to take them." (Morden, 1927, p. 258.)

Edmi Gazelle; Atlas Gazelle. Gazelle de Cuvier; Gazelle de montagne (Fr.). Gacela montés (Sp.)

GAZELLA CUVIERI (Ogilby)

Antilope Cuvieri Ogilby, Proc. Zool. Soc. London 1840, pp. v, 35, 1841. ("Mogadore," Morocco; the type, which was sent alive to London from Mogador, came probably from the western end of the Grand Atlas (Cabrera, 1932, p. 348).)

FIGS.: Gray, Gleanings Knowsley Menagerie, pl. 3, 1850; Selater and Thomas, 1898, vol. 3, pl. 58, pp. 113-114, figs. 58-59; Bryden, 1899, pl. 9, figs. 4-5; Lydekker, 1908, pl. 9, figs. 4-5; Selous, 1914, pl. 53; Lavauden, 1924, p. 20, figs. 1-2; Zammarano, 1930, p. 32, fig.; Maydon, 1932, pl. 20; Ward, 1935, p. 166, figs.; Pocock, 1937, p. 671, fig.

This gazelle of the Barbary States suffers from poor protection and has become generally scarce. In fact, it is referred to as "probably the rarest of all the gazelles" (Maydon, 1932, caption of pl. 20).

General color dull fawn; central facial band brownish fawn, with a black patch on top of the nose; whitish stripe from eye to nostril bordered below by a blackish stripe; ears long, pointed, their backs fawn; a broad, deep brown band on the flanks, bordered above by an ill-defined light band; a broad black stripe on each side of the rump; tail tuft black; under parts, buttocks, and inner surface of forelegs white; fore-knees with distinct black tufts. Horns little divergent, thick, strongly ribbed, curving slightly backward and finally forward at the tip; record length on front curve, $14\frac{7}{8}$ inches. Height at shoulder, 26-28 inches. Females similar, but horns shorter, slenderer, and straighter. (Ogilby, 1841, p. 35; Selater and Thomas, 1898, vol. 3, pp. 109-110; Ward, 1935, pp. 163-164.)

This species is found especially in the mountainous regions of the southern parts of the Barbary States: High Atlas of Morocco (region of Mogador); Ksour of Oran; Djebel Amour; Monts des Ouled Nail; Aurès (regions from Biskra to Négrine); southern Tunisia (regions of Tamerza and Gafsa as far as the chain of Tebaga, south of the chotts) (Joleaud, 1929, p. 445).

Morocco.—This gazelle is distributed in the Middle Atlas, as well as in the calcareous hills of the eastern Sherifian Empire, from the eastern end of the High Atlas as far as the mountains rising south of Oudjda; but it does not reach the Beni Snassen. Thus it lives in the intermediate chains of the Atlas across the zone of the Hauts-Plateaux. (Joleaud, 1929, p. 445.)

Its range includes the Middle and the High Atlas, and extends beyond the latter almost to the Atlantic Coast. It is doubtful if it occurs in the Sahara, on the border of the Erg, where Foley mentions it under the name of *G. corinna*. It lives at high elevations in Morocco, and in general in the same localities as the Arui, but in a different ecological habitat—the high valleys, the broad saddles, the

covered slopes of the low mountains, and the small meadows between the mountain forests. Here it is met with in small groups, or rather in families, never in herds. It abounds especially in the central part of the Middle Atlas, in the territories of the Beni Mguild and the Ait Aiach, and more particularly along the line of contact between this chain and the High Atlas. (Cabrera, 1932, pp. 348-350.)

It was formerly abundant in the Zaian district of central Morocco, in the environs of Sidi Lamine and Khenifra, but has been destroyed little by little. It still exists in the vicinity of Guelmous, of the Aït Ishacq, in the zone of posts. A small band was met with near Alemsid. The natives pursue it mercilessly at all seasons. Moreover, the transhumant shepherds slaughter it in summer in the high pastures which they seek. (Carpentier, 1932, p. 22.)

H. C. Maydon writes (*in litt.*, February 28, 1933): "No up to date information. From what I saw and heard in Morocco I fancy they are scarce and very ill protected. The Arabs have too many guns (outside administered zones) and there are too many people ready to hunt game in motor cars, as also in Syria and Egypt."

This gazelle is now almost completely driven back from the littoral regions, but it exists in numbers on the pre-Saharan declivities, from the Sus to the Syrtes (Heim de Balsac, 1936, p. 101).

Algeria.—It is met with especially on the borders of the Sahara and the Hauts-Plateaux. Loche (1867) records it in southern Algeria and especially on the Djebel-Amour. (Lataste, 1885, p. 294.)

In eastern Algeria "this Gazelle is by no means so rare as is generally supposed, though it is difficult to secure . . . There is hardly a mountain in the southern ranges of the Aures where they are unknown, and I have seen them on almost every mountain from far to the N. W. of Biskra to the Tunisian frontier at Negrine. I know that they are common on the Djebel Cherchar, and I have seen them as far north as the hills and woods of Melagon, near Chelia. I have seldom seen more than eight in a herd, and far more frequently they are met with singly and in pairs, or bands of three to five." (Pease, 1897, p. 814.)

"This Gazelle . . . is common enough in the southern ranges of the Atlas, especially in the more or less bare rocks near El-Kantara, and it never leaves the mountains or their close neighbourhood. It appears . . . to be absent from the real Sahara, and we never saw or heard of it south of Biskra." (Hartert, 1913, p. 33.)

In Algeria it does not pass south of the Aurès mountains. It ranges toward the north not only across the Algerian Hauts-Plateaux, but even in the Atlas of Tell. (Lavauden, 1926, pp. 21-22.)

In eastern Algeria it lives on the rocky hills of the plains of Numidia (Djebel Tafrent, etc.). It existed, at the beginning of the con-

quest, in the mountains about Constantine, as well as on the borders of Algiers and Oran. (Joleaud, 1929, p. 445.)

Tunisia.—"The Mountain Gazelle . . . is to be found sparingly on most of the mountains throughout the Tunisian Regency. . . . It never occurs, so far as I am aware, on the plains, or at any distance from hilly country.

"I have met with the Edmi, and obtained specimens of it, on some of the higher ranges near Kasrin, in Central Tunis, and have found it in the south near Gafsa and Tamerza. In the north of the Regency it seems to occur on the mountains near Zaghouan, the extreme eastern range of the Atlas, and in the neighbourhood of Gharimaou It seems evident, therefore, that the species has a wide range in the Regency, although perhaps it is nowhere very abundant." (Whitaker, 1897, pp. 815-816.)

It inhabits the mountains of the south and the center—Djebel Sidi-Aïch, Djebel Chambi, Djebel Selloum—and ranges toward the north as far as Bou-Kornine. It lives in small isolated troops of 3 to 6 individuals. It is always rare. (Lavauden, 1924, p. 21.)

It only touches the border of the Sahara proper, in certain mountain chains of southern Tunisia (Tebaga chain, for example, south of the chotts) (Lavauden, 1926, p. 21).

In Tunisia the range extends almost continuously from south to north, along a chain of small calcareous hills, as far as Ghardimaou (Ouargha massif), Teboursouk (Djebel Ech Chehid), and Tunis (Djebels Bou Kournin and Zaghouan). It is somewhat erratic in its movements; thus it disappears from Bargou and Slata, while remaining in the adjacent mountains of the Serdj and the Harraba in central Tunisia. (Joleaud, 1929, p. 445.)

Libya.—Reports from this country are not as well substantiated as might be desired. De Beaux (1928, pp. 41, 74) records a single horn found near Jarabub, but not certainly of local provenance, and perhaps brought from somewhere on the plateau of Cirenaica. It is probably on the basis of this specimen that Heim de Balsac (1936, p. 101) refers to the occurrence of the species on the plateau of Barka, Cirenaica.

Rufous Gazelle. *Gazelle rouge* (Fr.)

GAZELLA RUFINA Thomas

Gazella rufina Thomas, Proc. Zool. Soc. London 1894, p. 467, 1894. (Type locality unknown; the type specimen was purchased in Algiers.)

FIGS.: Thomas, 1894, p. 468, fig. 1; Selater and Thomas, 1898, vol. 3, p. 168, fig. 73.

Only three specimens of this puzzling species are known, and it is probably now extinct (Heim de Balsac, 1936, p. 88).

General color bright rich rufous; central facial band especially rich, and the light bands on each side only slightly paler than body color; crown, cheeks, and sides of neck pale rufous; dark lateral bands very strong and well defined, 1 to 1½ inches broad, nearly black; light lateral bands sharply defined from deep color of middle back, concolor with neck, cheeks, and crown; dark pygal band little developed; belly white; limbs rufous in front, whitish behind; tail rufous basally, black terminally. Horns thick and strong, 292 mm. in length along front curve; far apart basally, and diverging evenly but slightly; curving backward for basal two-thirds, then slightly upward; about 10 rings, strongly developed in front. Length of head and body, about 1,400 mm. (Thomas, 1894, pp. 468-469.)

The type specimen was "purchased at a shop in Algiers" in 1877; "in all probability it was brought from somewhere in the interior" (Selater and Thomas, 1898, vol. 3, p. 168).

The species doubtless inhabits the south of the Orano-Moroccan border country. There are reports from Gruz and from the borders of Tafilalet. It is a form that has disappeared or is in the process of disappearing, like the Bubal Hartebeest. (Joleaud, 1929, pp. 447-448.)

Lavauden (1930, pp. 327-332) gives the following account:

A second specimen (skin and skull) was bought by P. Pallary in Oran (about 1894?). Another was given to the Paris Museum by M. Demaison. There is also a skull in the possession of F. Doumergue at Oran. There must still exist in Algeria a number of skins, prepared as rugs and unknown to naturalists. In 1925 the furriers of Oran knew this species well, and distinguished it from *G. cuvieri*. According to them, it is very rare, and a skin is seen only every three or four years. The female is entirely unknown. The range is almost certainly in the region of the Algerian-Moroccan boundary, and it is very probably extremely restricted. It is considered an animal of the brush or of the forest; thus it may have remained unknown to the human inhabitants of the region. Most authors assign to it a range along the southern part of the Algerian-Moroccan boundary. But all the photographs, horns, etc., which have come from the region of Figuig pertain to the dark form of *G. dorcas* of eastern Morocco or to *G. cuvieri*. The habitat of the present species may be farther north, in the very wild and little frequented forests situated between Frenda and Telagg, on either side of the Saïda, in the central part of the Province of Oran. The dark color of the animal indicates a forested habitat. Moreover, the forest appears to be the best refuge for large animals that are much persecuted.

Heim de Balsac (1936, pp. 88-89) has received information that some small bands may perhaps still exist in the mountainous districts on either side of the low valley of the Chéelif, between Oran and Algiers.

**Slender-horned Gazelle; Loder's Gazelle. Gazelle blanche;
Gazelle des dunes (Fr.). Gazella del deserto (It.)**

GAZELLA LEPTOCEROS (F. Cuvier fils)

Antilope leptoceros F. Cuvier fils, in Geoffroy and Cuvier, *Hist. Nat. Mammif.*, vol. 7, livr. 72, text to pls. 373-374, 1842. ("Sennaar"—doubtless erroneous; the type locality was "probably desert between Giza and Wadi Natron, Lower Egypt, as the type-specimen was brought to Paris by James Burton, circa 1833" (Flower, 1932, p. 438).)

SYNONYM?: *Gazella loderi* Thomas (1894).

FIGS.: Geoffroy and Cuvier, *loc. cit.*; Heuglin, 1877, vol. 2, pl. accompanying p. 101; Thomas, 1894, pl. 32, p. 471, fig. 2; Selater and Thomas, 1898, vol. 3, pl. 63, pp. 147-148, figs. 67-68; Bryden, 1899, pl. 9, fig. 8; Anderson and de Winton, 1902, pl. 61; Lydekker, 1908, pl. 9, fig. 8; Selous, 1914, pl. 53; Lydekker and Blaine, 1914, vol. 3, p. 70, fig. 15; Zammarano, 1930, p. 30, fig.; Ward, 1935, p. 166, figs.

Two subspecies have been recognized by some authorities: *G. l. leptoceros* (F. Cuvier fils), of Egypt and presumably Libya, and *G. l. loderi* Thomas, of Algeria and Tunisia. Since they are doubtfully distinct, both will be treated together here under the name of *G. leptoceros*.

Among the Gazelles, this species in particular is in process of serious diminution. It is less shy than the others, and its tracks may be followed very easily by any hunter on the sand of the Erg. Its disappearance from the northern Sahara, like that of the Addax, is only a question of years. (Lavauden, 1926, p. 27.)

Sexes alike in color; upper parts very light fawn; a slightly darker line on the sides, bordering the white venter; tail also darker, with a black tip; upper part of limbs fawn; brushes at knees; lower parts, area about eyes, sides of muzzle (paralleling the frontlet), ears, and end of muzzle, white (F. Cuvier fils, *op. cit.*). Height of male at shoulder about 25 inches [28 in type of *loderi*]. Horns slender, closely and heavily ringed nearly to the tip; ordinarily rather straighter than in other species, curving but slightly backwards; sometimes diverging very widely. Horns of female slenderer and even less curved than in the male. (Selater and Thomas, 1898, vol. 3, pp. 137-138.) Record length of horns on front curve, 16¼ inches (Ward, 1935, p. 173).

Egypt and Anglo-Egyptian Sudan.—Heuglin (1877, vol. 2, p. 102) reports this species in the Libyan Desert in the vicinity of Lake Natron and the Fayum.

In 1895 Bramley (1896, pp. 863-865) saw several of these gazelles in the Western Desert, within sight of the Fayum. Here the Arabs were in the habit of capturing the animals in ring traps. In November and December they would also catch the fawns with trained hounds.

"This species does *not* occur in Sennar, and I have failed to obtain any evidence of its occurrence or former occurrence in any part of Nubia. . . . This . . . species is confined to desert tracts on the western side of the Nile. It existed, but was not numerous, in the desert west of Giza which stretches from the Wadi Natron southward to the Fayum." It has bred in captivity at the Giza Zoological Gardens. (Flower, 1932, pp. 438-439.)

In 1932 Bagnold (1933, pp. 107-108) found "well-worn gazelle tracks crossing the country in every direction" a little west of Gebel 'Uweinat, in the northwestern part of the Anglo-Egyptian Sudan. "The place was full of gazelle," two of which were secured and eaten. Shaw (1933, p. 15) refers to these as *G. leptoceros*.

Libya.—We have no positive information on its presence in eastern Fezzan and in the Libyan Desert proper (Lavauden, 1926, p. 21). Joleaud (1929, p. 446) refers to its occurrence in the dunes of Tripolitania and in the Libyan Desert. Its range includes the sandy plains of the interior of Libya (Zammerano, 1930, p. 31; De Beaux, 1935, p. 13).

Algeria and Tunisia.—Sir Edmund Loder (1894, pp. 473-476) found this species occurring singly and in small bands of as many as 5 individuals in the sand dunes of Oued Souf, about 100 miles south of Biskra. A specimen secured here became the type of *G. loderi*. Pease (1897, p. 813) states:

The Rhime (*Gazella loderi*) . . . is the common Gazelle of the Sahara. Enormous numbers are killed by the Arabs in the neighbourhood of Rhadamis, and their skins dressed and dyed with a dye made from the rind of pomegranates and exported from Rhadamis. They are to be found throughout the region of the great Ergs and everywhere in the Sahara sands where there is vegetation sufficient to support them. The only places where they are to be met with, I believe, north of El Oued Souf, are to the south-west of Bou Chaama and near Sef el Menadi. A number of their horns are always on sale at Biskra and sometimes the skins.

Whitaker (1897, p. 817) says that in Tunisia—

it seems to be true desert species, never occurring out of the sand-dune country, where it replaces *G. dorcas*

Herr Spatz, who has resided for several years in the south of Tunis, and is well acquainted with this Gazelle, informs me that it is common in the inland country of the extreme south of the Regency, being first met with at about 25 to 30 miles south of the Chott Djerid. In the districts where it occurs it is plentiful, and is generally to be found in small herds The nomad Arabs . . . kill a good many, and every year some 500 to 600 pairs of horns of this species are brought by the caravans coming from the interior to Gabes, where they find a ready sale among the French soldiery.

Hartert (1913, p. 33) writes of its occurrence as follows:

It is found in the Erg between Biskra and El-Oued, and is common . . . between Ouargla and Rhadames. We found it also among the dunes south of El-Golea, and between El-Golea and Ghardaïa. It is probably found in every

Erg of any great extent. Owing to the hilly nature of the dunes and the noiseless walking on the sand, the Reem is easily stalked, and generally killed with shot by the Arabs, who have no idea of sportsmanlike shooting: they often catch the young (with or without the help of dogs), then make it squeak, and kill the mother when coming to the help of her young. In this way, and by waiting patiently for days and nights in ambush, these and other Gazelles are decimated, and they will soon be rare or disappear from all the more or less frequented districts of the northern Sahara.

It is rare in Iguidi and in the ergs of the Azdjers region, and it is known to exist in the Erg Edeyen, on the Algero-Libyan frontier. The heads and horns were found formerly in great abundance, but now much less commonly, in the markets of Biskra, Touggourt, and Ouargla. Very few naturalists have been able to observe this gazelle in the wild, to kill it, or even to see it in the flesh. (Lavauden, 1926, p. 21.)

The species is found only in the Ergs [sand-dune regions] of the northern half of the Sahara, from the Saoura to Egypt. It is not really common except in the Erg occidental and the Erg oriental of the Algero-Tunisian Sahara. In years of great drought it leaves the dunes and wanders northward, seeking food. Thus, in 1927, some of the animals, coming from the Erg occidental, proceeded as far as the Saharan Atlas, and some were killed not far from Aïn-Sefra in a deplorable physiological condition. (Heim de Balsac, 1936, pp. 177, 236, map 14.)

Mhorr Gazelle. *Gazelle Mohor* (Fr.). *Gacela mohor* (Sp.)

GAZELLA DAMA MHORR (Bennett)

Antilope Mhorr Bennett, Proc. Zool. Soc. London 1833, p. 2, 1833. ("Brought from the territories of the Sheikh of Wednoon (twelve days' journey inland [from Mogador, Morocco])" (Bennett, 1833b, p. 3); this is interpreted by Cabrera (1932, p. 352) as, roughly, the region of the upper Nun, between the Anti-Atlas and the basin of the Draa.)

Figs.: Bennett, 1833b, pl. 1; Selater and Thomas, 1898, vol. 3, pl. 72; Bryden, 1899, pl. 10, fig. 5; Lavauden, 1926, pl. 2, fig. 1.

Very little is known of this rare subspecies or of the distance to which it extends into the Sahara from its type locality in southwestern Morocco. Toward the south it presumably intergrades with *G. d. dama* (Pallas), and toward the southeast with *G. d. damergouensis* Rothschild.

Upper parts, including neck, deep fulvous; head pale rufous; area about eyes and muzzle white; blackish patches between eye and mouth and between the ears; color of upper parts extending as a narrowing stripe down the outer side of the legs to the hoofs; remaining surface of legs, under parts, rump, and a patch on front of neck, white; tail white, terminal tuft mixed fulvous and black. Horns

black, basal two-thirds well ringed; curving backwards, outwards, and abruptly forwards; length along front curve, 12 inches. Height at shoulder, 30 inches. (Bennett, 1833*b*, pp. 4-5.)

The range is given by Cabrera (1932, p. 352) as "the extreme south of Morocco, in the hammadas [stony deserts] of the Saharan district." According to Lavauden (1926, pp. 22, 24), the range extends southward to Rio de Oro, but the form of Ahnet and Muydir, southern Algeria, is not *mhorr*.

"The *M'horr* is regarded in the kingdom of Morocco as an exceedingly rare animal, and Mr. Willshire states that the one earliest obtained by him was the first individual of the race which had been seen in Mogadore. It is highly esteemed, according to Mr. Drummond Hay, on account of its producing the bezoars, so precious in oriental medicine, and which are known in Morocco as the Baid-al-Mhorr, or Eggs of the M'horr." (Bennett, 1833*b*, p. 8.)

The species as a whole has not been able to resist the advent of man. It has disappeared from all the places where man has implanted himself, and has sought refuge farther and farther in the desert. The progressive formation of the Sahara has created for this species, through isolation, a veritable sanctuary. (Lavauden, 1926, p. 26.)

Information on the status of the animal is very uncertain, since the region it inhabits is very little frequented. Specimens are very scarce in museums. (Cabrera, 1932, p. 354.)

[Other subspecies of *Gazella dama* are: *G. d. dama* (Pallas), of Senegal; *G. d. damergouensis* Rothschild, of the Air region and presumably most of the rest of the central Sahara; and *G. d. ruficollis* (H. Smith), of Dongola, Kordofan, and Darfur. These have maintained a much more satisfactory status than *G. d. mhorr*. In fact, the form occurring in the western and central Sahara, from Tagant to Chad, is said to be the commonest gazelle of that region (Joleaud, 1929, p. 449).]

Scimitar Oryx; White Oryx

ÆGORYX ALGAZEL (Oken)

C[emas] algazel Oken, Lehrbuch d. Naturgesch., vol. 3, pt. 2, p. 741, 1816. (Upper Egypt, and other localities.)

SYNONYMS: *Antilope dammah* Cretzschmar (1826); *A[ntilope] tao* Hamilton Smith (1827).

FIGS.: Jour. Soc. Pres. Fauna Emp., n. s., pt. 20, frontisp., 1933; Brocklehurst, 1931, col. pl. opp. p. 6; Maydon, 1932, pl. 24; Leister, 1938, p. 88, fig.

The Scimitar Oryx is often called the White Oryx, but this name is better reserved for the Arabian White Oryx, or Leucoryx.

It somewhat resembles the Beisa Oryx in size and structure; the horns, as the name implies, are curved gently backward; and the general coloring is pale, whitish with a more or less distinct chestnut tinge on the neck, shoulders, under parts, upper portions of the limbs, and the facial mark. The record length of horn, as given by Rowland Ward, is 45 $\frac{3}{8}$ inches on the front curve.

This is a typical desert species, with a range in the arid districts of northern Africa from the Nile to Senegal. Its flesh is much prized by the Arabs, who dry it and lay it by for future use or sell it in the markets. The hide is used for shields and for sandals, although it is not considered of first-rate quality for these purposes (Hemp- rich and Ehrenberg).

The range of this species has probably become considerably restricted in recent decades, and its numbers have decreased. On the north, according to Cabrera (1932), it evidently existed in south- western Morocco up to a recent date, and possibly may still in the region of the Wadi Nun and Wadi Draa, here reaching approximately its extreme northwestern limit. Thence southward its range extended over Río de Oro to the desert parts of Senegal. Within historic times it seems never to have existed north of the Grand Atlas. During the Middle Ages it was so abundant between the Grand Atlas and Rio de Oro that a local king is said to have sent as a present a thousand shields made of its hide! At that time it was the most characteristic animal of the southern part of Morocco. Probably, according to Cabrera, it may still be found a little farther to the south in the Spanish Sahara. In Tunisia it is said by Arambourg (1929, p. 74) to have persisted in the extreme south up to 1906, where there have been two or three authentic captures in the two decades before 1924 (Lavauden). It is still found in the eastern Sahara, the Fezzan, and the region about Kufra (Senussi country). Lavauden (1933) suggests that the recent exodus of native peoples from Fezzan toward Chad, fleeing Italian domination, constitutes a new menace to this species, for the invasion of Arabs is always disastrous to the large game of a region. Brocklehurst (1931, p. 101) writes that "at one time the White Oryx was common in Egypt, as it is often depicted in old bas-reliefs and frescoes. It is now found only in Dongola, northern Darfur and Kordofan Provinces." It is now extinct in Egypt but "early in the nineteenth century it appears to have still occurred on the west side of Giza Province and round the Fayum. James Burton appears to have seen a small herd near the Wadi Natron, Lower Egypt, in about the year 1831. . . . From accounts given me, now over thirty years ago, by old Bedawin hunters, the last specimens must have been killed about 1850." (S. S. Flower, 1932.) This accords well with the statement of T. W.

Russell in a letter that these oryx existed in the Egyptian Desert seventy or eighty years ago.

At the present time small numbers are found chiefly in the Sudan (Dongola, Darfur, Kordofan) and the Chad region. A recent expedition found some numbers in Kordofan, not far to the west of Khartoum. Though the animals were seen more often in twos and threes,

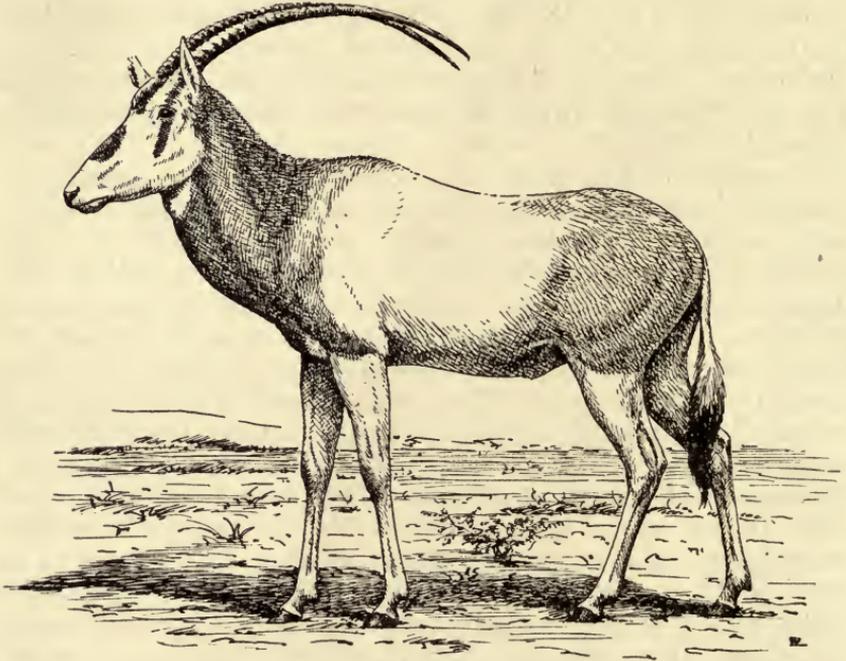


FIG. 63.—White Oryx (*Aegoryx algazel*). From specimen in Philadelphia Zoo.

larger herds up to 40 or more were occasional. They seem to be somewhat nomadic, moving to the southern parts of their range at certain seasons. After the rains, when grass is plentiful, it is said that they are easily run down and speared by a man on a fast camel (Brocklehurst, 1931). At such times they may come as far south in the Sudan as latitude 14° or even farther, having been seen on the road between El Fasher and Um Kedada. "The great oryx herds are, or were, on the Wadi Howar in the Anglo-Egyptian Sudan" (Thesiger, 1939, p. 445). Very little information is at hand as to their numbers, since they inhabit regions seldom hunted by Europeans. Probably it is impracticable to stop hunting by the desert tribes, which perhaps is the greatest peril to these animals at present.

G. M. A.

Arabian Oryx

ORYX LEUCORYX (Pallas)

Antilope leucoryx Pallas, Spicil. Zool., fasc. 12, p. 17, 1777. ("Arabiae & forte Lybiae proprium animal"; type locality restricted by Selater and Thomas (1899, vol. 4, p. 52) to "Southern Arabia, to the shores of the Persian Gulf.")

SYNONYMS: *Oryx beatrix* Gray (1857); *Oryx leucoryx latipes* Pocock (1934).
 FIGS.: Schreber, Säugthiere, pl. 256 B, 1784; Proc. Zool. Soc. London 1857, Mamm., pl. 55; Selater and Thomas, 1899-1900, vol. 4, pl. 82; Lydekker, 1901, pl. 2, fig. 12; Carruthers, 1915, pl. 11; Hamilton, 1918, pl. facing p. 283; Carruthers, 1935, pls. 28, 31, 32; Ward, 1935, p. 211, fig.; Pocock, 1937, p. 666, fig.; Leister, 1938, p. 88, fig.

This is a rare and "fast-diminishing species" (Cheesman, 1926, p. 367).

Height of adult male at shoulder, 40 inches; a distinct hump on the back; general color chiefly pure white; legs dark chocolate brown, sometimes nearly black, with white pasterns; a fawn-colored stripe on each flank, sometimes almost lacking; black areas in front of horns, between eyes and nostrils, and on cheeks; tail white, tuft black. Horns nearly straight, annulated; record length 29 inches in female, shorter in male. (Carruthers, 1935, pp. 182-184.)

This species once ranged over various parts of the Arabian Peninsula, north to the Syrian Desert and Mesopotamia.

Tristram (1884, p. 5) refers to it as "common in North Arabia, and found in the Belka and Hauran. Its horns may be purchased at Damascus. I have been near enough to identify it by its long horns." On the other hand, Carruthers remarks (1935, p. 164): "It is very doubtful whether the oryx ever extended its range as far as the Belga and Hauran."

Lydekker and Blaine (1914, vol. 3, p. 131) record specimens from the head of the Persian Gulf, from Adam, Oman, and from the Mesopotamian Desert.

Carruthers (1915, pp. 30-32) gives the following account:

[This species was] unknown until quite recently, except for native report and "traded" specimens

In days gone by, no doubt, the oryx antelope ranged the deserts bordering Moab and Edom, but they are now restricted to the inner deserts of Arabia The natural range of the oryx might be best described as extending around the main sand areas of Arabia. That is to say, the great sand deserts, such as the Nafud in the north-west and the Roba-el-Khali in the south, are probably their true refuge, beyond which they roam as far as pastures and native hunters allow them. The sand belts are the pasture zones *par excellence* in Arabia. In its southern habitat the oryx is unknown (except for one specimen . . . from Oman . . . and live specimens at Aden, said to have been brought from the southern Nafud); it probably inhabits the country inside the coastal belt of mountains, from the Yemen highlands to Oman. In Northern Arabia, and along the Persian Gulf, it is not found, but around

the Nafud in the north-west the oryx are numerous and in this locality alone is it feasible to hunt them.

When the Bedawin are not in the neighbourhood the oryx can be found for a certainty at the end of seven days' camel ride from the Hedjaz railway, east of the Dead Sea. But should there be ample rain the Arabs move far into the desert, and the oryx, no doubt, retreat farther away. . . . I have seen their tracks within a few hours of the railway south of Tebuk In early spring, during a very dry season, I found the oryx numerous along the western edge of the Nafud sand desert. [The sand dunes] were covered with tracks, and I should say that they are their true refuge and feeding ground for the greater portion of the year. . . . I have come across them, too, in quite broken country in the hills of Tbaik to the west of the Nafud.

Hamilton (1918, pp. 283-284, pl.) mentions and figures two specimens in captivity at Riyadh. "They come, I understand from the Great Nefudh south-west of Nejd and are now somewhat rare as it is not difficult to stalk them among the sand dunes. . . . One curious superstition the Arabs hold about them is that eating their flesh will expel a bullet which has lodged in a man's body even if it has been embedded for years. . . . As for their habitat I expect they roam the whole Nefudh or sand deserts of Arabia. Sir Percy Cox informed me that he had come across their tracks in the country behind Muscat."

Cheesman (1926, pp. 342, 367) writes:

The Oryx owes its continued existence in Arabia to its ability to live in places that are inaccessible to the badawin on account of their waterless character. The hunters of the Oryx, indeed, have to depend on camels' milk, and the extent of the journeys is limited to the time that their camels can exist without water. . . .

The home of this fast-diminishing species is to-day the uninhabited centre of the Great Arabian Desert, to which they have been driven by the increasing arms among the tribes. The Al Murra tribesmen, who roam as near the centre as any Arabs, say they were plentiful many years ago in the deserts around Jabrin in seasons of good rain, when they followed the growing vegetation. Now they are only to be found far to the south in the Great Desert, more particularly in the neighbourhood of Najran. . . .

It would be safe to assume that . . . all those in the British Museum have had their origin in the South Desert, with the exception of those killed by D. Carruthers in Tebuk in the Northern Nafud.

The following statement of Bodenheimer's (1935, pp. 115-116) would appear to relate more properly to years gone by than to the present period: "The Arabian Oryx . . . is still common in the Syrian and Arabian Deserts, whence it intrudes occasionally into Transjordanian." He adds that it was "probably more common in the deserts of Transjordanian and S. Palestine in earlier periods."

According to Pocock (1935a, p. 464), Bertram Thomas "mentions killing a specimen at Wadi Gudun in Nejd."¹ It was this specimen that was made the type of *O. l. latipes* Pocock.

¹ This wadi is at "the southern margin of the Rub al Khali" (Carruthers, 1935, p. 184, and map).

"The oryx, which still exists in Trans-Jordan and the Hedjaz, was in those days [the eighteenth century] to be found in considerable numbers in Sinai also. To-day not one remains." (Jarvis, 1932, p. 201.)

In 1936 this species was placed on the list of protected animals in Trans-Jordan for a period of five years (Jour. Soc. Preservation Fauna Empire, n. s., pt. 31, pp. 50-51, 1937).

In 1909 Carruthers (1935, pp. 63-131) encountered this species in the region of the Jabal Tubaiq, approximately 150-200 miles east of the head of the Gulf of Akaba, and also farther south, at a point 30 miles north-northeast of Taima. One herd of 15 was sighted, and there were said to be herds of as many as 20 to 30 individuals. Four specimens were secured.

"The sum total of our knowledge of the Arabian Oryx in the year 1909 did not amount to very much, for although he had been hunted throughout the ages either as a wild cow in the desert or as a Unicorn through mythology, he had retained successfully his solitary loneliness, and there is as much mystery attached to him to-day as there was in the past" (Carruthers, 1935, p. 142).

This author then presents (p. 142 et seq.) an extremely interesting résumé of the history of the species, from which there is space for the quotation of only a few items. In 1528 Tenreiro encountered "many wild cows" along the lower Euphrates, but by the latter half of the eighteenth century they had disappeared from this region.

At the present day the Arabian Oryx is divided into two separate detachments, the northern and the southern. These two groups are quite isolated, they live at least seven hundred miles apart, keeping to their two sandy refuges—the Northern Nafud and the Southern Wilderness of Rub al Khali. The two groups used to link up along the Dahana sand belts, but it is unlikely that they wander there any longer. The exact range of the northern group is fairly well known, but there is a good deal of conjecture about that of the south

In the north, the nucleus of the Oryx left at the present day centres around the Western Nafud between Jauf and Taima, but they do not, of course, approach to within some distance of either of these oases. The hills bordering the Hijaz railway on the east mark the western limits of the Oryx. They do not range much to the north of the Jabal Tubaiq, nor south of Taima. They are not found in Jabal Shammar, nor have they been recorded from the southern edge of the Nafud between Taima and Hail. Of their occurrence in the eastern half of the Nafud there has been only one, and that not a too reliable, record.

It is doubtful whether the Oryx exists any longer in the Dahana sand-belts, or indeed in any of the other sand-beds in middle Arabia. The great southern wilderness of sand from Najran to Oman is his main, and probably his last, stronghold. We have actual records of him from the southern margin of the sand, both from the north of the Hadhramaut and from the hinterland of Dhufar; and we know he ranges, under certain conditions, over the whole of the main sand area of the Rub al Khali west of longitude 52 degrees.

Philby found traces of it everywhere, and in addition he collected much information from very reliable nature [=native?] sources as to its habitat. I say "under certain conditions," for at the time of Philby's visit [1932] all the Oryx of that wide region traversed by him on his journey from Jabrin through the Rub al Khali and back to Wadi Dawasir, had migrated owing to the prolonged drought, and had left the district. They had probably moved down to the Najran country. But, broadly speaking, we may say that the whole of the western half of the Rub al Khali is Oryx country in normal seasons. We have no up-to-date information as to how far they extend eastwards towards Oman.

The sand-beds are the refuge of the Oryx for more reasons than one. Besides being a vast and safe retreat, unoccupied by man, they are also the main source of their food supply and of the moisture they need.

Cape Gemsbok; Gemsbuck

ORYX GAZELLA GAZELLA (Linnaeus)

Capra gazella Linnaeus, Systema Nat., ed. 10, vol. 1, p. 69, 1758. ("India" = Cape of Good Hope.)

SYNONYM: *Oryx aschenborni* Strand (1924).

FIGS.: Shortridge, 1934, vol. 2, pls. facing pp. 560, 564; Selater and Thomas, 1899, vol. 4, pl. 83 (col.); Maydon, 1932, pls. 25, 122, 132; Pocock, 1937, p. 667, fig.

Angolan Gemsbok

ORYX GAZELLA BLAINEI W. Rothschild

Oryx gazella blainei W. Rothschild, Ann. Mag. Nat. Hist., ser. 9, vol. 8, p. 209, Aug. 1921. (Angola, 20 miles inland from Elephant Bay.)

In general resembling the East African Oryx, this is a paler animal with straight and slightly diverging stout horns, tapering to a rapier point. It stands about 46 inches high at the shoulder. Of a general fawn gray, the head has a rich brown mark in the center of the muzzle connecting anteriorly with a similarly colored band from eye to mouth, and extending back under the jaw to meet a similar mark at the angle of the jaw, thus leaving the end of the muzzle and two stripes on the side of the face white. Neck with a short, forwardly directed mane. A brown line runs along the lower side of the neck from the chin, forking on the chest to send a long black band down each side of the flanks to the upper hind leg. Tail reaching well below hocks, ending in a long black tassel. Both sexes with horns, those of the female slightly longer and more slender than in the male. Head and body, 6 feet 3.5 inches; tail, 16 inches, with its terminal tuft 27 inches; average length of horns, about 36 inches, the longest record given by Rowland Ward 48 inches on the outer curve for the typical race; 40 $\frac{3}{8}$ inches for the Angolan race. The latter is characterized by its paler and grayer ground color, with an absence of a buffy suffusion, and a shorter, narrower posterior black

cheek-stripe, and by having the black of the throat more restricted. Both races are here treated together.

This is one of the most spirited-looking of the antelopes; of erect carriage, long straight horns, and with a smooth slashing trot, a herd dashing past may well be likened, as Shortridge has done, to a troop of lancers. The South African forms, though in no actual danger of over-reduction, are nevertheless included here since their range and numbers have become of late decades considerably restricted.

Essentially a desert animal, its habitat was limited mainly to the more arid regions in South Africa, including the karoo and central plains of Cape Colony. As late as about 1843, Gordon Cumming shot many in what are now the Philipstown and Hopetown districts, on the north karoo of the Colony. "Somewhat before that date," says Bryden (1899, p. 383)—

it was found yet farther south, on the Great Karoo itself, in the very heart of the Colony. All through the Kalahari, in Great Namaqualand, Damaraland, and the more desert parts of Bechuanaland, in the western part of Matabeleland as far as the Ramokwebani River, from thence westward as far as the Mababi veldt—towards Lake Ngami—along the Botletli River, and northward through Khama's country, well up towards the Zambesi, the range of the gemsbuck may be said to have once extended. At the present time [*i. e.*, forty-six years ago] it is still to be found sparingly in most of these localities, but it is to be noted that in the Cape Colony it has been driven for years by the tide of civilization more and more northwestward, until . . . it is only to be found, south of the Orange River, in the dry waterless wastes of the region known as Bushmanland. Here . . . it is still occasionally to be found in small troops. In the heart of the Kalahari the gemsbuck is one of the commonest of the game animals, and ranges freely in large troops in those desert regions. . . . The flesh of the gemsbuck is very good, and its skin, which is remarkably tough and strong, is in great demand for making *riems*—raw-hide thongs—and whip-lashes.

In the 46 years that have elapsed since Bryden's account, the general aspects of the picture seem to have changed but little. South of the Orange River, now its southern outpost, "there are a few head left in the Richtersveld, close to the mouth of that river" (Shortridge, *in litt.*, 1937). In Bechuanaland "the Kalahari Park was specially created as a reserve for gemsbok, where they may be seen to-day in thousands. The Park itself is situated about 250 miles north of Upington. At present there is one European ranger. Water holes have been sunk at various points in this park. Fringing the borders of it are quite a few herds in existence, but again it is impossible to give approximate numbers." (1932 official memo.) In Southern Rhodesia, the northern limit of their range, "the only place where they exist is in the Wankie Game Reserve, . . . which should conserve a few head in any case" (letter of International Office, 1933).

The Gemsbok is now distributed over the more arid districts of southwestern Africa. Here it is still abundant in the Kalahari Desert, "where, in default of water, it uses the juice of the t'sama wild melon, which is diffusely spread over that otherwise waterless zone. Consequently, until some years ago, when the motor car arrived in this remote region, the Gemsbok had a natural reserve in which its only enemies were the wandering bushmen and other nomads, and an occasional Lion. Now, however, all is changed, and cars can penetrate right into its remotest fastnesses. . . . The Gemsbok is, therefore, rapidly decreasing, and though still existing in large numbers, it is not to be expected that outside the sanctuaries which are eventually to be established in the Union of South Africa and South-west Africa, the species will survive very long." (Stevenson Hamilton, in Maydon, 1932, p. 344.)

In northern South-West Africa and the neighboring parts of Angola the subspecies *blainei* is found, but the limits of its intergradation with the typical race do not seem as yet to have been precisely defined. Shortridge (1934, vol. 2, p. 561) writes that "Gemsbok are the most widely distributed of the larger antelope in South-West Africa, with the possible exception of the Kudu: they occur very sparsely in some districts, however, and are retreating before European settlement. Gemsbok have been recorded from every part of South-West Africa except the Caprivi,—east of the Okavango." Detailed reports by districts are given for the region, indicating its varying abundance, though on the whole they appear to be in most parts plentiful. In Angola they are restricted to the southwestern part, not extending north of the Coporollo River (Blaine), and according to Statham (quoted by Shortridge), they are "said to be confined to the coastal zone of scrub and desert northwards to within 50 miles of Benguella, and also near the Chitanda (Coluhi)-Cunene Junction and other parts south of 16 degrees latitude." They avoid the neighborhood of the sea and keep to the plains of the interior. They are very keen-sighted and will detect the slightest movement behind any but dense cover (Blaine). They may often be found in company of Springbok, Wildebeest, or Roan.

G. M. A.

Blaauwbok; Blue-buck

HIPPOTRAGUS LEUCOPHAEUS (Pallas)

Antelope leucophaea Pallas, Misc. Zool., p. 4, 1766. ("Promontoria bonae Spei"; the entire range of the species was said by Le Vaillant (1790, vol. 1, p. 82) to be comprised in the valley of Soete-Melk, Swellendam district, Cape Colony.)

Figs.: Buffon, Hist. Nat., suppl., vol. 6, pl. 20, 1782; Schreber, Säugthiere, pl. 278, 1784; Selater and Thomas, 1899, vol. 4, pl. 76, p. 11, fig. 88; Renshaw, 1921, pl., and 1934, pl. facing p. 32.

The Blaauwbok was apparently the first of the Recent African mammals to succumb to civilized man and his weapons. As long



FIG. 64.—Blaauwbok (*Hippotragus leucophaeus*). After Daniell, in Jardine's Naturalist's Library.

ago as 1799 or 1800 the last one disappeared from the very restricted range of the species near the southern tip of the continent.

General color bluish gray; forehead brown; upper lip and a patch in front of the eye lighter than the general color; mane short, directed forward; throat-fringe almost wanting; under parts dull whitish; limbs with an inconspicuous darker line in front; tail tuft grayish. Horns like those of the Roan Antelope, but smaller and slenderer, up to $24\frac{2}{5}$ inches in length. Height at shoulder, 45 inches (male) to 40 inches (female). (Selater and Thomas, 1899, vol. 4, p. 6; Lydekker and Blaine, 1914, vol. 3, p. 133.)

"The blaauwbok was never known in any other part of South Africa than the . . . division of Swellendam, and there, probably, within an area of 100 miles—a curiously confined habitat" (Bryden, 1899, p. 418).

Lichtenstein, passing through the Swellendam district in 1803, writes (1812, pp. 165-166): "The beautiful blue antelope . . . is, as Mr. Barrow justly observes, almost entirely destroyed. Some were shot so lately as the year 1800, and their skins were brought to Leyden; but since that time they have not been seen."

Renshaw (1921, pp. 24-26) gives the following account:

The blaauwbok . . . was the first of the splendid fauna of South Africa to disappear. So quickly indeed was it exterminated . . . that it was hardly known before it had gone forever, and was for many years regarded, even by naturalists of the highest standing, as little more than a zoological myth. . . .

The discovery of the blaauwbok is unrecorded; but in the time of Pieter Kolben, who travelled in the Colony during 1705-1713, it had become well known as the "blue goat." Its best-known haunt was the valley of Soete Melk, . . . an extensive tract near the town of Swellendam. . . . Another locality was the mountains near the Buffalo-jagt River, between Swellendam and Algoa Bay. By 1774 the blaauwbok was becoming rare; by 1781, according to Le Vaillant, the valley of Soete Melk was its last remaining refuge. . . . Le Vaillant's specimen . . . was possibly an old animal that had been expelled from its troop; even at this late period there were enough surviving to allow of this, for in 1796-1797 a small band appeared in the wooded hills behind the valley of Soete Melk. . . . In 1800 the last survivors were shot, and the blaauwbok went to join the dodo, and the solitaire, and the aphanapteryx—a victim of civilization.

Only five stuffed examples of the blaauwbok survive to-day; they are preserved in the Museums of Leyden, Paris, Stockholm, Vienna, and Upsala. . . .

And so the blaauwbok heads the sad procession of exterminated and threatened fauna which, having from immemorial centuries graced South Africa, has now long been retreating before the hand of man. Blaauwbok and quagga, bontebok and white rhinoceros, blesbok and black wildebeest indicate but too surely the path which the great game has taken.

Dollman remarks (1937, pp. 68-69): "Its extermination must be largely attributed to this very limited distribution, since being found nowhere else than in this Province it was impossible to replenish the supply once the original stock had been exterminated. The tragedy of the Blaauwbok was that its life as a species was of such short duration, after the arrival of the white man in South Africa, that it was hardly known to science before it was exterminated."

**South African Roan Antelope. Antilope chevaline (Fr.).
Bastergemsbok; Bastereland (Boer)**

HIPPOTRAGUS EQUINUS EQUINUS (Desmarest)

Antilope equina "Geoffr." Desm[arest], Nouv. Dict. Hist. Nat., ed. 1, vol. 24, p. 4, 1804. (Type locality unknown; restricted by Harper (1940, p. 330) to "the vicinity of Litakun, British Bechuanaland," at approximately lat. 27° S., long. 24° E.)

Figs.: Jardine, Nat. Libr., Mammalia, vol. 3, pl. 23, 1835; Harris, 1840, pl. 18; A. Smith, 1849, pl. 27; Millais, 1895, pl. facing p. 188, pp. 126, 129, figs.; Selater and Thomas, 1899, vol. 4, pl. 77, p. 29, fig. 90; Bryden, 1899, pl. 12, figs. 6-7; W. L. Selater, 1900, vol. 1, p. 218, fig. 57; Lydekker, 1908, pl. 12, figs. 6-7; Selous, 1914, pl. 26.

The range limits of this subspecies have not been satisfactorily determined; they may be provisionally considered to extend from the Orange River, South Africa, north to Nyasaland and southern Belgian Congo. This broad range includes large portions of the Southeast Veldt District, the Kalahari Arid District, and the Rhodesian Savanna District of Bowen (1933, pp. 256, 259, 260). Practically everywhere over this territory the numbers of the Roan have been seriously depleted except in Northern Rhodesia and in reserves such as Kruger National Park. In Angola it is replaced by *H. e. cottoni* Dollman and Burlace, and in East Africa by *H. e. langheldi* Matschie.

General color of male pale brown; muzzle, chin, a stripe from base of horns past front of eye, and a rounded patch behind eye, white; rest of face, and forehead up to base of horns, black; ears with black pencils at tips; a mane of stiff upright hairs, gray basally and brown terminally, extending from occiput to middle of back; a throat-fringe of long hairs; chest and inside of forelimbs chestnut-black; outside of limbs like back; belly and inside of hind limbs white; tail with black tuft, reaching hocks. Horns stout and strong, cylindrical, transversely ridged, somewhat divergent, curved backwards; record length on front curve, 39 inches. Height at shoulder, 54 inches. Female slightly smaller, with shorter horns, and with black of face not so well marked. (W. L. Selater, 1900, vol. 1, pp. 217-219; Ward, 1935, p. 205.)

"Not very many years ago the animal was frequently seen within the northern boundary of the Cape Colony, . . . from which it has now in a great measure, if not completely, disappeared. It is an animal which congregates, and commonly from six to twelve individuals are found associated together. . . . The number of herds in any given tract is comparatively small, so that the animal, though generally diffused, is, nevertheless, no where abundant." (A. Smith, 1849, text to pl. 27.)

Selous (in Bryden, 1899, pp. 406-407) writes of the Roan as follows:

Roan antelopes had not yet become extinct in Griqualand West in 1886. Travelling northwards I never met with this species either in British Bechuanaland or along the western border of the Transvaal . . . In the southern part of the Bechuanaland Protectorate, along the Notwani River and on the Upper Limpopo, near the junction of that river with the Marico, I have both seen and shot roan antelopes; and from there eastwards and northwards this species used to be generally distributed throughout the greater portion of South-East Africa, including the northern and eastern portions of the Transvaal, as well as certain districts in Swaziland and Amatongaland, in all of which latter territories, however, it has now become very scarce. [It is] not uncommon along both banks of the Chobi River. In the flat coast country between the mouth of the Buzi River [Beira] and the Zambesi, the roan antelope is, to the best of my belief, unknown, and it is also absent from all the low-lying country on both sides of the Zambesi as far as the Victoria Falls. In fact I cannot remember to have met with this species in any part of South-East Africa where the altitude of the country was much less than 3000 feet above sea level.

North of the Orange River "it was formerly found in Griqualand West, and southern Bechuanaland, though hardly now surviving in those regions; it is still fairly abundant in German South-west Africa, in Matabeleland and Mashonaland . . .; it is also found, though now very rarely, in the eastern districts of the Transvaal, and has been recorded as far south as Swaziland. North of the Zambesi the roan is not uncommon in Barotse, Manica and Nyasaland." (W. L. Sclater, 1900, vol. 1, pp. 219-220.)

It is fairly numerous locally in parts of Kruger National Park (Warden of Kruger National Park, *in litt.*, December, 1936).

Roberts (1937, p. 778) says:

At present the roan occurs mainly in such reserves as Kruger National Park, and only elsewhere within the Union limits on an estate in Swaziland and a few farms in the eastern and northern Transvaal, thanks either to the proximity of the Kruger National Park or the wilder country north of our Union boundaries. It extends widely over the bushveld beyond our limits, and is, therefore, not in immediate danger of extermination; but that should be no reason why more should not be done for its conservation outside the sanctuaries, in places where sportsmen can legally secure trophies of its beautiful head and horns.

The range includes the western part of Mozambique (Shortridge, 1934, p. 570).

In South-West Africa the range of the Roan is now restricted to the northeastern corner of the country (chiefly beyond Etosha Pan and Grootfontein); it includes the Caprivi. The animals are fairly numerous in parts of this territory. (Shortridge, 1934, pp. 569-570, map facing p. 570.)

In Southern Rhodesia "this animal is widely but scarcely distributed, frequenting similar haunts to the Sable, but in far less numbers. They enjoy complete protection outside the tsetse fly areas and are not in any great danger of extermination. Their numbers have remained more or less constant during the past few years, even though a considerable number has been destroyed in the tsetse fly campaign. Legally considered as 'Royal Game.'" (Game Warden, Wankie Game Reserve, *in litt.*, March, 1937.)

"Roan are exceedingly common in parts of Nyasaland and N. E. Rhodesia" (Lyell, quoted in Shortridge, 1934, p. 570).

"I have encountered roan antelopes everywhere; from the Kafue to the Zambesi in Northern Rhodesia and from Shamva [Southern Rhodesia] to Tete [Portuguese East Africa] and on up to Chiputo they were to be found everywhere. I have never seen a large herd, seventeen is the maximum, but they are numerous nevertheless." (Hubbard, 1926, p. 190.)

The number of these animals in Northern Rhodesia (excluding Barotse) is estimated at 60,000. It "must be one of the commonest of the larger antelopes. Its shy retiring habits, and its tendency to keep always on the move, can only be the result of constant molestation." Many were "noted along the Luangwa bank. The abundance of skins seen in villages is some indication of the extent to which this species—not on the Native Licence—is being poached." (Pitman, 1934, pp. 331, 344, 378.)

In the Belgian Congo the Roan frequents the forest of Katanga. It abounded on the Bianos and the Kundelungus Mountains in 1912: we could not traverse the Bianos without seeing constantly around us a dozen and sometimes several dozens of Roans, Hartebeests, and Zebras. The slaughter of big game by the hunters for the constructors of the Bukama railway depopulated these fine hunting areas. (Leplae, 1925, p. 93.)

The Roan used to occur in enormous numbers throughout the south of the Belgian Congo from its southern frontier to latitude 3° S., except in the forest zones in the north of the Kasai and Kwango districts. Even 15 years ago it was one of the animals most frequently met with. In the south of Kwango, in the Kasai, in the country between the Kasai and the Lulua, in the stock-raising zones of the Lualaba and Lomami districts, one may travel or hunt for entire days without discovering a single Roan. In the north of Lomami and in the Tanganyika district, except on the banks of the Lualaba where they have been exterminated, they are found more frequently without approaching the abundance of a few years previously. They have also become localized in Maniema, in what is now the unguarded game reserve of the Luama. In the lower Congo this fine animal has long since been exterminated by the

natives. In the Kwango, the Tshokwe and Lunda natives are actively engaged in exterminating, especially with the aid of encircling fires, the last bands still wandering in the south of that district. In 1934, on the right bank of the Loange, 18 were killed at a single place, in one encircling fire. In the district between the Lulua and Tanganyika, the natives each year decimate the remaining bands, with the powerful aid of professional hunters. The intensive mining operations in Maniema have sounded the knell of the rich fauna of that region, everywhere except in the Luama reserve, established tardily and not guarded. It is impossible to estimate the number of Roans remaining in the Congo. Completely annihilated in some regions, they have dangerously diminished in all the others, where they are subjected to ceaseless hunting. The resident's game license allows the killing of 52 antelopes; commercial permits, 180 antelopes. As the species are not specified, all of these could be Roans. With the commercial permits suppressed, the sporting licenses should not, in certain districts, authorize the killing of more than one or two male Roans. They ought to be totally protected in all the rest of the colony. The prohibition of encircling fires and of the killing of females and young, restricted bag limits, and the suppression of commercial permits, seem to me the only chances of survival for this species. (A. J. Jobaert, *in litt.*, November 10, 1936.)

[The remaining subspecies of the Roan do not appear to have suffered to the same extent as the South African form in reduction of numbers and restriction of range. Their names, together with their ranges (which can be only approximately stated), are:

H. e. cottoni Dollman and Burlace.¹ ANGOLAN ROAN. Range: Angola.

H. e. langheldi Matschie.² EAST AFRICAN ROAN. Range: Tanganyika Territory, Kenya, and eastern Uganda.

H. e. bakeri Heuglin.³ NILE ROAN. Range: Uganda, Anglo-Egyptian Sudan, northeastern Belgian Congo, and perhaps eastern French Equatorial Africa.

H. e. scharicus (Schwarz).⁴ SHARI ROAN. Range: Lake Chad region.

H. e. koba (Gray).⁵ GAMBIAN ROAN. Range: Gambia to Nigeria.]

¹ *Hippotragus* *e[quinus]* *cottoni* Dollman and Burlace, Rowland Ward's Records of Big Game, ed. 9, p. 265, 1928 ("Quanza River," Angola).

² *Hippotragus langheldi* Matschie, Sitz.-ber. Ges. Naturf. Freunde Berlin 1898, p. 182 (Tabora, Tanganyika Territory).

³ *Hippotragus Bakeri* Heuglin, Nova Acta Acad. Caes. Leopold.-Carol., vol. 30, pt. 2, p. 16, 1863 (apparently Atbara River, Anglo-Egyptian Sudan).

⁴ *Egocerus equinus scharicus* Schwarz, Ann. and Mag. Nat. Hist., ser. 8, vol. 11, p. 266, 1913 (Abilela, lower Shari River).

⁵ *Aegocerus koba* Gray, Cat. Ruminant Mammalia Brit. Mus., p. 35, 1872. (Gambia.)

Northern Rhodesian Sable Antelope. Zwart-wit-pens (Boer)

HIPPOTRAGUS NIGER KIRKII (J. E. Gray)

Aegocerus niger var. *Kirkii* J. E. Gray, Cat. Ruminant Mammalia Brit. Mus., p. 35, 1872. (Type locality not stated, but shown by Harper (1940, p. 330) to be "Batoka Hills, in the southern part of Northern Rhodesia, more or less north of Victoria Falls.")

In its main habitat in Northern Rhodesia and the southern Belgian Congo this subspecies has become so rare that it is apparently approaching the danger line.

It is similar to *H. n. niger* (Harris), of the region south of the Zambesi, but the females are much redder, never turning quite black. Horns of male up to 52½ inches, compared with a maximum of 49½ inches in *H. n. niger*. (Selous, 1914, p. 89; Ward, 1935, pp. 197-198.)

The range of the present subspecies may be considered provisionally to include Northern Rhodesia, southern Belgian Congo, Nyasaland, and inland parts of Portuguese East Africa north of the Zambesi.

"North of the Zambesi I have met with the sable antelope wherever I have traveled, but it always appeared to me to be rather sparingly distributed through those regions" (Selous, in Bryden, 1899, pp. 398-399).

"Northward of the Zambesi it was always less common [than to the southward], although the Batoka plateau is one of its present strongholds; and it was never abundant in the Mozambique province" (Lydekker, 1908, p. 291).

Hubbard (1926, pp. 190-191) writes:

This magnificent antelope is found at its best on the Batoka Plateau, and from there it spreads everywhere, and is found in greater or lesser numbers over most of Northern Rhodesia and the interior of Portuguese East Africa where I have been.

Occasionally one finds sable antelopes in herds of as many as forty individuals, but more often the numbers are around fifteen. The old, black, fully adult bulls run by themselves either singly or in parties of two or three. . . .

In my operations I have often had [live] young sable antelopes brought to me for sale by the natives.

In Northern Rhodesia "Sable Antelope are scarce" about Mpika; they are also found about Kasempa (Lyell, in Maydon, 1932, p. 328).

The total number of Sable Antelope in this country (excluding Barotse) is estimated at 10,000, according to Pitman (1934, p. 331), who says also (p. 23):

This species is most plentiful in parts of North-Western Rhodesia, particularly the Kasempa Province, and the Mumbwa, Mkushi and Serenje Districts. . . . When wounded it is a savage antagonist and in consequence

is treated with considerable respect by the local population, and thereby enjoys a certain degree of immunity from molestation. It is absent from the Luangwa Valley proper, and is very scarce generally in East Luangwa where a special measure of protection is recommended, and occurs only very sparingly and locally throughout North-Eastern Rhodesia as a whole.

"Sable antelope are . . . being thinned out to the danger line" in Northern Rhodesia (David Ross, *in litt.*, February 14, 1936).

"Passing northwards of the Zambesi we find the Sable Antelope recorded by Peters, in his 'Reise nach Mossambique,' as met with in the Portuguese dominions west of Tette, and on the woody plains of Sena. In Nyasaland Mr. Crawshay tells us it is not by any means evenly distributed, but appears to be plentiful in some places. In the Shiré Highlands, as Sir Harry Johnston writes, the Sable is one of the commonest Antelopes, . . . and we have seen many heads obtained . . . from this district." (Sclater and Thomas, 1899, vol. 4, p. 37.)

In Nyasaland "Sable get progressively scarcer as one goes north from the Bua River" (Wood, in Maydon, 1932, p. 320).

A dozen years previously the Sable was abundant in Katanga, Belgian Congo, but it has been slaughtered to a point where it has become very rare (Leplae, 1925, p. 91).

This beautiful antelope formerly occurred abundantly in the southeast of the Belgian Congo, from the Kasai River on the west to Lake Tanganyika on the east, and from the southern boundary of the Colony to latitude 7° S., from Kasai to Lualaba. From Lualaba to Tanganyika its range extended more to the north, as far as the Lukuga River. At present the Sable has been exterminated between the Kasai and the Lubudi, a western tributary of the Lualaba. In the remaining part of its range it has decreased to such an extent that the Government has placed it on the list of protected animals. The European occupation of Katanga, the development of public works, and commercial hunting are the responsible factors. The rare herds left have tried to find a refuge in the remotest and wildest regions. There are probably not more than 1500-2000 head left in the Congo. The prohibition of commercial hunting and of the trade in trophies and other parts of the animal, in addition to the protection now afforded by law (if really effective), would save the species from a most dangerous decrease in numbers. (A. J. Jobaert, *in litt.*, November, 1936.)

[The remaining subspecies of the Sable call for only brief comment.

The taxonomic status of the form occurring from Ngamiland through the Caprivi into southeastern Angola has not been definitely determined. If it should prove distinct, the name *H. n. kaufmanni*

Matschie (Deutsche Jäger-Zeitung, vol. 59, p. 119, 1912; based upon a specimen from the Caprivi, between the Chobi and the Zambesi) is available. Sable are fairly numerous in the Caprivi (Shortridge, 1934, vol. 2, p. 578) and plentiful in southeastern Angola (Varian, in Maydon, 1932, p. 379).

The South African Sable (*H. n. niger* (Harris)¹) is numerous in the Kruger National Park, but very scarce elsewhere in the Transvaal. In Southern Rhodesia it is "common all over the country" and "in no danger of extermination" (Game Warden, Wankie Game Reserve, *in litt.*, March, 1937).

The East African Sable (*H. n. roosevelti* (Heller)²) occupies a coastal strip in Kenya and Tanganyika Territory, from the vicinity of Mombasa south to the Kigani River opposite Zanzibar Island. It occurs in very moderate numbers, but receives some protection and apparently is not decreasing rapidly.

Many herds of Sable are reported in southern Tanganyika Territory, and a few herds in the western part (Annual Rept. Game Dept., 1932). Whether these represent *roosevelti*, *kirkii*, or some undescribed form, has not been determined.]

Giant Sable Antelope; Angolan Sable Antelope. Hippotrague noir d'Angola (Fr.)

HIPPOTRAGUS VARIANI Thomas

Hippotragus niger variani Thomas, Abstr. Proc. Zool. Soc. London, no. 151, p. 1, 1916. ("Luando River, Angola.")

FIGS.: Thomas, Proc. Zool. Soc. London 1916, p. 299, fig. 1; Blaine, 1922, pls. 1, 5A; P. N. Gray, 1930, pls. facing pp. 3, 30; Acad. Nat. Sci. Philadelphia, 1930 Year Book, p. 6, fig.; Maydon, 1932, pls. 120, 124, 127; Field Mus. News, vol. 3, no. 4, p. 1, fig., 1932; P. N. Gray, 1933, frontisp., pl. facing p. 103; Curtis, 1933, pl. facing p. 237; Ward, 1935, p. 203, fig.; Pocock, 1937, p. 673, fig.

This finest of African antelopes occupies a very limited range in Angola, and its total population amounts probably to only a few hundred individuals. Its horns fetch an exceptionally high price as trophies, and in recent years it has been sorely pressed by the natives in meeting this demand. The great need of safeguarding its future is thoroughly recognized, and it ranks as a Class A species under the London Convention of 1933.

Color of male above intense glossy black; under parts and inside of thighs white³; forehead and foreface wholly black, but a faint

¹ *Aigocerus niger* Harris, Proc. Zool. Soc. London 1838, p. 2, 1838. ("On the northern side of the Cashan [now the Magaliesberg] range of mountains, about a degree and a half south of the tropic of Capricorn" [now in the Rustenburg district, Transvaal].)

² *Ozanna roosevelti* Heller, Smithsonian Misc. Coll., vol. 56, pt. 4, p. 1, 1910. ("Shimba Hills, British East Africa.")

³ The white does not extend to the front of the thigh as in *H. niger niger*.

trace of cheek stripes in some specimens; a buffy patch in front of eye; lower part of cheeks, chin, and lips creamy buff; inside of ears white, back tan; mane of soft, crimped black hairs, extending to middle of back; tail and tuft black, with reddish tan hairs along the dorsal crest; side and back of hocks, and a stripe down back of forelegs to fetlocks, deep tan; rest of legs black. Females golden chestnut, under parts white; a blackish brown blaze down center of face, flanked by indistinct cheek stripes; patch in front of eye, inside of ears, and sides of jaws buffy white, paling to white on lips and chin; mane blackish brown; tail-tuft deep brown. Young males somewhat resembling females, but with face black as in old males. Horns of male rising perpendicularly and curving backwards in an arc; usually a wide outward sweep toward the tips; laterally compressed and strongly annulated, except at tips; record length, 64 inches. Horns of females shorter and less curved. Height of adult male at shoulder, 55½ inches; of adult female, 47 inches. (Blaine, 1922, pp. 319-320.)

"This splendid Antelope, so far the finest in all Africa" (Blaine, 1922, p. 317), was perhaps the last species of the African big game mammals remaining to be described. The type, secured by H. F. Varian in 1913, was named by Thomas in 1916. Though closely related to the Sable Antelopes of South and East Africa, it is sufficiently distinct in size, color, skull characters, and range to rank as a separate species, rather than subspecies.

Blaine's account (1922, pp. 320-324) is, in part, as follows:

The Angolan Sable Antelope is found in the strip of country enclosed by the upper waters of the Quanza River and its eastern tributary the Luando, and it is also said on good authority to occur between that river and its western tributary the Kutatu I procured all my specimens . . . some 70 miles southeast beyond the junction of the Quanza and Luando. The distance between these two rivers is about 30 miles, with a low, flat, ironstone ridge forming the divide The Sable here are mostly found on the Luando side of the watershed where several streams rise, such as the Luce, the Kaluando, the Dunde, and the Lusinge

The numbers in a herd vary from eight to twenty individuals, about half of them being bulls. . . . In a small herd there is usually only one big black bull. . . .

In this country they have few natural enemies, such as lions or wild dogs. . . .

They [the adult bulls] are also covered with several kinds of ticks, which are very numerous on the neck and shoulders, where the hair is worn thin in consequence. The younger bulls had fewer ticks and the cows fewer still. . . .

In conclusion, one is glad to remark that there is no reason why this splendid Antelope should not continue long to exist in its present environment. During three months spent in the locality I must have seen at least 100 individuals, forming several strong and flourishing herds, and measures have been taken by the Portuguese Government, at the instigation of Mr. Varian, to protect them.

Gray writes (1930, p. 27) that "a few specimens have been killed north of the Loando." Varian states (in Maydon, 1932, p. 380) that the southern limit is the Luaco River. Monard (1935, p. 290) has reports of some form of Sable from the region of Kafima, east of Kuanyama. Moreover, Welwitsch sent a head from the interior of

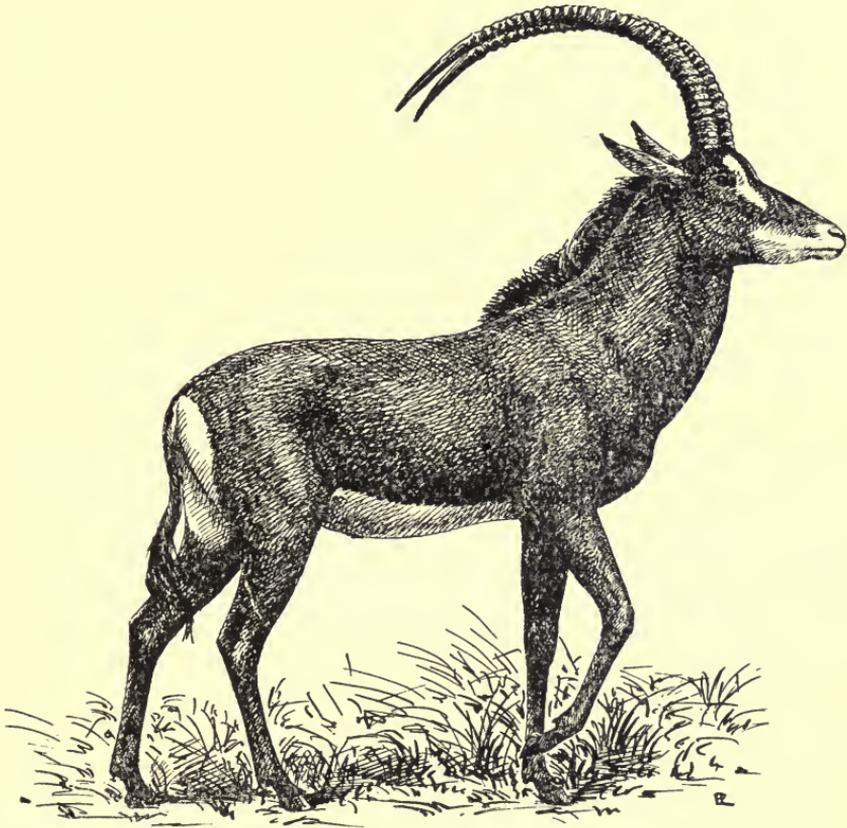


FIG. 65.—Giant Sable Antelope (*Hippotragus variani*)

Mossamedes, at a period prior to the immigration of the game-destroying Boers (1874-1880).

P. N. Gray (1930, p. 30) writes:

For the past four years it has been against the law to kill giant sable except on a special license issued by the High Commissioner. Very few of these have been issued, with the result, I believe, that none have been killed legally since the Vernay expedition for the American Museum of Natural History in 1925. However, with the withdrawal of license a demand for the horns has sprung up so that the local Portuguese traders find it very lucrative to shoot the bulls for their horns, and cows for their hides and meat.

One trader told me he had killed eighteen last year and I was offered at least twenty sets of horns from 46 to 60 inches in length. This slaughter plus the usual number killed by the natives in pits will soon wipe out the relatively few animals remaining.

Varian (in Maydon, 1932, pp. 384-385) says:

In 1912 the Boers raided the small area where the Giant Sable lives, and heads up to 61 inches were the result, which were sold for high prices. On this account a further raid was contemplated in the following year. Fortunately I was a friend of the Governor of the district at the time and, when the matter was represented to him, the country was closed for shooting; for the time being they were saved from practical extermination. Poaching, to a certain extent, still continued, and good heads found a market, as they still do. But the greater number and the largest heads have been accounted for by the pit traps of the local natives. One of the largest heads recorded was traded for something less than a shilling from the natives.

The district in which they live is an outlying one, and too large to police for the game purposes only, so a certain amount of poaching, principally by natives, goes on. Such a thing is likely to continue as long as there is a selling value on the heads, and until barter of them is made a serious offence. Lions have been reported in the country in recent years, as well as Wild Dogs—that curse of African game—and these have taken a certain amount of toll.

At Camacupa "I was offered two sable heads for 150 Angolars each. The strict protection of the Giant Sable seemed a myth. Only against foreign sportsmen were they protected. The Portuguese residents killed them wholesale and sold the heads. In fact, subsequently, I was offered any number of heads I cared to buy, and I heard several Portuguese brag of killing ten sable in a month. At that rate, this magnificent animal will soon be extinct." (P. N. Gray, 1933, p. 125.)

Curtis (1933, pp. 238-239, 241, maps facing p. 245) gives the following account:

The species is not known to live elsewhere than in this part of Angola where we were camped, an area of perhaps 50 miles square. There are only a comparatively few specimens living and unless these get better protection than the Portuguese government is giving them the species will soon become extinct. Besides those that are being killed for specimens, many are killed by the native black hunters who offer the horns for sale for small sums. I have lately been told that one of our large museums sent an expedition to Angola to collect specimens of the female for their group, and that after three months they were unsuccessful. . . .

My son and I, hunting separately, saw forty-four male, female and young Sable in a week of hard hunting from sunrise to sunset [in 1923].

"It seems that it is well protected as far as permission to shoot them by white hunters is concerned

"I gathered also that the local natives still continue to trap considerable numbers in pitfalls

"While these things are still possible it is obvious that extermination eventually will be the . . . result." (H. F. Varian, *in litt.*, March 10, 1933.)

"The estimate made [by Col. A. Brandao de Mello in a recent letter] in regard to the sable I think is extremely high [750-800] I think if this was cut in half it would be on the high side, but I am glad to notice that the Government is at last rigorously enforcing protection. . . . You will notice that they are only allowing four to be shot each year and a price of \$5000 for each head taken out. Therefore I do not think that number will be decreased by ordinary sportsmen or Museums." (Arthur S. Vernay, *in litt.*, January 18, 1937.)

**Addax (Eng., Fr., Ital.). Antilope Adax (Sp.). Mendesan-
tilope (Ger.)**

ADDAX NASOMACULATUS (Blainville)

A[*antilope*] *Nasomaculata* Blainville, Bull. Sci. Soc. Philomatique Paris 1816, pp. 75, 78. (Type locality not given; regarded by Lydekker and Blaine (1914, vol. 3, p. 148) as "probably Senegambia.")

SYNONYM: *Antilope addax* Cretzschmar (1826).

FIGS.: Geoffroy and Cuvier, Hist. Nat. Mamm., vol. 6, pls. 388, 389, 1824; Cretzschmar, 1826, pl. 7; Lichtenstein, 1827-1834, pl. 2; Hemprich and Ehrenberg, decas 2, pl. 4, 1833; Gray, Gleanings Knowsley Menagerie, pl. 18, 1850; Royal Nat. Hist., vol. 2, p. 280, fig., 1894; Bryden, 1899, pl. 11, fig. 4; Selater and Thomas, 1899, vol. 4, pl. 86, pp. 83, 85, figs. 95-97; Lydekker, 1908, pl. 11, fig. 4, p. 303, fig. 63; Selous, 1914, pl. 28; Antonius, 1929*b*, pp. 381-382, figs. 9-10; Zammarano, 1930, p. 33, fig.; Brocklehurst, 1931, pl. facing p. 58; Maydon, 1932, pls. 23, 41, 42, 131; Ward, 1935, p. 213, fig.; Malbrant, 1936, pl. 11, lower fig.; Pocock, 1937, p. 672, fig.; Leister, 1938, p. 89, fig.

This fine antelope of the Sahara is suffering from a general reduction in numbers and restriction of range. In all the vast territory it occupies, there appears to be not a single game reserve.

General color in summer sandy above, whitish below, with a brown patch on the forehead; in winter the coat is gray and a heavy mass of long brown hair is developed on the neck, shoulders, and forehead; a streak across the face below the eyes, the lips, and a spot on the outer surface of each ear, white; hoofs very wide and shallow. Horns spirally twisted and closely ringed; record length on front curve, 43 inches. Height at shoulder, about 42 inches. (Ward, 1935, p. 214.)

The range extends more or less throughout the Sahara region, from Senegambia and Algeria east to the Anglo-Egyptian Sudan. The evidence for the former occurrence of the species in Palestine and Arabia is inconclusive.

Western Sahara.—Lydekker and Blaine (1914, vol. 3, p. 149) record two specimens of the first half of the past century as probably from Senegambia. According to Cabrera (1932, p. 328), there is no real evidence of the occurrence of the Addax in Morocco within historical times.

Algeria and Tunisia.—The species appears rather widespread in the Algerian Sahara, but at a certain distance from its northern limits. Its fine horns are rather frequently brought by the Arabs to Laghouat, Bou-Sâada, and Biskra, where they are sold to officers and tourists as objects of ornament. (Lataste, 1885, p. 293.)

Pease (1897, pp. 810-812) writes as follows:

The Addax . . . visits this district [Bir Aoueen, southern Tunisia] in large quantities in favourable years. The Addax country is the Erg, the great region of sand-dunes covered more or less thickly with vegetation according to situation and rains. This sand-dune country covers hundreds—it may be said thousands—of miles and the Addax follows the rains. . . . In one year the Addax are only found far south of Rhadamis and Aïn Taïba (S. of Ouargla), in other years they follow the rain as far north as the southern borders of the Chott Djereed in the east and the neighbourhood of Aïn Taïba in the west. . . .

The Chambas who have firearms shoot a great many of these Antelopes

. . . . The Touaregs hunt the Begra el Ouash [Addax] . . . with Sloughia (Grey-hounds . . .). The sloughia bring it quickly to bay, and the men go in and spear it.

Geyr von Schweppenburg (1917, pp. 251-295) reports small numbers of Addax at various points west and south of Temassinin, in the southern territories of Algeria.

Half a century ago the Addax ranged over the entire Sahara, but its retrogression before man is considerable. Today it practically exists no more in the Algerian Sahara, unless in the south of the Erg Oriental. The same statement applies to the north of the Libyan Erg. To find the Addax in numerous herds, one must go to the southern or western Sahara (beyond the central massifs and the Saura). It lives not only in the Ergs, but also in the Regs and on the plateaus. (Heim de Balsac, 1936, pp. 177-178.)

“The Addax . . . is still to be found in the inland desert country of the south of the Regency [of Tunisia], although of late years, even in these remote and uninhabited districts, its numbers seem to have diminished considerably. . . . The meat of this animal, it appears, is much esteemed by the Arabs as food, while the hides are still more highly prized for the purpose of making the soles of shoes and sandals.” (J. S. Whitaker, in Selater and Thomas, 1899, vol. 4, pp. 83-84.)

In Tunisia the Addax is now confined to the Erg, south of a line passing approximately by Berresof and Bir-Aouïne. It is a normal

inhabitant of the great dunes. The bands are not large (15 individuals at the most). An authorization from the Director General of Agriculture is required for hunting this animal. (Lavauden, 1924, pp. 22-23, distr. map; 1932, p. 22.)

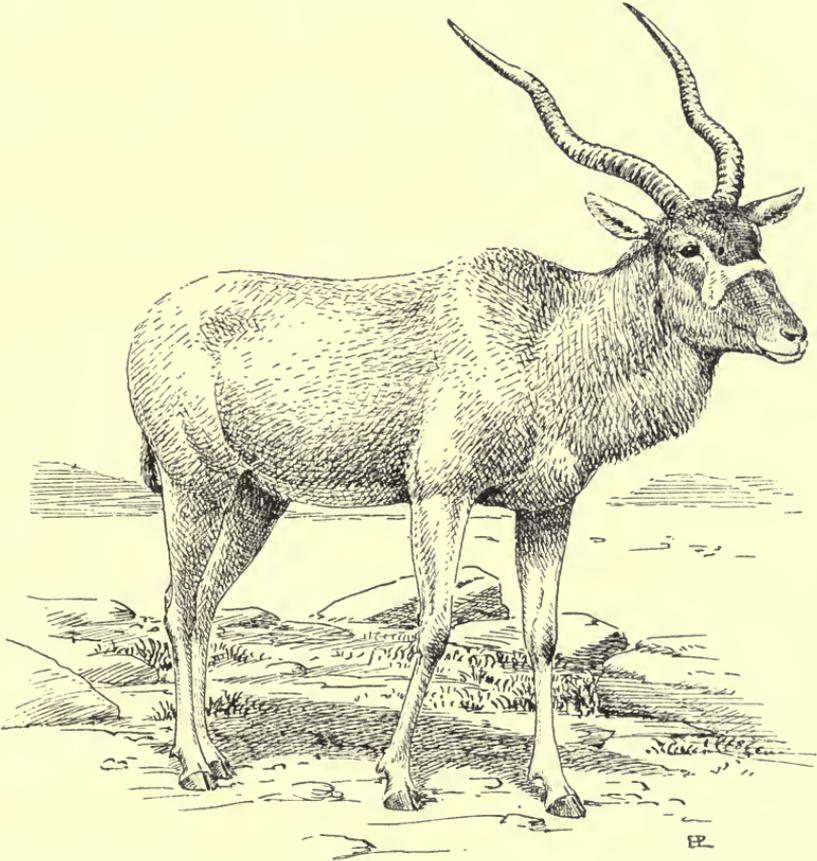


FIG. 66.—Addax (*Addax nasomaculatus*). After Brehm, etc.

The present habitat in Tunisia is the extreme southern part, in the Grand Erg Oriental, where the animal is quite rare. The cause of depletion is the progress of civilization. Hunting is allowed only on special permit; permits are given for the revictualling of expeditions. (Conservator of Forests, Tunisia, *in litt.*, September, 1936.)

Libya.—The Addax “certainly existed west of our [Egyptian] frontier at the commencement of the Turco-Italian War as Prince Imer Toussoum was actually hunting them, probably in the vicinity of Wadi Marah 130 miles S. of Derna when that war started. Don Bates who was through that country sometime prior to 1911 gives Addax

"I understand from Western Arabs that the great field for game nowadays is in the 'Harush' [apparently in the central part of Libya] There considerable numbers of Addax . . . exist." (Colonel Green, *in litt.*, March 13, 1933.)

In Tripolitania "it is reported that the animals have practically ceased to exist owing to being machine-gunned by Italian military patrols" (Hone, 1933, p. 38).

The Addax is doubtless rarer than the Barbary Sheep in Libya. Its presence is up to now materially documented only by a single horn brought back by the expedition to the Oases of Cufra. Legal protection is urged. (De Beaux, 1935, p. 14.)

The Addax is rare and of rather uncertain distribution in Libya. It can be hunted only under permit, which may be issued no more than twice per year to a given person. (Ministry of Colonies, Rome, *in litt.*, March 5, 1937.)

Central Sahara.—"The disappearance of the Addax from the northern Sahara is only a question of years. Happily, it will maintain itself for a long time yet in the solitudes of the southeastern Sahara, north of Lake Chad, where I have seen it in immense herds. Mechanical locomotion will some day permit hunters to go there and pursue it. Let us hope that the powers that be will take effective action for its protection before that day arrives." (Lavauden, 1926, p. 27.)

The Addax is threatened almost solely by the natives. The exodus toward Chad of peoples from Fezzan, fleeing the Italian domination, constitutes a new menace to the species. In general, the invasion of Arabs is always disastrous to the large game of a region. (Lavauden, 1933, p. 29.)

According to Ramecourt (1936, p. 30), the species is common nowhere unless in the Ti-n-Toumma, on the border of the immense dunes of Agadem.

In Chad the Addax is found only in the north of the colony. It inhabits, at times, some of the most remote and arid regions of the southern Sahara, where it is almost inaccessible. It is a great wanderer, but never goes farther south than latitude 15° N., except perhaps in the region of Aurak (between Ziguei and Salal). It is quite abundant north of Eguei [lat. 16°] and Bodelé [lat. 17°] (Kanem), particularly in the triangle Hacha, Kouba, Aurak. It is sometimes met with between Faya and Oum Chalouba [15° 30' N., 20° 30' E.]; and more to the east in Ennedi, especially in the Bideyat country and at the north in the Erdis. While it is not so common as the Oryx, several hundred may be observed in a single day. It is hunted with dogs by the Haddad, by certain groups of the Toubous, and by the Bideyat of Ennedi. The Oulad Sliman are said

to hunt the Addax without dogs, following it on horseback or on their best camels. (Malbrant, 1936, pp. 87-88.)

The Addax exists in the region of Timetrine [19° 30' N., 0° 30' W.] and Inguezzans [19° 30' N., 5° 40' E.], and in Borku and Ennedi. The southern limit is approximately: Chingueti [20° 30' N., 13° W.], Arouane [19° N., 3° 30' W.], Tessalit [20° 15' N., 0° 30' E.], Ifrouane [19° N., 6° E.], Beduaram, Ennedi. (General Government of French West Africa, *in litt.*, November, 1936.)

Thesiger (1939, p. 445) had native reports of great herds of Addax in Erdi, to the north of Ennedi.

Anglo-Egyptian Sudan.—Brocklehurst (1931, pp. 1-2) gives the following account:

It is found in Dongola, northern Darfur, and the northern part of the Kordofan Province, its most southern range being approximately 15° 7' latitude North. . . .

Normally at the beginning of the hot weather after the southern migration starts, the Addax come as far south as Jebel Teiga, but in the very dry seasons, when there is little grazing in the north, they have been known to come as far south as the Anke district.

They are usually found in herds of from five to thirty; but I have seen much larger herds, and on one occasion I counted considerably more than 400 in the course of one day's march.

Early in 1927, I was travelling in the Bedayat country of north-western Darfur on the boundary of French Equatorial Africa where I came across many Addax. Those near the frontier were few and far between, besides being very wary and difficult to approach, as they had been hunted by parties of Arabs with dogs. Carrying enough water for six or seven days, a small party of these Arabs mounted on camels and accompanied by their dogs will push into the desert until they strike the fresh spoor or actually sight a herd of Addax, . . . and by following the undulations of the ground, the party is able to get within a few hundred yards of their quarry without being observed.

The Addax being short-legged and heavy, is incapable of any great speed, and the cows and calves are soon brought to bay, and even some of the old bulls are run down and speared.

Further to the north and east, where they are seldom disturbed, I encountered several large herds.

About 1932, north of Wadi Hawa, Dongola, tracks were common and a specimen was secured (Maydon, 1932, p. 188).

In 1933(?) Addax were found near the French frontier at about latitude 17° N., but seemed to fade out about 16° 45' N. (Shaw, 1933, p. 15).

Egypt.—"The Addax, formerly to be met with occasionally in western Egypt, is now extinct. The last instance known, El Miralai T. W. Russell Pasha, of the Egyptian Police, told me, 12 June, 1910, was that of an Addax shot by an old Bedawin hunter in about the year 1900 in the Mariut district, about 40 miles west of Alexandria.

"The so-called eastern [*A. n. addax*] and western subspecies [*A. n. nasomaculatus*] are untenable." (Flower, 1932, p. 441.)

The Addax "have now all been completely destroyed and can never be reintroduced" (T. W. Russell, MS, September 12, 1934).

The present habitat is the north of Halfa plains of Derr Markaz [not located]. The causes of depletion are injudicious hunting and reduced rainfall. The skins and horns are sold, and the meat is used for food. Shooting is prohibited by Frontiers Department decision of 6.V.1930. (Ministry of Agriculture and Zoological Garden, Cairo, *in litt.*, January, 1937.)

Palestine and Arabia.—"The beautiful milk-white Addax is a scarce and very large Antelope, but has a wide range through Abyssinia, Nubia, and Egypt, as well as Arabia. . . . It is well known to the Arabs as 'Addas' or 'Akas,' and approaches the southern and eastern frontiers of Palestine. Its claim to be included here is rather historical than actual." (Tristram, 1884, p. 5.)

Addax disappeared from the limits of Palestine about 25 years ago (Aharoni, 1930, p. 329).

"The Addax . . . probably only sojourned on our territories [Palestine] for a very short time, if at all" (Bodenheimer, 1935, p. 116).

In the absence of specimens, the above-quoted reports are not regarded as satisfactory evidence of the former Asiatic occurrence of the Addax. "The Bubal disappeared as a myth, and the Addax followed suit" (Carruthers, 1935, p. 4).

Nyala; Inyala

TRAGELAPHUS ANGASII Angas

Tragelaphus Angasii "Gray" Angas, Proc. Zool. Soc. London 1848, p. 89, 1849. ("The northern shores of St. Lucia Bay, in the Zulu country, lat. 28° south.")

FIGS.: Angas, 1849, pls. 4, 5; Angas, Kafirs Illustrated, pl. 29, 1849; Baldwin, African Hunting, pl. facing p. 92, 1863; Drummond, 1875, pl. facing p. 378; Selater and Thomas, 1900, vol. 4, pl. 92, pp. 140, 146, figs. 105, 106; Bryden, 1899, pl. 13, fig. 4, p. 463, fig. 39; Lydekker, 1908, pl. 13, fig. 4; Lydekker and Blaine, 1914, vol. 3, p. 181, fig. 25; Selous 1914, pl. 37; Maydon, 1932, pls. 110, 141; Ward, 1935, p. 226, fig.; Pocock, 1937, p. 661, fig.

The Nyala is locally distributed in the coastal belt of south-eastern Africa. Its numbers are comparatively few, and many have been destroyed by natives.

The male has a shaggy aspect; general color grayish black, tinged with brown and ochre; sides with several transverse white stripes; forehead sienna-brown; mane black on neck, white from withers to tail; ears rufous, tipped with black; a white chevron between and below the eyes; lips, chin, and three marks beneath each eye white; a long fringe of dark hair extending down middle of throat, along each side of belly, and across thighs to the tail; white spots or

patches on dewlap, on upper part of foreleg, on breast, and on sides and front of thigh; lower part of limbs bright rufous; tail black above, tip and lower side white. Height at shoulder, 40 inches; tail, 20 inches. Horns 24 inches, twisted and sublyrate; basal half deeply ridged; brownish black, with straw-colored tips. (Angas, 1849, p. 89.) Record length of horns on front curve, $32\frac{7}{8}$ inches (Ward, 1935, p. 224).

Female smaller and hornless; color bright orange-rufous, paler below; a median dorsal ridge of bristly black hair from crown to tail; white spots on various parts of the body resembling those of the male; stripes on sides more numerous and more clearly defined; tail rufous above, white below, tip black. Height at shoulder, 33 inches. (Angas, 1849, p. 89.)

The species ranges from Natal north to southern Nyasaland, and inland to northeastern Transvaal and Southern Rhodesia.

Natal.—Angas (1849, p. 90), its discoverer, says it was "found in small troops of eight or ten together" on the hills near St. Lucia Bay.

In 1896 Selous (as quoted in Selater and Thomas, 1900, vol. 4, pp. 141-144) found Nyalas still common in dense bush along the Usutu River in Amatongo-land.

Elsewhere Selous (in Bryden, 1899, pp. 455-460) writes:

[From St. Lucia Bay] northwards it appears to have once existed in all the low-lying coast country, along the banks of all the rivers flowing into the Indian Ocean, as far as the Sabi, and, following the Limpopo, penetrated a good distance inland Between the Sabi and the Zambesi it has not yet been met with

Owing to the protection which has been afforded them of late years by the Government in Zululand, inyalas have recently increased in that territory, but in Amatongaland, and everywhere else in South-East Africa where these antelopes exist, they are being very rapidly exterminated by the natives; and as the rinderpest has also lately worked sad havoc amongst them, especially in Zululand, it is quite certain that this beautiful species will become very rare, if not exactly extinct, in the coming century.

In Zululand the species is plentiful along the Umkuzi River. "At the present day the herds are small, though the natives assured me that formerly, before the introduction of guns, they were commonly much larger." C. R. Saunders writes that the largest number he has seen in one herd is sixteen; also that "the inyala is among the species of game that have suffered most heavily from the rinderpest plague that has recently swept through Zululand." (Neumann, in Bryden, 1899, pp. 462-466.)

"Zululand is such an easy country to reach that it is a marvel and a blessing that Nyala have not long since ceased to exist there, despite a very strict preservation. The advance of civilization and occasional organized game drives for the elimination of 'Fly' do not promise much for the future." (Maydon, 1932, p. 351.)

In Zululand "there are more than 1000 Nyala in the two Game Reserves [Hluhluwe and Mkuzi] and some 200 or so on the private farms in the False Bay and Mkuzi sections" (H. B. Potter, Game Conservator, Ann. Rept. for 1934). Charter (1934, p. 3) reports 160 of the animals in the Hluhluwe Reserve, and 750 in the Mkuzi Reserve.



FIG. 67.—Nyala (*Tragelaphus angasi*). After Selater and Thomas, 1900.

The number in northeastern Zululand is estimated at 700 to 1,000. Three-quarters of this number are found in the Ndumu, Hluhluwe, and Mkuzi Reserves. Depletion has been gradual; reduction has been necessary owing to the spread of nagana. Fuller protection is now accorded. (Administrator's Office, Natal, *in litt.*, December, 1936.)

Portuguese East Africa.—From Zululand the range extends northward through Portuguese territory for some 40 miles to the Nimpeluzi River, and from west to east between the Lebombo and Maputa Rivers, a distance of some 30 miles. Probably the next few

years will see the extinction of the species in Portuguese East Africa south of Delagoa Bay, where it has been systematically destroyed by the natives for many years. It is next met with 200 miles north of Nimpeluzi in the Portuguese provinces of Gazaland and Inhambane not far from latitude 24° S. Here, as in the Maputa district, the animals are far from numerous. In 1908 the species was discovered on the Inyamapuzi River in Gorongoza north of Beira. (Stevenson-Hamilton, 1912, pp. 134-136.)

"In 1921 two parties . . . went with waggons into the Portuguese territory, near the Rhodesian border, and killed, one 400, and the other 250, head of big game—nearly all sable and inyala—within two months" ("Sabi," 1922, p. 43).

Transvaal.—In Kruger National Park the opening of a road along the Pafuri River "has enabled tourists to see them very frequently. . . . A few have probably been killed by lions, leopards, and wild dogs, but the species continues to increase satisfactorily." (Ann. Rept., Kruger National Park, 1934.)

"Within recent years there was also quite a number in the Zoutpansberg district on the Limpopo, but these have now disappeared" (Hone, 1933, p. 42).

The number in Kruger National Park is estimated at 100 (Warden, Kruger National Park, *in litt.*, December, 1936).

Nyasaland.—"The inyala . . . is rare in British Central Africa. The only district in which it has yet been found is that bordering on the Shiré River, from Port Herald up to the Murchison Cataracts

"They were not known to exist in this part of Africa till 1891." (Sharpe, in Bryden, 1899, pp. 460-461.)

Wood (in Maydon, 1932, pp. 317-324) writes of the Nyala in this region:

In our borders it is only known to exist in two localities, near Chiromo and near Chikwawa. In both places their numbers are very limited and Government has wisely proclaimed their breeding haunts as Game Reserves. But animals are often found at certain seasons outside the boundaries of these reserves. . . .

The African Hunting Dog (*Lycan pictus*) must take heavy toll of Nyala in Nyasaland. On several occasions I have found skeletons of both sexes which would appear to have been killed by them, and early one morning found them at the very deed. . . .

Also natives have brought in horns of Nyala found dead and presumably killed by Dogs. They are a terrible scourge in that forest country surrounding the main jungles

They [Leopards] must often succeed in killing Nyala, in particular cows and calves, and, with Hunting Dog, are the obvious natural check to their increase.

Southern Rhodesia.—"Nyala have never been very numerous and very few have been shot since the European occupation. A few are reported to survive in the lower reaches of the Lundi River and in the Zambesi valley near Angwa river. Legally considered as 'Royal Game.'" (Game Warden, Wankie Game Reserve, *in litt.*, March, 1937.)

Northern Rhodesia.—Pitman (1934, pp. 23-25) discusses reports of this species in the following localities: the southern extremity of Lake Tanganyika; the vicinity of Fort Hill on the Nyasaland border; and the left bank of the Zambesi somewhere below Victoria Falls. "From the foregoing it will be realised that the evidence to include the nyala in the list of Northern Rhodesia mammals is inconclusive, though the localities as indicated are worth exhaustive investigation."

General.—"Not only is it a king amongst its congeners [the bushbucks], by reason of its much greater size, but it is also one of the most beautiful of all the African antelopes" (Selous, 1914, p. 121).

The Nyala is accorded complete protection under the London Convention of 1933.

Mountain Nyala

TRAGELAPHUS BUXTONI (Lydekker)

Strepsiceros buxtoni Lydekker, *Nature*, vol. 84, no. 2135, p. 397, 1910. ("To the west of the Arusi plateau of Gallaland [Ethiopia], in the Sahatu Mountains, and south-east of Lake Zwei, at an estimated height of 9000 feet above sea-level.")

FIGS.: Lydekker, 1911, pl. 16, p. 351, fig. 103; Lydekker and Blaine, 1914, vol. 3, pp. 183-184, figs. 26-27; Sanford and LeGendre, 1930, pp. 163, 166, figs.; Maydon, 1932, pls. 60, 139; Ward, 1935, p. 228, fig.

This species is known only from some of the higher mountains of southern Ethiopia, and its numbers are limited to a few thousand individuals at most.

The coat is rather long and coarse, with an incipient fringe on the throat; color brownish fawn, lighter about the eyes and darker on nose and forehead; a short dark brown mane on neck, continued backwards as a brown and white dorsal crest; tail bushy, white beneath; chevron below eyes, two spots on sides of head, lips and chin, a gorget on throat and another on chest, a row of 9 spots on upper sides, a spot on upper part of thigh, and several patches on limbs, white. Height at shoulder about 52 inches. Horns like those of *T. angasii*, but heavier, obliquely ridged at bases, divergent, with an open spiral, forming about one complete turn and a quarter, with smooth yellow-tipped terminal portion. (Lydekker and Blaine, 1914, vol. 3, pp. 183-184.) Record length of horns on outside curve, 44 inches (Ward, 1935, p. 225).

Females are said to be hornless but similar to the males in color (Lydekker, 1911, p. 349).

The Mountain Nyala was made known to science as late as 1910, on the basis of a specimen secured by Ivor Buxton. It is evidently limited to the Abyssinian Highland District of Bowen (1933, pp. 256, 260).

"Fairly plentiful in the Arusi mountains fifty miles s. e. of Addis Ababa in a district bounded by Lake Zwai, both banks of the Webbi Shabeila river, and Hawash railway station. A mountainous country, running to 12,000 feet or more, forest and tree heath. They are harried by natives undoubtedly, but they are outside the zone of many Europeans and all motor-cars. No fear of extinction in 1925." (Maydon, 1933, p. 738.)

Several herds were seen and several specimens were shot on Chelalo Mountain, south of Lake Zwai. Others were obtained near Lajo, south of the Webbi River. (Maydon, 1932, pp. 223-225.)

Sanford and LeGendre (1930, pp. 161-166) found the species on Ansha and Kaka Mountains and report the taking of over a dozen specimens by their party.

W. H. Osgood (*in litt.*, April 21, 1933) contributes the following account:

"The Mountain Nyala . . . has an exceedingly limited distribution in the higher mountains of southern Abyssinia. It is probably existing in all the mountains exceeding 9000 feet in height in the province of Arussi and on a few of those in the provinces of Bale and Sidamo. These are mainly the Chilalo Mountains, Mount Gugu, Mount Kaka, and the Gedeb Mountains. They are included in an area scarcely more than one hundred miles square, a large part of which is unsuitable for the nyala. . . .

"Because it is so largely forest-inhabiting, accurate estimates of its numbers are not possible. It seems hardly probable that there are more than a few thousand animals living and it may be that there are only hundreds. It is shy and difficult to hunt and some expeditions into its range have failed to secure it, so it is evident it cannot be very abundant. . . .

"The Abyssinians doubtless kill a few nyala each year, and the extent to which they have reduced other game shows what they might do in this case if it were not that the higher parts of the mountains are uninhabited. It is unlikely that any effective regulations could be carried out to control killing by the natives. They are remote from central authority and given to independent action. Many of them have guns of very poor quality and condition, but they are often good hunters.

"It is usually possible to find a few horns of the mountain nyala . . . at Addis Ababa, and the sale of these to foreigners perhaps might be stopped."

The species is placed in Class A under the London Convention of 1933.

South African Eland

TAUROTRAGUS ORYX ORYX (Pallas)

Antelope Oryx Pallas, Misc. Zool., p. 9, 1766. (Type locality restricted by Shortridge (1934, p. 607) to "mountains near Cape Town," Cape Province, South Africa.)

Figs.: Harris, 1840, pl. 6; A. Smith, 1849, pls. 40, 41; Bryden, 1899, pl. 12, figs. 1, 3; Sclater and Thomas, 1900, vol. 4, pl. 98; Lydekker, 1908, pl. 12, figs. 1, 3; Roosevelt and Heller, 1914, vol. 2, pl. facing p. 470, upper fig.; Haagner, 1920, p. 221, fig. 130; Leister, 1938, p. 91, lower fig.

The South African Eland has long been exterminated over most of its former range; it now survives chiefly in a few protected areas, such as the Kruger National Park.

The general color of the male is rusty sienna-yellow; under parts pale cream-yellow; forehead yellowish brown; middle of face below eyes brownish red; sides of head creamy white; mane thin brownish yellow; a narrow median reddish brown stripe from shoulders to tail; ears long, narrow, pointed; a dewlap present. Height at shoulder, 5 feet 9½ inches. Horns directed backwards, very thick toward the base, with two spiral turns; length, 34 inches. Female slightly paler and with rather slender horns. (A. Smith, 1849, text to pls. 40, 41.)

The former range of *T. o. oryx* may be considered to have included practically all of South Africa south of the Limpopo River and the Tropic of Capricorn, except the coastal part of Great Namaqualand. This corresponds to the Southeast Veldt District and the Kalahari Arid District of Bowen (1933, pp. 256, 259, 260).

The early writers recorded the Eland from many places in the Cape Province. Kolben (1731, vol. 2, pp. 110-111) refers to the animal as inhabiting the mountains near the Cape of Good Hope; it frequently attempted to enter the garden of the colonists, and was taken in snares set there.

"The hide of the Eland, particularly that of the neck, is very thick, and is highly esteemed as soles for shoes; the rest of the hide, on account of its toughness, is much sought after by the farmers, being valuable as traces for horses. Its flesh is highly esteemed as food; and from the animal being on these various accounts so useful, it is much hunted by the *Boers*, which accounts for its being now so rarely met within the boundaries of the Colony." (A. Smith, 1849, text to pl. 41.)

Selous (in Bryden, 1899, pp. 421-422) says:

Time was when these magnificent animals roamed in herds over the whole of South Africa from Cape Agulhas to the Zambesi. . . . Even now, or at any rate as lately as 1896—for it is impossible to tell just at present how much havoc the terrible plague of rinderpest which has recently swept through South Africa has worked amongst the elands—the range of this species, although it has long been banished from all the settled states of South Africa, is or was still very extensive. It is said that a few elands yet survive amongst the fastnesses of the Drakensberg mountains, where that range divides Basutoland from Natal; but with this exception I doubt whether any of these animals are still to be found anywhere within the borders of Natal, Zululand, Swaziland, the Cape Colony, British Bechuanaland, the Orange Free State, Griqualand West, or the Transvaal. From all these territories they have been driven long ago.

“At the present time there are still a few left in the mountainous country along the Basutoland, Griqualand East, and Natal borders; beyond the Colony there are a certain number in the North Kalahari, in . . . the country between Beira and Mozambique, and possibly in Zululand and the Transvaal Eastern frontier; elsewhere they have been nearly exterminated.” (W. L. Sclater, 1900, vol. 1, p. 250.)

“Nothing could be more encouraging than the reports received regarding the increase of this fine species formerly extinct in the Transvaal. It seems now to be found in all areas north of the Olifants River, and there are even unconfirmed reports of individuals having been seen south of it.” (Ann. Rept. Transvaal Game Reserve, 1925.)

“Eland have become more and more common in the north, and Ranger Botha saw a herd of well over a hundred with a number of calves in his section” (Ann. Rept. Kruger National Park, 1934).

The present range of this Eland includes parts of the Kalahari Desert and the Kruger National Park in the northeastern Transvaal; it is strictly preserved in both areas. Depletion has been brought about by man and by the rinderpest epidemic of 1896. There are many possibilities in utilization through domestication. (Warden of Kruger National Park, *in litt.*, December, 1936.)

In Natal the animal is rigidly protected in the Giant's Castle Game Reserve, where there are approximately 1,500 individuals. Recently a few have been successfully established in the Hluhluwe Reserve. (Administrator's Office, Natal, *in litt.*, December, 1936.)

With the exception of those in the reserves just mentioned, “and one or two small troops on enclosed farms in the Transvaal and Orange Free State, Eland are already extinct in the Union of South Africa” (Shortridge, 1934, vol. 2, p. 610).

Roberts (1937, pp. 776-777) writes:

The eland was at one time plentiful all over the Union, and always a favourite with the hunter, owing to its size, fattiness and tender quality of the meat, the hide also being better than that of domestic cattle. No wonder then that it rapidly disappeared with the advance of settlement. Attempts were made by many early settlers to keep it on their farms, but it was either shot off by poachers, or when restless during droughts migrated elsewhere. Ordinary fences are of little avail to keep it within bounds, as its tough hide enables it to push through ordinary wire fences without much damage to itself, and its ability to leap over obstacles six feet high makes it difficult to keep in confinement. . . . A few occur in the Kruger National Park as strays from Southern Rhodesia and Portuguese South-East Africa, and a fair number are said to occur in the Kalahari Gemsbok Park. . . . The advantages of protecting this, the largest of the antelopes, both for economic and technical scientific reasons must be obvious.

"As the Eland breeds well in captivity, and is as a rule of a mild docile nature, it is mysterious why no attempt was made by our earlier settlers to domesticate this fine animal, even if only as a fresh item for the bill of fare. The Elands in the National Zoological Gardens breed regularly every year." (Haagner, 1920, p. 224.)

[The remaining subspecies of this Eland have survived in much better numbers than the one of South Africa, and require only brief mention.

The MASHONA ELAND (*Taurotragus oryx selousi* Lydekker¹) ranges over Southern Rhodesia, between the Zambesi and the Limpopo, and apparently the adjacent parts of Portuguese East Africa. According to the Warden of the Wankie Game Reserve (*in litt.*, March, 1937), Elands are common in most districts of Southern Rhodesia and have held their own, despite the large numbers shot in tsetse fly operations and despite the severe effects of drought.

The name LIVINGSTONE'S ELAND—*T. o. livingstonii* (P. L. Sclater)²—may be applied for the present to the Eland of South-West Africa, the northern part of the Bechuanaland Protectorate, Angola, Northern Rhodesia, Nyasaland, and the southern part of the Belgian Congo. Apparently it still occurs in fair numbers over a large part of this range. Pitman (1934, p. 331) estimates the number in Northern Rhodesia (excluding Barotse) at 30,000. In the Belgian Congo, however, it has been decimated by both Europeans and natives, despite total legal protection (A. J. Jobaert, *in litt.*, November 10, 1936).

¹ *Taurotragus oryx selousi* Lydekker, Ward's Records of Big Game, ed. 6, p. 328, 1910. (Typified by two heads from the "Mashuna country," Southern Rhodesia, figured by Selous, A Hunter's Wanderings in Africa, pl. 1, figs. 1, 3, 1890.)

² *Oreas livingstonii* P. L. Sclater, Proc. Zool. Soc. London 1864, p. 105, 1864. (Near Sekhosi, on the Zambesi, about 115 miles northwest of Victoria Falls, Northern Rhodesia; cf. Harper, 1940, p. 331.)

The EAST AFRICAN ELAND (*T. o. pattersonianus* Lydekker¹) ranges from southern Anglo-Egyptian Sudan (east of the Nile) through Uganda, Kenya, and Tanganyika Territory, and west to Ruanda. Although it has suffered from hunting and from rinderpest, and is local in its distribution, it remains in moderate numbers over much of its range, and has even shown an encouraging increase in protected areas.

T. o. billingae Kershaw (Ann. Mag. Nat. Hist., ser. 9, vol. 11, p. 598, 1923), based upon an incomplete skin from the Iringa District of Tanganyika Territory, does not seem to be clearly differentiated from *T. o. pattersonianus*.]

Derby Eland; West African Eland. Elande Derby (Fr.)

TAUROTRAGUS DERBIANUS DERBIANUS (Gray)

Boselaphus Derbianus J. E. Gray, Ann. Mag. Nat. Hist., ser. 1, vol. 20, p. 286, 1847. ("Western Africa, Gambia.")

Figs.: Gray, Gleanings Knowsley Menagerie, pl. 25, 1850; Reade, 1863, pl. 22; Reade, Savage Africa, ed. 2, pl. facing p. 397, 1864; Rochebrune, Faune Sénégalie, atlas, Mamm., pl. 7, fig. 2, 1883-1885; Bryden, 1899, pl. 12, fig. 2; Sclater and Thomas, 1900, vol. 4, pl. 100, p. 218, fig. 119; Lydekker, 1908, pl. 12, fig. 2; Selous, 1914, pl. 29 (subsp.?) ; Ward, 1935, p. 248, fig.

The typical Derby Eland is now considered rare everywhere in its West African range.

General color deep chestnut or rufous; 14 or 15 narrow white transverse stripes on sides; neck black, with a brown mane, and bordered posteriorly with a white collar; adult bulls with a chocolate frontal tuft; nose black; sides of head dusky brown; an oblique whitish stripe in front of each eye; lips and chin white; ears large, marked with white, black, and brownish; a broad median black dorsal stripe from neck to tail; under parts nearly white, middle of belly black; a black patch on back of foreleg above the knee; pasterns black behind. Height at shoulder probably about 70 inches. Horns large, massive, divergent, twisted. Females smaller, with smaller horns, and without frontal tuft. (Sclater and Thomas, 1900, vol. 4, pp. 215-216.) Record length of horns, 36½ inches (Ward, 1935, p. 246).

This Eland occurs in the interior parts of Senegal (Bofing), Gambia, French Guinea (Fouta Djallen), and the Ivory Coast, and along the upper Niger (Tinkisso) (General Government of French West Africa, *in litt.*, November, 1936). Portuguese Guinea is also included in its range (Ward, 1935, p. 246).

Reade writes (1863, pp. 169-170) that when he was on the Casamance, in Senegal, he was told that the animal was most abundant

¹ *Taurotragus oryx pattersonianus* Lydekker, Field, vol. 108, p. 579, 1906. (Laikipia Plateau, Kenya.)

in the bamboo forest of Bambunda, about 50 miles northeast of Sedhu. The natives were in the habit of annually burning the undergrowth of the forest and the high grass of the plains, and at that time holding a "battue," in which game animals, including Elands, were killed in large numbers. "Thus I obtained one specimen; the others I purchased at Macarthy's Island, Gambia."

"Sir Robert [Llewelyn] stated that the Derbian Eland . . . was rare in the colony [Gambia], though occasionally found in Niamina in the dry season, but was said to be met with in large quantities on the upper river" (P. L. Sclater, 1898, p. 349).

"This splendid eland . . . is almost completely unknown, except by a few horns, to hunters and zoologists of the present day (Bryden, 1899, p. 439).

In Gambia "it does not seem to be very abundant, and is undoubtedly very shy. During my stay on the river, several pairs of horns were found in the possession of natives. Two were met with on the south bank, west of M'Carthy's Island, and one at Koina, on the north bank, 100 miles east of M'Carthy's Island. All these had been procured in the year 1899." (J. S. Budgett, in Sclater and Thomas, 1900, vol. 4, p. 220.)

"It has long since been exterminated within the limits of 500 miles of Timbuktoo" (Cotton, 1933, p. 1037).

E. Johnson reports (1937, p. 65) for Gambia: "Only found in the upper river, especially on the north bank near Koina, 300 miles up. A lot are killed by native hunters during the months of May and June. I have seen as much as fifteen heads weighing from 600 to 1,400 lb. each brought in for sale during the month of May, 1926. Now, however, much less appears in that district, I reckon there are a thousand heads left. As these animals generally come in a single file containing from six to a dozen animals, they become an easy target for the night hunter. The Wild Animal Regulations for 1916 state 'absolutely protected'."

All subspecies of *Taurotragus derbianus* have been accorded a place in Schedule B of the London Convention of 1933.

Giant Derby Eland; Sudani Derby Eland; Nile Derby Eland

TAUROTRAGUS DERBIANUS GIGAS (Heuglin)

Boselaphus gigas Heuglin, Nova Acta Acad. Caes. Leop.-Carol., vol. 30, Abhandl. 2, p. 19, 1863. (West of the upper White Nile, at about lat. 7° N.)

Figs.: Heuglin, *op. cit.*, pl. 1, fig. 2; Sclater and Thomas, 1900, vol. 4, p. 208, fig. 117; Novit. Zool., vol. 12, pl. 12, 1905; Lydekker, 1908, p. 316, fig.; Brocklehurst, 1931, pl. facing p. 98; Nat. Hist., vol. 31, no. 6, cover and pp. 589, 590, 593, figs., 1931; Ward, 1935, p. 245, fig.

There are no records to show that this Eland ever was very common, and its numbers have now been considerably depleted by disease as well as by hunting.

The adult male has a frontal mat of dark chocolate-brown; nose black; sides of head light gray to pale fawn; a narrow white stripe extending obliquely forward from the eye, and a round white spot on the cheek; upper lip and chin white; ears large, externally mostly black, with white tips; a large dewlap of whitish gray; a brown and black neck mane of coarse hair, becoming entirely black round the base of the neck and forming a conspicuous collar, bordered posteriorly by a white stripe extending halfway to the withers; body color very pale fawn, becoming white on the belly; median dorsal and ventral black stripes; about 10 white stripes running down the sides and haunches; limbs pale fawn, white on the inner sides, with black patches above the hoofs and on the back of the fore limbs above the knees. Horns very straight, stout, and heavy, with the spiral ridges very strongly developed. (Butler, 1905, pp. 289-290.) Roosevelt and Heller (1914, vol. 2, pp. 463-467) give the number of side stripes as 11 to 15, and the maximum horn length as 41 inches. Height at shoulder, 6 feet (Cotton, 1933, p. 1038).

"So far as known the giant eland is confined to the Bahr-el-Ghazal and Lado Enclave Provinces of the Egyptian Soudan. It is limited to the western drainage of the Bahr-el-Jebel Nile, extending roughly from the vicinity of Rejaf northward to the Bahr-el-Ghazal River and its continuation the Bahr-el-Arab; westward it reaches Dem Zubeir in the Dar Fertit country. The distribution is limited to the eastward by the Nile and northward by its chief western affluent, the Bahr-el-Ghazal; while westward the heights of the Nile watershed confine it. In this latter region, however, it extends to the very borders of the watershed in the Niam-Niam country." (Roosevelt and Heller, 1914, vol. 2, p. 459.) The range is now known to extend into northwestern Uganda and northeastern Belgian Congo. It corresponds in part to the eastern division of the Sudanese Savanna District of Bowen (1933, pp. 256, 258).

According to Heuglin (1869, as quoted in Sclater and Thomas, 1900, vol. 4, p. 207), the animal "is found in pairs and singly in the forests of the Djur River and amongst the Arol negroes."

Collins (in Butler, 1905, p. 290) writes of seeing a herd of 60.

Roosevelt and Heller (1914, vol. 2, pp. 459-462) give the following information:

Throughout this range it is distributed only locally and is so rare that it is a very difficult species to obtain. . . .

Heuglin . . . described the species from a pair of horns collected somewhere near the present position of Wau, probably east of it. . . . In 1874, Doctor Georg Schweinfurth . . . referred to the eland occurring about the Lehssy River and the village of Sabby [in the Bahr-el-Ghazal region].

[In the Lado Enclave] they were found in herds of from ten to thirty or forty individuals; the old bulls . . . were frequently solitary. . . .

It is said that in the rainy season, when the grass is thick and tall, they are often killed by lions, which are then able to get so close as to seize them by the head.

Brocklehurst writes (1931, pp. 46-48):

A few herds are scattered throughout the Mongalla and Bahr-el-Ghazal Provinces and south-western Darfur. . . .

They are generally found in herds of from fifteen to twenty-five, though I have seen a herd of over forty. They are very local

Eland are very susceptible to cattle plague and rinderpest, and between the years 1923 and 1927 several herds were much depleted by these diseases.

J. L. Clark (1931) encountered several herds in the vicinity of York House and Amadi, and secured two specimens. At this time "disease had greatly diminished the eland and in certain localities had wiped them out completely."

Tweedie (in Maydon, 1932, pp. 168-172) gives the following account:

In the Sudan his best-known haunts are:

(1) The Jur country, a few miles east of Wau.

(2) The old Lado enclave.

(3) The western portion of the Bahr el Ghazal.

(4) The Gell river, between Wau and Rumbek

Now that the advance of civilization has made their habitat so much more easily accessible, are they one of the fine beasts that are doomed? It is not perhaps the rifle of the regulated sportsmen that they need fear, so much as the local native. Game sanctuaries and regulations are good, but who is to control the wild native himself? *Pax Brittanica* has freed him from inter-tribal wars and slave raids, only to free him to play havoc with the game.

"From my own inquiries I gather that they are well protected in British administered Sudan (west bank of Nile); rare and protected in Uganda; very rare in n. e. corner of Belgian Congo and protected" (Maydon, 1933, p. 738).

Cotton (1933, pp. 1037-1038) writes as follows:

Within the limits of British territory the species is practically confined to the Soudan, though herds of females are said to stray into Uganda, and . . . by far the best area for Giant Eland is the Bahr-el-Ghazal, and by far the best district is, in my opinion, Tonj. . . . The tracks of lion and leopard are found occasionally; but the real enemies of the game are the forest tribes, who are one and all expert hunters. . . .

The Giant Eland . . . never, I think, trespasses on the cultivation

A herd of Giant Eland consists usually of six or seven cows accompanied by a bull They are never common, and, judging from the oldest records of the country, those of Junker and Schweinfurth, they never have been common within historic times. Indeed, they strike one as being relics of the remote past, before man became the acknowledged ruler of the planet, and their survival due to the remoteness of their haunts, shut in between the desert and the equatorial forest, and now, as Africa is opened out, the Giant Eland will be one of the first to go.

The species did not formerly occur in Uganda, but the north-western portion of the West Nile District (formerly the southern part of the Lado Enclave) is occasionally visited by herds of cows, totalling less than a hundred individuals. There is no reason to believe that the species is decreasing in this locality. It is protected, and only males may be hunted under Government permit. During 12 years past no male has been seen or killed by sportsmen. (Game Warden, Uganda, *in litt.*, December, 1936.)

In the Belgian Congo this animal is found only in the north-eastern corner, and probably it never has been very numerous. Though long and completely protected by law, there is no doubt that in late years it has been hunted not only by natives but also by unscrupulous Europeans. The numerous trophies found almost everywhere constitute a proof. There may not exist, north of Aba, but a few isolated individuals, perhaps a few small troops. The species is dangerously near extinction in the Belgian Congo. The measures adopted for its protection—an unguarded game reserve—are notoriously insufficient. (A. J. Jobaert, *in litt.*, November 11, 1936.)

Congo Derby Eland

TAUROTRAGUS DERBIANUS CONGOLANUS Rothschild

Taurotragus derbianus congolanus Rothschild, Ann. Mag. Nat. Hist., ser. 8, vol. 12, p. 575, 1913. ("Eastern Congo, Ubanghi District" = probably the Ubangi-Shari Territory of French Equatorial Africa.)

SYNONYM?: *Taurotragus derbianus cameroonensis* Millais (1924).

FIGS.: Dollman, 1929, p. 30, fig.; Weidholz, 1930, figs. 1-3; Maydon, 1932, pls. 31, 38, 136; Lavauden, 1934, pl. 5; Malbrant, 1936, pl. 12, lower fig.; Ramecourt, 1936, pl. 10.

Hunting and disease have reduced the stock of this Eland to a point considerably below its former status.

Horns longer and slenderer than in the other Derby Elands; anterior crest of the spiral twist passing round the back of the horns only once; distance between base of horn and second frontal point of the twist much greater than in the other two forms; frontal tuft dark blackish chestnut (Rothschild, 1913, pp. 575-576). A large dewlap commences at the chin and terminates about halfway down the neck (Dollman, 1929, p. 29). Record length of horns, 44½ inches (Ward, 1935, p. 247). Three specimens in the Academy of Natural Sciences of Philadelphia, collected at Kabo, 60 miles north of Batangafo, Ubangi-Shari, have 13 to 14 narrow white stripes on the sides and a white round spot or a vertical stripe on the cheek.

The range appears to be restricted to the central part of French

Equatorial Africa and the northern part of French Cameroons.¹ This appears to correspond to the more westerly portions of the Ubangi Savanna District of Bowen (1933, pp. 256, 258). The animal occurs chiefly in the basins of the Shari and upper Benue Rivers and on some of the tributaries of the Ubangi in Ubangi-Shari Territory. It extends north to the Bagirmi district and to Dar Rounga (toward the Sudan frontier), west to the Garua district of Cameroons, and south to the basin of the Kouango River. Schwarz (1920, p. 1022) records specimens from between Njia and Nana Barja and from Bate, eastern Cameroons. Ward (1935, p. 247) records specimens from French Chad, "French Congo" [=French Equatorial Africa], Ubangi-Shari, and River Loubo; his determination of two specimens from Cameroons (p. 246) as *T. d. derbianus* seems open to question. Dollman (1929, p. 576) records a specimen from near Fort Archambault.

At Borkoru (apparently in the Bahr Sara region southwest of Fort Archambault), Akroyd (in Maydon, 1932, pp. 400-401) "found that the Eland were afflicted with some pest, of which they were dying in considerable numbers." The natives "thereabouts reported Eland frequently in sight."

According to Lavauden (1934, pp. 382-383), the Arabs in former times encountered the animal in the southern part of Wadai. It is extremely localized in Cameroons and has become very rare. It is protected by the game regulations of French Equatorial Africa and can be killed only on scientific permit, but enforcement of the law remains to be applied.

In an area south of Fort Archambault the Elands had been decimated by disease, by encircling fires, and by the systematic operations of the hunters of a local sultan (Ramecourt, 1936, p. 124).

Malbrant (1936, p. 91) states that this Eland is still quite widespread in French Equatorial Africa, and is not so rare as generally believed. He gives detailed records from many points within its range.

L. Blancou reports (*in litt.*, December, 1936) that it was formerly found by thousands throughout French Equatorial Africa, from latitude 6° N. to the Chad Colony. It was localized, however, in certain favorable regions. It still has the same range, but occurs only by hundreds and no more by thousands. He is convinced that the Derby Eland is now commoner in Ubangi-Shari than anywhere else. Depletion was due to the demand for its excellent meat. It

¹ The insufficiently described *Taurotragus derbianus cameroonensis* Millais (Far Away up the Nile, p. 240, 1924; "North-West Cameroon") is provisionally included with the present subspecies.

Rothschild's female paratype of *congolanus* was recorded as from "N. W. Tanganjika"; but either the locality or the identification must be erroneous.

has also been decimated by epizootics, even more than the Buffalo has been, and at the same periods. It seems to be quite capable of domestication. It has been partly protected since 1929, and it occurs in small numbers in all the parks and preserves of Ubangi-Shari.

In the French Cameroons there are still some hundred head, living in the north. They are absolutely protected, except on scientific permit. (Paris Agency, *in litt.*, November, 1936.)

Powell-Cotton (in Maydon, 1932, pl. 136) presents a photograph of a specimen from Kone Hills, south of Garua, French Cameroons.

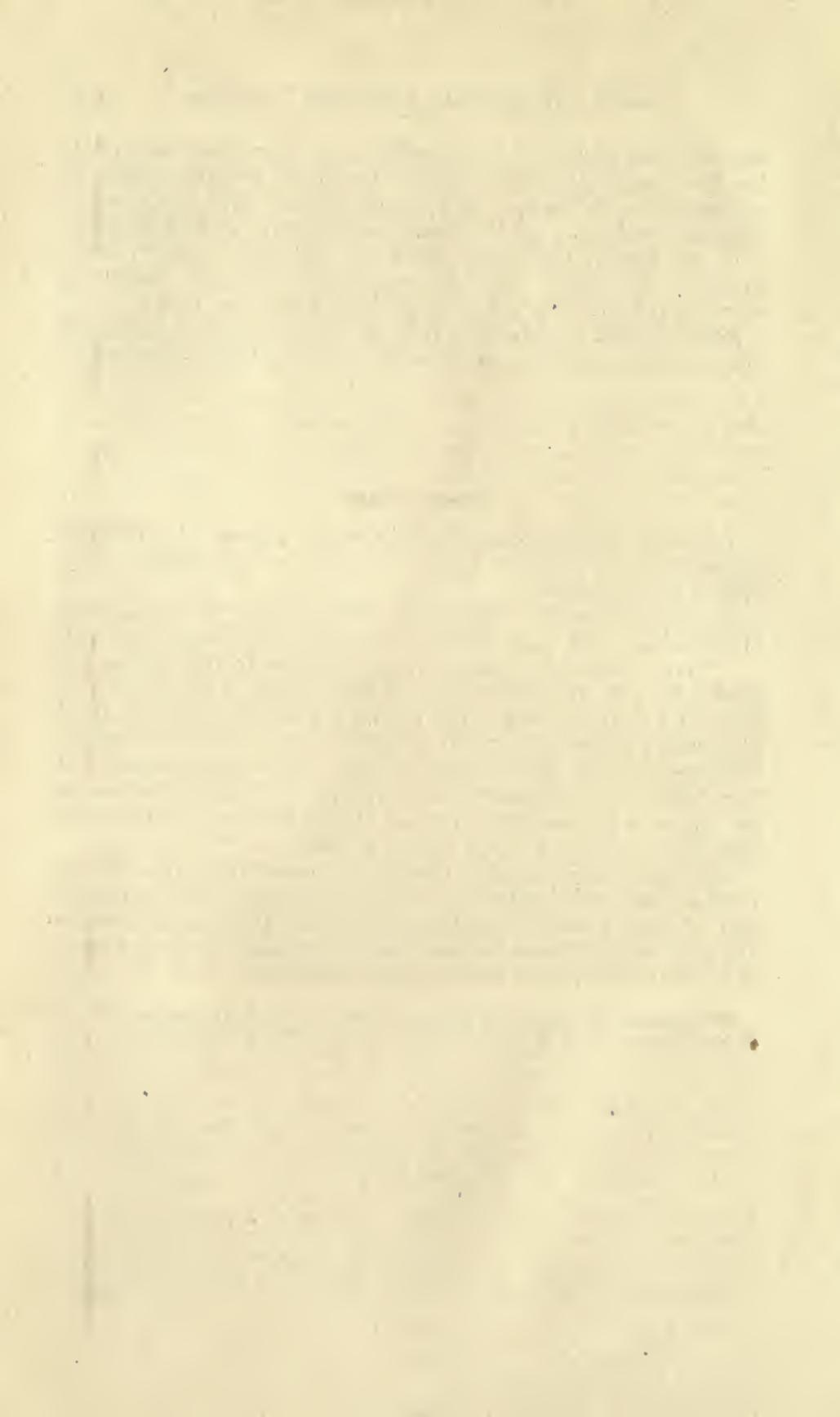
POSTSCRIPT

Too late for presentation elsewhere in this volume, the following information has come to hand concerning an apparently extinct New Zealand species:

The Short-tailed Bat (*Mystacina tuberculata*¹) "is on the brink of extinction, and may, indeed, even now have ceased to exist. . . . Many years have passed away since one of the species was recorded." (F. W. Hutton and J. Drummond, *Animals of New Zealand*, pp. 31-32, 1904.) The species is confined to New Zealand and forms a family by itself (G. M. Allen, *Bats*, p. 206, fig. 40, 1939). "Neither axe nor fire entirely explain [its] disappearance." It "was always an extremely rare creature." It may have become the victim of an epizootic. (Perrine Moncrieff, *Jour. Soc. Preservation Fauna Empire*, n. s., pt. 49, p. 13, 1944.)

With the disappearance of this bat an entire family (the *Mystacinidae*) has become extinct. The only other indigenous land mammal of New Zealand, the Long-tailed Bat (*Chalinolobus morio* (Gray)), seems likewise to have become extirpated in that country; it survives, however, in Australia and Tasmania.

¹ *Vespertilio tuberculatus* "G. Forster" J. E. Gray, in E. Dieffenbach, *Travels in New Zealand*, vol. 2, pp. 181, 296, 1843. ("Dusky Bay, New Zealand.")



BIBLIOGRAPHY

The following bibliography consists primarily of the titles of books and papers that have been consulted in the preparation of this work and that have been quoted, either directly or indirectly, in the foregoing pages, with appropriate reference in each case, by author, year, and page. There is also a very small proportion of titles of works that have not been so utilized, but they are allowed to remain in the list because of their value for reference purposes. Some of these have not been utilized simply because of nonavailability.

As a means of increasing the usefulness of the bibliography, a regional index has been prepared to precede it. The index itself does not, as a rule, refer to general catalogues or monographs of a more or less cosmopolitan scope, or, on the other hand, to papers devoted to a single species or to a conspecific group of subspecies. It is felt that a suitable approach to the latter type of literature is provided by the numerous references in the separate accounts of species and subspecies in the main part of this report. The index is primarily a guide to the faunal literature.

REGIONAL INDEX

AUSTRALASIA

- | | |
|--|---|
| Barrett, C., 1927 | Gregory, 1921, 1924 |
| Barry, 1928, 1934 | Grey, 1841 |
| Brazenor, 1931 | Gunn, 1838 |
| Briggs, 1921 | Harris, G. P., 1808 |
| Campbell, A. G., 1923 | Helms, 1896 |
| Campbell, T. G., 1925 | Hoy, 1923 |
| Chisholm, 1923, 1925, 1927 | Hull, 1923, 1929 |
| Collett, 1897 | Iredale and Troughton, 1934 |
| Finlayson, 1927, 1930 <i>a</i> , 1930 <i>b</i> , 1931 <i>a</i> ,
1931 <i>b</i> , 1933 <i>b</i> , 1934, 1935 <i>a</i> , 1935 <i>b</i> ,
1935 <i>c</i> | Jones, 1923 <i>a</i> , 1923 <i>b</i> , 1924, 1925 |
| Fleay, 1932 <i>a</i> | Jones and Manson, 1935 |
| Flinders, 1814 | Kinghorn, 1928 |
| Glauert, 1933 | Krefft, 1871 |
| Gould, 1841 <i>a</i> , 1841 <i>b</i> , 1841 <i>d</i> -1842,
1844 <i>a</i> , 1844 <i>b</i> , 1845-1863 | "Kurrajong," 1931 |
| | Le Souef, A. S., 1923 <i>a</i> , 1923 <i>b</i> , 1924 <i>a</i> ,
1924 <i>b</i> , 1928, 1929, 1930, 1932. |
| | Le Souef, A. S., and Burrell, 1926 |

- Le Souëf, W. H. D., 1907
 Lewis, 1928*a*, 1928*b*, 1930
 Longman, 1923, 1924, 1930
 Lord, 1928
 Lord and Scott, 1924
 Lucas and Le Souëf, 1909
 Lydekker, 1894
 McCoy, 1883
 McKeown, 1923, 1929, 1933
 Mitchell, T. L., 1838
 Musgrave, 1925
 Ogilby, 1892
 Osborn, 1934
 Péron and Freycinet, 1816
 Phillip, 1789
 Raven, 1924, 1929
 Shortridge, 1910, 1936
 Smith, G., 1909
 Spencer, 1896, 1897
 Spencer and Kershaw, 1910
 Stirling and Zietz, 1893
 Thomas, O., 1888, 1904, 1906*b*, 1907,
 1921, 1923
 Thomas, O., and Dollman, 1909
 Tindale, 1925
 Troughton, 1931, 1932*a*, 1932*b*, 1938
 Waite and Jones, 1927
 Waterhouse, 1841, 1842, 1846
 Wilkins, 1928

MALAY ARCHIPELAGO

- Allen, J. A., 1910
 Andrews, C. W., 1900, 1909
 Banks, 1931
 Carpenter and Coolidge, 1938
 Chasen, 1933
 Comyn-Platt, 1937*c*
 Coomans de Ruiter, 1932
 Dammerman, 1928, 1929*a*, 1929*b*,
 1929*c*
 De Beaufort, 1926
 Everett, 1893
 Heynsius-Viruly and Van Heurn,
 1936
 Horsfield, 1851
 Hose, 1893
 Kies, 1936
 Lumholtz, 1920
 Lyon, 1908, 1916
 Mertens, 1936
 Meyer, 1896
 Miller, 1942
 Mjöberg, 1930
 Müller, 1839
 Pocock, 1927*c*, 1933
 Raffles, 1821
 Raven, 1935
 Robinson, H. C., and Kloss, 1918,
 1923
 Sarasin, P. and F., 1905
 Schlegel and Müller, 1845
 Schneider, 1905
 Shelford, 1916
 Sody, 1936
 Taylor, E. H., 1934
 Thomas, O., 1887*b*, 1898
 Thomas, O., and Wroughton, 1909
 Weber, 1890-1891
 Worcester, 1898

ASIA (IN GENERAL)

- Allen, G. M., 1929, 1930*a*, 1930*b*,
 1930*c*, 1938, 1939*a*, 1940
 Engelmann, 1938
 Kinloch, 1892
 Lydekker, 1900, 1901, 1904*c*
 Nasonov, 1923
 Pocock, 1932*a*
 Sushkin, 1925
 Wallace, 1915
 Ward, 1935

NORTHERN ASIA

(SOUTH THROUGH RUSSIAN TURKESTAN, TIBET, MONGOLIA, MANCHURIA,
AND JAPAN)

- Allen, J. A., 1903
 Andrews, R. C., 1920*a*, 1920*b*, 1924,
 1926
 Andrews, R. C. and Y. B., 1919
 Aoki, 1913
 Atkinson, 1858, 1860
 Belopolski, 1933
 Bower, 1894
 Brehm, 1876
 Brooke and Brooke, 1875
 Bunge, 1884
 Burnham, 1929
 Burrard, 1925?
 Carruthers, 1913, 1915*b*, 1915*c*
 Cumberland, 1895
 David, 1867
 Demidoff, 1900, 1904
 Elias, 1874
 Elwes, H. J., 1899
 Eversmann, 1823
 Flerov, 1929, 1933
 Formozow, 1931
 Futterer, 1901
 Goodwin, 1935
 Hatta, 1928
 Hedin, 1899, 1903, 1904
 Hollister, 1912
 Inukai, 1932*b*
 Kaburaki, 1934*a*, 1934*b*
 Karéline, 1841
 Kuroda, 1928
 Latimore, 1929
 Leche, 1904
 Lydekker, 1905*d*
 Matschie, 1911
 Middendorff, 1853
 Millais, 1915
 Morden, 1927, 1930
 Morgan, 1891
 Nasonov, 1914*a*
 Nazároff, 1932
 Nehring, 1890
 Noack, 1889*b*
 Ognev, 1930, 1931, 1935
 Ognev and Heptner, 1928
 Pallas, 1811, 1834-1842
 Pfizenmayer, 1939
 Prejevalsky, 1876, 1879
 Prschewalski, 1884
 Przewalski, 1883
 Radde, 1862
 Radde and Walter, 1889
 Reymond, 1932
 Rockhill, 1891
 Roosevelt, T., Jr., and K., 1926
 Salesski, 1934
 Scalon, 1931
 Schäfer, 1937, 1938
 Schrenck, 1859
 Serebrennikov, 1931
 Severtzoff, 1876
 Severtzov, 1873
 Sjölander, 1922
 Skottsberg, 1934
 Sowerby, 1920, 1923, 1937*c*
 Stebbing, 1912
 Teichman, 1937
 Temminck, 1842-1845
 Thomas, O., 1906*a*
 Uchida, 1935
 Wellby, 1898
 Younghusband, 1888

SOUTHEASTERN ASIA

(NORTH THROUGH INDIA AND CHINA)

- Ali, 1935
 Allen, G. M., 1912
 Anonymous, 1933-1935
 Baker, S. W., 1855
 Baldwin, 1876
 Barthélemy, 1930
 Bentham, 1908
 Blanford, 1888-1891
 Blyth, 1863, 1868
 Bonhote, 1900, 1903

- Büchner, 1891
 Burgess, 1935
 Chasen, 1935, 1940
 Chasen and Kloss, 1930
 Comyn-Platt, 1937*a*, 1937*b*
 De la Chevasnérie, 1936?
 Elwes, 1914
 Faunthorpe, 1924
 Flower, S. S., 1900
 Forbes, 1840
 Fry, 1929
 Gairdner, 1914*a*, 1914*b*, 1915
 Gyldenstolpe, 1919
 Hanson, 1931
 Heude, 1894
 Horsfield, 1851
 Howell, A. B., 1929
 Hubback, 1923, 1932
 Irwin, 1914*a*
 Jerdon, 1874
 Jernigan, 1908
 Johnston, R. F., 1908
 Kloss, 1916, 1917, 1919*a*, 1919*b*
 Lydekker, 1913*b*
 Milne Edwards et Milne Edwards,
 1868-1874
- Milroy, 1934
 Morris, 1935*b*
 Osgood, 1932
 Page, 1934
 Peacock, 1931, 1933, 1934*a*
 Phythian-Adams, 1935
 Pocock, 1908, 1927*c*, 1933
 Pollok, 1879
 Richmond, 1935
 Ridley, 1895
 Roosevelt, T., Jr., and K., 1929
 Schäfer, 1933, 1937, 1938
 Sclater, P. L., 1876
 Sowerby, 1914, 1917, 1934*a*, 1934*b*,
 1934*c*, 1935, 1936, 1937*a*, 1937*c*
 Stebbing, 1912
 Stockley, 1922*a*, 1928, 1936
 Styan, 1886
 Swinhoe, 1870
 Tutein-Nolthenius, 1929
 Van der Byl, 1915
 Wallace, 1913
 Weigold, 1924
 Wilson, 1913

SOUTHWESTERN ASIA

(NORTH THROUGH TRANSCAUCASIA, PERSIA, AND AFGHANISTAN)

- Aharoni, 1930
 Aitchison, 1889
 Allen, G. M., 1915
 Blanford, 1876
 Bodenheimer, 1935
 Carruthers, 1915*a*, 1935
 Cheesman, 1926
 Danford and Alston, 1877, 1880
 Goodwin, 1940
 Hablizl, 1783
 Hay, 1840
 Hedin, 1910
 Jarvis, 1932, 1935
- Kennion, 1911, 1915
 Legendre, 1939
 Murray, n. d.
 Philby, 1933
 Pocock, 1934*b*, 1935*a*
 Porter, 1821
 Satunin, 1896, 1906
 Satunin and Radde, 1899
 Stockley, 1930
 Thomas, B., 1932
 Thomas, O., 1900
 Tristram, 1884

EUROPE (IN GENERAL)

- Lydekker, 1901, 1910
 Millais, 1914
 Nasonov, 1923
- Sushkin, 1925
 Trouessart, 1910

EASTERN EUROPE

(WEST THROUGH FINLAND, THE BALTIC STATES, POLAND, RUMANIA,
BULGARIA, AND EUROPEAN TURKEY)

- | | |
|-----------------------|-------------------------|
| Calinescu, 1930, 1931 | Niezabitowski, 1934 |
| Demidoff, 1898 | Ognev, 1930, 1931, 1935 |
| Eversmann, 1840 | Økland, 1928 |
| Flerov, 1933 | Pallas, 1776 |
| Gmelin, S. G., 1774 | Pearson, 1899 |
| Heuglin, 1874 | Satunin, 1901 |
| Kuntze, 1935 | Van der Byl, 1915 |

WESTERN EUROPE

(INCLUDING ICELAND AND SPITSBERGEN)

- | | |
|---|---------------------|
| Barnard, 1871 | Hinton, 1935 |
| Bate, 1904, 1906, 1913 | Krumbiegel, 1930 |
| Blasius, 1857 | Leopold, 1936 |
| Bory de Saint-Vincent, 1833 | Martin, 1910 |
| Bowden, 1869 | Millais, 1904-1906 |
| Cabrera, 1911 <i>a</i> , 1911 <i>b</i> , 1914 | Miller, 1912 |
| Caton, 1875 | Mohr, 1931 |
| Chapman, A., 1897, 1912 | Pontoppidan, 1755 |
| Chapman, A., and Buck, 1893, 1910 | Ramme, 1913 |
| Colosi, 1933 | Raulin, 1869 |
| Didier and Rode, 1935 | Rosenhauer, 1856 |
| Fatio, 1869 | Schoenichen, 1933 |
| Ferrant, 1931 | Schroeter, 1927 |
| Gadow, 1897 | Tennant, 1885 |
| Geoffroy Saint-Hilaire, I., 1832 | Trouessart, 1884? |
| Gordon, S., 1922 | Van den Brink, 1931 |
| Gourdon, 1908 | Wettstein, 1928 |
| Harting, 1880 | Winge, 1908 |
| Hecht, 1932 | |

AFRICA (IN GENERAL)

- | | |
|-----------------------------|--------------------------|
| Allen, G. M., 1939 <i>b</i> | Ramecourt, 1936 |
| Barth, 1857-1858 | Robinson, A. E., 1934 |
| Bryden, 1899 | Ruxton and Schwarz, 1929 |
| Hemming, 1938 | Selous, 1914 |
| Hone, 1933 | Thomas, O., 1910 |
| Lavauden, 1933 | Ward, 1935 |
| Lydekker, 1908 | Zammarano, 1930 |
| Maydon, 1932, 1933 | |

NORTH AFRICA (PALEARCTIC)

- | | |
|------------------------------|-------------------------------|
| Anderson and de Winton, 1902 | Carpentier, 1932 |
| Bagnold, 1933 | De Beaux, 1928, 1932 <i>c</i> |
| Buchanan, 1921 | Flower, S. S., 1932 |
| Cabrera, 1932 | Floyer, 1887 |

Geyr von Schweppenburg, 1917
 Gruvel, 1937
 Harcourt, n. d.
 Hartert, 1913
 Heim de Balsac, 1934, 1936
 Hilton-Simpson, 1906
 Johnston, H., 1898
 Joleaud, 1929
 Lataste, 1885
 Laurent, 1935
 Lavauden, 1924, 1926, 1930, 1932
 Leared, 1876

Loche, 1867
 Morales, 1935
 Pease, 1897
 Rothschild, W., 1921
 Seurat, 1930, 1934
 Shaw, W. B. K., 1933
 Thesiger, 1939
 Thomas, O., 1894, 1913*a*, 1913*b*
 Trouessart, 1905
 Wagner, 1841
 Whitaker, 1897

CENTRAL AND SOUTHERN AFRICA

Akeley, 1923*b*
 Allen, G. M., and Coolidge, 1930
 Allen, J. A., 1925
 Andersson, 1856
 Antonius, 1929*b*
 Aschemeier, 1921
 Bailey, 1932
 Baker, S. W., 1867
 Barns, 1922, 1923
 Blaine, 1922
 Brocklehurst, 1931, 1933
 Bryden, 1889
 Budgett, 1900
 Büttikofer, 1890
 Burchell, 1822, 1824
 Capell, 1929
 Charter, 1934
 Christy, 1924
 Chubb, 1909
 Cligny, 1900
 Cotton, 1912
 Coutouly, 1926
 Cretzschmar, 1826
 Cumming, 1850
 De Beaux, 1922, 1926, 1932*b*, 1935
 Delmé-Radcliffe, 1905
 De Winton, 1899*a*
 Dracopoli, 1914
 Drake-Brockman, 1910
 Drummond, 1875
 Du Chaillu, 1861
 Dugmore, 1910
 Elliot, 1897
 Fitzsimons, 1920
 Flower, S. S., 1901
 Forbes, 1903

Gray, P. N., 1930, 1933
 Gyldenstolpe, 1928
 Haagner, 1920
 Hamerton, 1931
 Hamilton, 1924
 Harris, W. C., 1839, 1840
 Hatt, 1934*b*, 1934*c*
 Hayman, 1936
 Haywood, 1932, 1933*a*, 1933*b*, 1933*c*
 Heller, 1912
 Henfrey, 1928
 Heuglin, 1861, 1877
 Hindlip, 1930
 Hingston, 1930
 Hollister, 1918, 1919*b*, 1924
 Hubbard, 1926
 Jentink, 1882, 1885, 1888
 Johnson, 1937
 Johnston, H., 1902, 1906
 Kirk, 1865
 Kolben, 1731
 Lavauden, 1934
 Ledward, 1936
 Leplae, 1925
 Letcher, 1911
 Le Vaillant, 1790, 1795
 Lichtenstein, 1812
 Lönnberg, 1912, 1917, 1919
 Lydekker, 1905*a*
 Malbrant, 1936
 Matschie, 1894*a*, 1895
 Maugham, 1914
 Maxwell, 1924, 1930
 Menges, 1885
 Millais, 1895
 Monard, 1930-1933, 1935

- Newton, 1937
 Noack, 1889*a*
 Oakley, 1931
 "Observer," 1934
 Percival, 1923
 Peters, 1852, 1869
 Pitman, 1934
 Pousargues, 1896-1897
 Powell-Cotton, 1902, 1904
 Reade, 1863
 Rhoads, 1896
 Ritchie, 1931
 Roberts, 1917, 1929, 1936, 1937
 Roosevelt, T., 1910
 Roosevelt, T., and Heller, 1914
 Rosevear, 1937
 Rothschild, M. de, and Neuville, 1911
 Rüppell, 1829, 1835
 St. Leger, 1936
 Sanderson, 1935
 Sanford and LeGendre, 1930
 Schouteden, 1913*a*, 1930*a*, 1934*a*, 1934*c*, 1934*d*
 Schubotz, 1912
 Schwarz, 1912*b*, 1920*a*, 1920*b*, 1934*a*, 1934*b*
 Slater, P. L., 1884, 1898
 Slater, W. L., 1900-1901
 Selous, 1881, 1890
 Shortridge, 1934*a*
 Smith, A., 1849
 Smith, A. D., 1897
 Statham, 1924
 Steedman, 1835
 Stevenson-Hamilton, 1912*a*
 Swayne, 1892, 1894
 Thomas, O., 1891, 1892, 1905
 Thomas, O., and Hinton, 1923
 Thomas, O., and Schwann, 1906
 Thomas, O., and Wroughton, 1908
 Turner, 1937
 Wilhelm, 1933
 Wood, 1928
 Yerkes and Yerkes, 1929
 Zukowsky, 1924

MADAGASCAR

- Allen, G. M., 1918
 Coquerel, 1859
 Delacour, 1932
 Flacourt, 1661
 Grandidier, 1867*a*, 1867*c*, 1870, 1871
 Kaudern, 1915
 Lorenz-Liburnau, 1898
 Major, 1894
 Milne Edwards, 1871
 Milne Edwards and Grandidier, 1875*a*-1876, 1875*b*
 Milne Edwards, Grandidier and Filhol, 1896-1897
 Petit, 1931, 1933, 1935
 Pollen, 1868
 Rand, 1935
 Schlegel, 1866
 Schlegel and Pollen, 1868
 Schwarz, 1931
 Shaw, G. A., 1879
 Sibree, 1915
 Sonnerat, 1782

BIBLIOGRAPHY

- AHARONI, J.
 1930. Die Säugetiere Palästinas. Zeitschr. f. Säugetierkunde, vol. 5, pp. 327-343.
 AHRENS, THEODOR G.
 1921. The present status of the European bison or wisent. Jour. Mammalogy, vol. 2, no. 2, pp. 58-62.
 AITCHISON, J. E. T.
 1889. The zoology of the Afghan Delimitation Commission. (Introduction, by J. E. T. Aitchison, pp. 53-55, 2 maps; mammals, by Oldfield Thomas, pp. 55-65.) Trans. Linn. Soc. London, ser. 2, vol. 5, zool., 1889.

AKELEY, CARL E.

1914. The wild ass of Somaliland. *Am. Mus. Jour.*, vol. 14, no. 3, pp. 112-117, 6 fig.
- 1923a. Gorillas—real and mythical. *Nat. Hist.*, vol. 23, no. 5, pp. 428-447, 18 fig., 1 map.
- 1923b. In brightest Africa. Garden City: pp. xviii+267, 63 pl., 3 fig., 3 maps.

ALI, SALIM.

1935. The preservation of wild life in India. No. 8. Hyderābād State. *Jour. Bombay Nat. Hist. Soc.*, vol. 38, no. 2, suppl., pp. 231-240.

ALLEN, GLOVER M.

1912. Some Chinese vertebrates. *Mammalia. Mem. Mus. Comp. Zoöl.*, vol. 40, no. 4, pp. 201-247, 6 fig.
1915. Mammals obtained by the Phillips Palestine Expedition. *Bull. Mus. Comp. Zoöl.*, vol. 59, no. 1, pp. 1-14.
1918. Vertebrata from Madagascar. *Mammalia. Bull. Mus. Comp. Zoöl.*, vol. 61, no. 14, pp. 511-516.
1929. Carnivora from the Asiatic Expeditions. *Am. Mus. Novit.* 360, pp. 1-14.
- 1930a. Bovidae from the Asiatic Expeditions. *Am. Mus. Novit.* 410, pp. 1-11.
- 1930b. Primates and pangolins from the Asiatic Expeditions. *Am. Mus. Novit.* 429, pp. 1-7.
- 1930c. Pigs and deer from the Asiatic Expeditions. *Am. Mus. Novit.* 430, pp. 1-19.
- 1938, 1940. The mammals of China and Mongolia. (Natural history of Central Asia, vol. 11.) New York: pt. 1, pp. xxv+620, 9 pl., 1 fig., 22 maps, 1938; pt. 2, pp. i-xxviii, 621-1350, 11 pl., 11 fig., 41 maps, 1940.
- 1939a. Zoological results of the Second Dolan Expedition to Western China and Eastern Tibet, 1934-1936. Part III,—Mammals. *Proc. Acad. Nat. Sci. Philadelphia*, vol. 90, pp. 261-294, 4 pl.
- 1939b. A checklist of African mammals. *Bull. Mus. Comp. Zoöl.*, vol. 83, pp. 1-763.
1942. Extinct and vanishing mammals of the Western Hemisphere. Special Publ. Am. Comm. International Wild Life Protection, no. 11, pp. xv+620, 1 pl., 24 fig.

ALLEN, GLOVER M., AND HAROLD J. COOLIDGE, JR.

1930. Mammals of Liberia. In: *The African republic of Liberia and the Belgian Congo (Harvard African Expedition 1926-1927)*, vol. 2, pp. 569-622, 10 fig.

ALLEN, J. A.

1903. Report on the mammals collected in northeastern Siberia by the Jesup North Pacific Expedition, with itinerary and field notes by N. G. Buxton. *Bull. Am. Mus. Nat. Hist.*, vol. 19, art. 4, pp. 101-184.
1904. A new sheep from Kamchatka. *Bull. Am. Mus. Nat. Hist.*, vol. 20, art. 25, pp. 293-298, 6 fig.

ALLEN, J. A.—*Cont.*

1910. Mammals from Palawan Island, Philippine Islands. Bull. Am. Mus. Nat. Hist., vol. 28, art. 3, pp. 13-17.

1925. Primates collected by the American Museum Congo Expedition. Bull. Am. Mus. Nat. Hist., vol. 47, art. 4, pp. 283-524, 69 pl., 3 fig., 1 map.

AMSCHLER, WOLFGANG

1931. Ergebnisse einer Tierzuchtexpedition der Sibirischen Akademie in den Altai im Sommer 1930. Fortschr. Landw., vol. 6, no. 3, pp. 73-75.

ANDERSON, C., AND T. G. CAMPBELL

1928. Burragorang Valley and beyond. Australian Mus. Mag., vol. 3, no. 6, pp. 204-210, 9 fig.

ANDERSON, JOHN

1872. Notes on *Rhinoceros sumatrensis*, Cuvier. Proc. Zool. Soc. London 1872, pp. 129-132.

ANDERSON, JOHN, AND W. E. DE WINTON

1902. Zoology of Egypt: Mammalia. London: pp. xvii+374, 67 pl., 7 fig., 1 map.

ANDERSON, MALCOLM PLAYFAIR

1920a. The discovery of the Chinese takin. Nat. Hist., vol. 20, pp. 428-433, 2 fig.

1920b. A winter journey in northern China. Nat. Hist., vol. 20, pp. 516-531, 14 fig.

ANDERSSON, CHARLES JOHN

1856. Lake Ngami, or explorations and discoveries during four years wanderings in the wilds of South Western Africa. London: pp. 1-546, illus., 1 map.

ANDREWS, CHARLES W.

1900. Zoology. Mammalia. In: Andrews, A monograph of Christmas Island (Indian Ocean). London: pp. 22-33, 2 pl., 1 fig.

1909. Account of his visit to Christmas Island in 1908. Proc. Zool. Soc. London 1909, pp. 101-103.

ANDREWS, ROY CHAPMAN

1920a. New expedition to Central Asia. Nat. Hist., vol. 20, pp. 349-355, 5 fig.

1920b. In Mongolia and North China. Nat. Hist., vol. 20, pp. 356-373, 17 fig.

1924. Living animals of the Gobi Desert. Nat. Hist., vol. 24, no. 2, pp. 150-159, 9 fig.

1926. On the trail of ancient man. New York and London: pp. xxiv+370, 59 pl., 3 maps.

ANDREWS, ROY CHAPMAN, AND YVETTE BORUP ANDREWS

1919. Camps and trails in China. New York and London; pp. xxv+334, 32 pl., 2 maps.

ANGAS, GEORGE FRENCH

1849. Description of *Tragelaphus Angasii*, Gray, with some account of its habits. Proc. Zool. Soc. London 1848, pp. 89-90, 2 pl.

ANONYMOUS

1925. The tsetse fly problem and its solution. Jour. Soc. Preservation Fauna Empire, pt. 5, pp. 39-50, 1 map.
1927. The Native Bear. Australian Mus. Mag., vol. 3, no. 4, p. 112.
- 1933-1935. The wild animals of the Indian Empire and the problem of their preservation. (With chapters by A. A. Dunbar-Brander, G. Monteath, A. J. W. Milroy, F. W. Champion, Patrick Cadell, H. C. Smith, R. D. Richmond, R. C. Morris, Salim Ali, and E. G. Phythian-Adams.) Jour. Bombay Nat. Hist. Soc., suppl.: pt. 1, vol. 36, no. 4, pp. 1-58, 15 pl., 1933; pt. 2, vol. 37, no. 1, pp. 59-111, 33 pl., 1934; pt. 3, vol. 37, no. 4, pp. 112-188, 19 pl., 2 fig., 1935; pt. 4, vol. 38, no. 2, pp. 189-245, 16 pl., 1935.

ANTONIUS, OTTO

- 1912a. Die Rassengliederung der quartären Wildpferde Europas. Verh. zool.-bot. Ges. Wien, vol. 62, pp. (64)-(78).
- 1912b. Was ist der "Tarpan"? Naturwissen. Wochenschr., vol. 27 (new ser. vol. 11), no. 33, pp. 513-517, 2 fig.
1928. Beobachtungen an Einhufern in Schönbrunn. I. Der syrische Halbesel (*Equus hemionus hemippus* I. Geoffr.). Zool. Garten, vol. 1, nos. 1-2, pp. 19-25, 5 fig.
- 1929a. Beobachtungen an Einhufern in Schönbrunn. IV. Afrikanische Esel. Zool. Garten, N. F., vol. 1, nos. 7-9, pp. 289-296, 3 fig.
- 1929b. Bemerkungen über einige Tiere der Weidholz-Importe 1927 und 1928. Zool. Garten, N. F., vol. 1, nos. 10-12, pp. 369-390, 17 fig.
1931. Über das Vorkommen wilder Esel in der Westsahara. Zeitschr. f. Säugetierkunde, vol. 6, pp. 133-136, 3 fig.
1938. On the geographical distribution, in former times and to-day, of the Recent Equidae. Proc. Zool. Soc. London 1937, vol. 107, ser. B, pp. 557-564.
1939. Zur Frage der Zähmung des Onager bei den alten Sumerern. Bijdr. Dierkunde, vol. 27, pp. 477-484, 3 fig.

AOKI, B.

1913. A hand-list of Japanese and Formosan mammals. Annot. Zool. Japon., vol. 8, pp. 261-353.

ARAMBOURG, C.

1929. Les mammifères quaternaires de l'Algérie. Bull. Soc. Hist. Nat. Afrique du Nord, vol. 20, no. 3, pp. 63-84.

ARCHBOLD, RICHARD

1932. A new lemur from Madagascar. Am. Mus. Novit. 518, p. 1.

ARCHER, GEOFFREY, AND EVA M. GODMAN

1937. The birds of British Somaliland and the Gulf of Aden. Vol. 1. London and Edinburgh: pp. xcvi+285, 41 pl., 2 fig., 1 map.

ASCHEMEIER, C. R.

1921. On the gorilla and the chimpanzee. Jour. Mammalogy, vol. 2, no. 2, pp. 90-92.

- ATKINSON, THOMAS WITLAM
 1858. Oriental and western Siberia. New York: pp. i-xvi, 17-533, illus., 1 map.
 1860. Travels in the regions of the Upper and Lower Amoor. London: pp. xiii+553, illus., 1 map.
- AUDEBERT, J. B.
 1800. Histoire naturelle des singes et des makis. Paris: pp. iv+24+4+4+10+4+8+10+24+14+8+10+8+44, 63 pl.
- BÄCHLER, E.
 1935. Der Stand der Steinwildkolonien in der Schweizeralpen. Jahrb. St. Gallischen Naturwiss. Gesell., vol. 67, pp. 131-234, 35 fig.
- BAGNOLD, R. A.
 1933. A further journey through the Libyan Desert. Geog. Jour., vol. 82, no. 2, pp. 103-126, 8 pl., 3 fig.
- BAILEY, ALFRED M.
 1932. The heights of the Simyen. Nat. Hist., vol. 32, no. 1, pp. 61-74, 16 fig.
- BAIRNSFEATHER, P. R.
 1914. Sport and nature in the Himalayas. London: pp. 1-134, illus.
- BAKER, A. B.
 1912. Notes on animals now, or recently, living in the National Zoölogical Park. Smithsonian Misc. Coll., vol. 59, no. 9, pp. 1-3, 1 pl.
- BAKER, SAMUEL W.
 1855. Eight years' wanderings in Ceylon. London: pp. viii+423, 6 pl., 3 fig.
 1867. The Nile tributaries of Abyssinia. London: pp. xxiii+596, 24 pl., 2 maps.
- BALDWIN, J. H.
 1876. The large and small game of Bengal and the North-western Provinces of India. London: pp. 1-380, 22 pl.
- BANKS, E.
 1931. A popular account of the mammals of Borneo. Jour. Malayan Branch Royal Asiatic Soc., vol. 9, pt. 2, pp. 1-139, 9 pl., 1 map.
- BARBOUR, THOMAS, and GLOVER M. ALLEN
 1932. The lesser one-horned rhinoceros. Jour. Mammalogy, vol. 13, no. 2, pp. 144-149, 1 pl.
- BARCLAY, EDGAR N.
 1934a. Notes on the Fallow Deer of Asia Minor. Ann. Mag. Nat. Hist., ser. 10, vol. 14, no. 79, pp. 157-159.
 1934b. The Elk of Siberia. Ann. Mag. Nat. Hist., ser. 10, vol. 14, no. 82, pp. 447-448.
- BARCLAY, FORD
 1915. The Manchurian Tiger. In: The gun at home & abroad. The big game of Asia and North America. Pp. 225-233, 3 pl. London.
- BARNARD, M. R.
 1871. Sketches of life, scenery and sport in Norway. London: pp. 1-312.

BARNES, T. ALEXANDER

1922. The wonderland of the eastern Congo. London and New York: pp. xxxv+288, 88 pl., 1 map.

1923. Across the great craterland to the Congo. London: pp. 1-276, 64 pl., 2 maps.

BARON, L.

1833. Notes on the habits of the Aye-aye of Madagascar in its native state. Proc. Zool. Soc. London 1832, pp. 639-640.

BARRETT, CHARLES

1927. Wombats and their ways. Australian Mus. Mag., vol. 3, no. 2, pp. 66-71, 5 fig.

BARRETT, JAMES

1933. A note. Jour. Soc. Preservation Fauna Empire, n. s., pt. 20, pp. 10-11.

BARRY, H. C.

1928. Some dwellers of the bush. Australian Mus. Mag., vol. 3, no. 5, pp. 161-163, 4 fig.

1934. Some Central Australian mammals. Australian Mus. Mag., vol. 5, no. 6, pp. 194-198, 5 fig.

BARTH, HENRY

1857-1858. Travels and discoveries in North and Central Africa. Ed. 2. London: vol. 1, pp. xxxvi+578, 12 pl., 61 fig., 6 maps, 1857; vol. 2, pp. xi+676, 8 pl., 33 fig., 2 maps, 1857; vol. 3, pp. xi+635, 16 pl., 6 fig., 3 maps, 1857; vol. 5, pp. xi+695, 10 pl., 6 fig., 2 maps, 1858.

BARTHÉLEMY, MARQUIS DE (P. SAUVAIRE)

1930. Mon vieil Annam: ses bêtes. Contes et récits de chasses. Paris: pp. xiv+254, 10 pl.

BATE, DOROTHEA M. A.

1904. The mammals of Cyprus. Proc. Zool. Soc. London 1903, pt. 2, pp. 341-348, 1 fig.

1906. On the mammals of Crete. Proc. Zool. Soc. London 1905, vol. 2, pp. 315-323.

1913. The mammals of Crete. Pp. 254-256 in: Aubyn Trevor-Battye, Camping in Crete. London: pp. xxi+308, 32 pl., 1 map.

BECKER, JOHN

1934. Bemerkungen über den persischen Löwen. Zeitschr. f. Säugetierkunde, vol. 9, pp. 439-440.

BEDDARD, FRANK EVERS

1902. Mammalia. Cambridge Natural History, vol. 10. London: pp. xii+605, 285 fig.

BELL, WILLIAM

1793. Description of the double horned rhinoceros of Sumatra. Philos. Trans. Royal Soc. London 1793, pt. 1, pp. 3-6, 3 pl.

BELOPOLSKI, L. O.

1933. Die wildlebenden Paarhufer (Artiod., Mamm.) des Anadyr-Tschukotka-Gebietes. Trav. Inst. Zool. Acad. Sci. URSS, vol. 1, livr. 3-4, pp. 181-186, 1 map. (Russian, with German summary.)

BENNETT, E. T.

1832. Characters of a new genus of Lemuridae, presented by Mr. Telfair. Proc. Zool. Soc. London 1832, pp. 20-22.
- 1833a. Characters of a new species of *Lemur* (*Lemur rufifrons*). Proc. Zool. Soc. London 1833, p. 106.
- 1833b. On the M'horr Antelope. Trans. Zool. Soc. London, vol. 1, pp. 1-8, 1 pl.
1834. Notice of a mammiferous animal from Madagascar, constituting a new form among the viverridous Carnivora. Trans. Zool. Soc. London, vol. 1, pp. 137-140, 1 pl.
1835. Some account of *Macropus Parryi*, a hitherto undescribed species of kangaroo from New South Wales. Trans. Zool. Soc. London, vol. 1, pp. 295-300, 1 pl.

BENTHAM, T.

1908. An illustrated catalogue of the Asiatic horns and antlers in the collection of the Indian Museum. Calcutta: pp. 1-97, 42 pl.

BEQUAERT, JOSEPH

1922. The predaceous enemies of ants. Bull. Am. Mus. Nat. Hist., vol. 45, art. 1, pt. 3, pp. 271-331, 2 pl.

BHICHARANA, PHYA JOLAMARK

1932. Notes on the Schomburgk deer. Jour. Siam Soc., Nat. Hist. Suppl., vol. 8, pp. 311-313, 1 pl.

BIDDULPH, J.

1885. On the Wild Sheep of Cyprus. Proc. Zool. Soc. London 1884, pp. 593-596, 1 pl., 2 fig.

BINGHAM, HAROLD C.

1932. Gorillas in a native habitat. Carnegie Inst. Washington, publ. 426, pp. [2]+66, 22 pl., 3 fig., 2 maps.

BLAINE, GILBERT

1922. Notes on the zebras and some antelopes of Angola. Proc. Zool. Soc. London 1922, pp. 317-339, 8 pl.
1934. Hartmann's Zebra. Jour. Soc. Preservation Fauna Empire, n. s., pt. 22, pp. 15-17.

BLANFORD, W. T.

1876. Eastern Persia; an account of the journeys of the Persian Boundary Commission, 1870-71-72. Vol. 2. The zoology and geology. London: pp. viii+516, 28 pl., 11 fig., 1 map.
- 1888-1891. The fauna of British India, including Ceylon and Burma. Mammalia. London: pp. i-v, xiii-xx, iii-xii, 1-617, 199 fig.
- 1892a. Exhibition of, and remarks upon, two heads and a skin of the Yarkand stag. Proc. Zool. Soc. London 1892, pp. 116-117, 1 fig.
- 1892b. Exhibition of, and remarks upon, a skin of a Wild Camel obtained in Eastern Turkestan. Proc. Zool. Soc. London 1892, pp. 370-371.

BLASIUS, J. H.

1857. Naturgeschichte der Säugethiere Deutschlands und der angrenzenden Länder von Mitteleuropa. Braunschweig: pp. vi + 549, 290 fig.

BLYTH, EDWARD

- 1841a. An amended list of the species of the genus *Ovis*. Proc. Zool. Soc. London 1840, pp. 62-79.
 1841b. Letter from. Proc. Zool. Soc. London 1841, pp. 63-65.
 1862. A further note on wild Asses, and alleged wild Horses. Jour. Asiatic Soc. Bengal, vol. 31, no. 4, pp. 363-367.
 1863. Synoptical list of the species of *Felis* inhabiting the Indian Region and the adjacent parts of Middle Asia. Proc. Zool. Soc. London 1863, pp. 181-186.
 1868. Notes upon three Asiatic species of deer. Proc. Zool. Soc. London 1867, pp. 835-842, 23 fig.

BOBRINSKOY, N.

1922. [Protection of the European bison.] Jour. Soc. Preservation Fauna Empire, n. s., pt. 2, pp. 17-19.

BOBRINSKOY, N., AND K. FLEROV

1934. Materials for systematics of deer of the subgenus *Cervus*. (In Russian.) Arch. Mus. Zool. Univ. Moscou, vol. 1, pp. 15-41, 10 fig., 1 map.

BOCK, CARL

1879. Letter concerning *Capricornis sumatrensis*. Proc. Zool. Soc. London 1879, pp. 308-309.

BODENHEIMER, F. S.

1935. Animal life in Palestine. Jerusalem: pp. viii+506, 70 pl., 77 fig.

BONHOTE, J. LEWIS

1900. On a collection of mammals from Siam made by Mr. T. H. Lyle. Proc. Zool. Soc. London 1900, pp. 191-195, 1 pl.
 1903. Report on the mammals. (With field-notes by Nelson Annandale and Herbert C. Robinson.) In: Annandale and Robinson's Fasciculi Malayenses, zool., pt. 1, pp. 1-45, 4 pl.

BORY DE SAINT-VINCENT, [J. B. G. M.]

1833. Expédition scientifique de Morée. Sciences physiques. Vol. 3, pt. 1. Zoologie. Section 1. Animaux vertébrés (par Geoffroy Saint-Hilaire, père et fils). Paris: pp. 1-80, "1832."
 1836. Expédition scientifique de Morée. Sciences physiques. Vol. 1. Relation. Paris: pp. [6]+iv+472, illus.

BOTEZAT, E.

1932. Existența zimbrului în Bucovina. Bul. Fac. Stiinte Cernăuți, vol. 5, no. 2, pp. 370-377, 1 fig.

BOUBIER, MAURICE

1927. Histoire de la réintroduction du bouquetin dans les Alpes suisses. Bull. Soc. Zool. Genève, vol. 3, no. 6, pp. 68-75.

BOURDELLE, E.

1937. A propos de l'ours en France. Etat actuel et protection. Mammalia, vol. 1, no. 4, pp. 178-181.

BOURGUIGNAT, —

1867. Note sur un *Ursus* nouveau découvert dans la grande caverne du Thaya (Province de Constantine). Ann. Sci. Nat., ser. 5, zool., vol. 8, pp. 41-51.

- BOWDEN, JOHN
1869. The naturalist in Norway or notes on the wild animals, birds, fishes, and plants of the country. London: pp. 1-263.
- BOWEN, W. WEDGWOOD
1933. African bird distribution in relation to temperature and rainfall. Ecology, vol. 14, no. 3, pp. 247-271, 11 fig.
- BOWER, HAMILTON
1894. Diary of a journey across Tibet. London: pp. xvi+309, illus., 1 map.
- BRAMLEY, W. E. JENNINGS
1896. On Loder's Gazelle in Egypt, and the mode of its capture by the Arabs. Proc. Zool. Soc. London 1895, pp. 863-865.
- BRANDT, J. F.
1867. Zoogeographische und paläontologische Beiträge. Zweite Abhandlung. Die geographische Verbreitung des Zubr oder Bison, des Auerochsen der Neuern (*Bos bison seu bonasus*). Verhandl. Russ.-Kaiserl. Mineral. Gesell. St. Petersburg, ser. 2, Band 2, pp. 133-184.
- BRANDT, J. F., AND J. T. C. RATZEBURG
1829. Getreue Darstellung und Beschreibung der Thiere, vol. 1. Berlin: pp. iv+198, 24 pl.
- BRAZENOR, C. W.
1931. Twelve days in north-east Victoria. Victorian Naturalist, vol. 48, no. 8, pp. 165-167.
1932. A re-examination of *Gymnobelideus leadbeateri* McCoy. Australian Zoologist, vol. 7, pt. 2, pp. 106-109, 1 pl.
1934. A new species of mouse, *Pseudomys (Gyomys)*, and a record of the Broad-toothed Rat, *Mastacomys*, from Victoria. Mem. Nat. Mus. Melbourne, no. 8, pp. 158-161, 1 pl.
- BREHM, A.
1876. Aus Dr. Brehm's Tagebuch. Zool. Garten, vol. 17, no. 9, pp. 339-340.
- BRIDGES, WILLIAM
1935. The national collection of heads and horns. Bull. New York Zool. Soc., vol. 38, no. 2, pp. 39-51, 11 fig.
- BRIGGS, E. A.
1921. A naturalist on the Great Barrier Reef. Australian Mus. Mag., vol. 1, no. 3, pp. 79-84, 7 fig.
- BROCKLEHURST, H. C.
1931. Game animals of the Sudan, their habits and distribution. London and Edinburgh: pp. xix+170, 26 pl., numerous fig., 1 map.
1933. Big game's chances in the Sudan. The Field, April 8, 1933, p. 740, 1 fig.
- BROOKE, VICTOR, AND BASIL BROOKE
1875. On the large Sheep of the Thian Shan, and other Asiatic Argali. Proc. Zool. Soc. London 1875, pp. 509-526, 9 fig.

BRYDEN, H. A.

1889. Kloof and karroo: sport, legend, and natural history in Cape Colony, with a notice of the game birds, and of the present distribution of the antelopes and larger game. London: pp. xv+435, illus.

BRYDEN, H. A. (GENERAL EDITOR)

1899. Great and small game of Africa. An account of the distribution, habits, and natural history of the sporting mammals, with personal hunting experiences. (Contributors: A. J. Arnold, H. A. Bryden, T. E. Buckley, T. W. H. Clarke, Lord Delamere, D. G. Elliot, B. T. Finch, H. C. V. Hunter, J. D. Inverarity, F. J. Jackson, Harry Johnston, F. Vaughan Kirby, R. Lydekker, John Marriott, A. H. Neumann, A. E. Pease, G. W. Penrice, Edmond de Poncins, Percy Rendall, F. C. Selous, Alfred Sharpe, William Sitwell, A. H. Straker, H. G. C. Swayne, Poulett-Weatherley.) London: pp. xx+612, 15 pl., 55 fig.

BUCHANAN, ANGUS

1921. Exploration of Air. Out of the world north of Nigeria. London: pp. xxiii+258, 16 pl., 1 map.

BUDGETT, J. S.

1900. General account of an expedition to the Gambia Colony and Protectorate in 1898-99. Proc. Zool. Soc. London 1899, pp. 931-937.

BÜCHNER, EUG.

1891. Die Säugethiere der Ganssu-Expedition (1884-87). Mélanges Biol., Bull. Acad. Impér. Sci. St.-Pétersbourg, vol. 13, livr. 1, pp. 143-164.

BÜTTIKOFER, JOHANN

1890. Reisebilder aus Liberia. Vol. 2. Leiden: pp. viii+510, 14 pl., 99 fig.

BUFFON, [G. L. L. DE]

1765. Histoire naturelle, générale et particulière, vol. 13. Paris: pp. xx+441, 59 pl.

BULCOCK, EMILY H.

- 1936? Queensland's wonderland of National Parks. Brisbane: 27 unnumbered pp., 13 fig.

BUNGE, ALEX.

1884. Naturhistorische Beobachtungen und Fahrten im Lena-Delta. Mélanges Biol., vol. 12, pp. 31-107.

BURCHELL, WILLIAM J.

- 1822, 1824. Travels in the interior of southern Africa. London: vol. 1, pp. xi+582, 10 pl., 50 fig., 1 map, 1822; vol. 2, pp. 6+648, 10 pl., 46 fig., 1824.

BURGESS, H. E.

1935. Early days in Malaya. Jour. Bombay Nat. Hist. Soc., vol. 38, pt. 2, pp. 241-257.

BURNET, NOEL

1932. Koala Park. A conservation effort. Jour. Soc. Preservation Fauna Empire, n. s., pt. 16, pp. 56-59.

- BURNHAM, JOHN B.
1929. The rim of mystery. A hunter's wanderings in unknown Siberian Asia. New York and London: pp. xv+281, 46 pl., 1 map.
- BURRARD, GERALD
1925? Big game hunting in the Himalayas and Tibet. Ed. 2. London: pp. 1-320, 24 pl., 3 fig., 8 maps.
- BUSHELL, S. W.
1899. Extract from letter from, on the herd of *Cervus davidianus* in the Imperial Hunting Park, Peking. Proc. Zool. Soc. London 1898, pp. 588-589.
- BUTLER, A. L.
1900. On a new Serow from the Malay Peninsula. Proc. Zool. Soc. London 1900, pt. 3, pp. 675-676.
1905. On the Giant Eland of the Bahr el Ghazal, *Taurotragus derbianus gigas* (Heugl.). Proc. Zool. Soc. London 1905, vol. 1, pp. 288-290.
- BUXTON, CAROLINE
1921. African notes. Jour. Soc. Preservation Fauna Empire, n. s., pt. 1, pp. 48-52.
- BUXTON, E. N.
1892. Short stalks or hunting camps, north south east and west. London and New York: pp. 1-405, illus.
1921. Editorial. Jour. Soc. Preservation Fauna Empire, n. s., pt. 1, pp. 15-16.
- CABRERA, ÁNGEL
1910. On two new Carnivora from north-east Africa. Ann. Mag. Nat. Hist., ser. 8, vol. 6, pp. 461-465.
1911a. Sobre los ciervos de España. Bol. Real Soc. Españ. Hist. Nat., vol. 11, pp. 556-559.
1911b. The subspecies of the Spanish Ibex. Proc. Zool. Soc. London 1911, pp. 963-977, 3 pl., 5 fig., 1 map.
1914. Fauna Ibérica. Mamíferos. Madrid: pp. xviii+441, 22 pl., 143 fig.
1919. Genera Mammalium. Monotremata, Marsupialia. Madrid: pp. 1-177, 19 pl.
1932. Los mamíferos de Marruecos. Trabajos Mus. Nac. Cienc. Nat. [Madrid], ser. zool., no. 57, pp. 1-363, 12 pl., 34 fig.
1936. Subspecific and individual variation in the Burchell zebras. Jour. Mammalogy, vol. 17, no. 2, pp. 89-112, 21 fig., 1 map.
- CADELL, PATRICK
1935. The preservation of wild life in India. No. 5. The Indian Lion. Jour. Bombay Nat. Hist. Soc., vol. 37, no. 4, suppl., pp. 162-166.
- CALDWELL, KEITH
1924. Game preservation: its aims and objects. Jour. Soc. Preservation Fauna Empire, n. s., pt. 4, pp. 45-56.
1927. The commercialization of game. Jour. Soc. Preservation Fauna Empire, n. s., pt. 7, pp. 83-90.

CALINESCU, RAUL J.

1930. Von einigen Säugetieren Rumäniens. Zeitschr. f. Säugetierkunde, vol. 5, pp. 364-366.

1931. Verzeichnis und Bibliographie der Säugetiere Rumäniens. Zeitschr. f. Säugetierkunde, vol. 6, pp. 78-84.

CAMERANO, LORENZO

1908. Il Quagga del Museo Zoologico di Torino. Atti Accad. Sci. Torino, vol. 43, pp. 562-565, 1 pl.

CAMPBELL, A. G.

1923. Australian desert regions. Their influence on distribution of life. Australian Zoologist, vol. 3, pt. 5, pp. 169-174.

CAMPBELL, T. G.

1925. A visit to the Barrington Tops Plateau. Australian Mus. Mag., vol. 2, no. 6, p. 195.

CAPELL, E. A.

1929. [President's address at annual meeting of Wild Life Protection Society of Southern Rhodesia, held 14th February, 1929.] Jour. Soc. Preservation Fauna Empire, n. s., pt. 9, pp. 66-70.

CARPENTER, C. R., AND H. J. COOLIDGE, JR.

1938. A survey of wild life conditions in Atjeh, North Sumatra, with special reference to the orang-utan. Communications Netherlands Comm. International Nature Protection, no. 12, 34 pp.

CARPENTIER, C.-J.

1932. Les mammifères du pays Zaïan. Bull. Soc. Sci. Nat. Maroc, vol. 12, nos. 1-3, pp. 11-22.

CARRUTHERS, DOUGLAS

1909. Severtzoff's sheep from Russian Turkestan. Field, vol. 114, no. 2962, p. 623, 1 fig.

1913. Unknown Mongolia. (With three chapters on sport by J. H. Miller.) London, vols. 1 and 2: pp. xviii+659, 125 pl., 4 fig., 6 maps.

1915a. The Near East. In: The gun at home & abroad. The big game of Asia and North America. London: pp. 9-34, 7 pl.

1915b. Central Asia. In: The gun at home & abroad. The big game of Asia and North America. London: pp. 127-155, 14 pl.

1915c. Upper Asia. In: The gun at home & abroad. The big game of Asia and North America. London: pp. 179-191, 5 pl.

1935. Arabian adventure to the Great Nafud in quest of the Oryx. London: pp. xii+208, 33 pl., 2 maps.

CASTELLI, GUIDO

1935. L'Orso bruno (*Ursus arctos arctos*, L.) nella Venezia Tridentina. Trento.

CATON, JOHN DEAN

1875. A summer in Norway. Chicago: pp. 1-401, illus.

CHAPIN, JAMES P.

1932. The birds of the Belgian Congo. Part 1. Bull. Am. Mus. Nat. Hist., vol. 65, pp. x+756, 11 pl., 153 fig., 56 maps.

CHAPMAN, ABEL

1897. Wild Norway. London and New York: pp. 1-351, illus.
 1912. Notes on the Spanish Ibex. Proc. Zool. Soc. London 1912, pp. 754-756.
 1922. The white rhinoceros of the Sudan. Jour. Soc. Preservation Fauna Empire, n. s., pt. 2, pp. 44-45.

CHAPMAN, ABEL, AND WALTER J. BUCK

1893. Wild Spain. London: pp. 1-472, illus.
 1910. Unexplored Spain. New York and London: pp. xvi+416, 40 pl., 145 fig.

CHAPMAN, F. SPENCER

1938. Lhasa in 1937. Geog. Jour., vol. 91, no. 6, pp. 497-506, 4 pl.

CHARTER, —

1934. An address . . . on the policy of the administration in respect of game preservation in Zululand. Natal Provincial Administration: pp. 1-10.

CHASEN, F. N.

1933. Notes on the fauna of Christmas Island, Indian Ocean. Bull. Raffles Mus., Singapore, no. 8, pp. 51-54.
 1935. On mammals from Siam. Jour. Siam Soc., Nat. Hist. Suppl., vol. 10, pp. 31-57.
 1940. A handlist of Malaysian mammals. Bull. Raffles Mus., Singapore, Straits Settlements, no. 15, pp. xx+209, 1 map.

CHASEN, F. N., AND C. BODEN KLOSS

1930. On mammals from the Raheng district, western Siam. Jour. Siam Soc., Nat. Hist. Suppl., vol. 8, pp. 61-78.

CHEESMAN, R. E.

1926. In unknown Arabia. London: pp. xx+433, 32 pl., 2 fig., 3 maps.

CHISHOLM, E. C.

1923. The principal fauna found in district of Marrangaroo, County of Cook, N. S. W. Australian Zoologist, vol. 3, pt. 2, pp. 60-71.
 1925. The principal fauna of the Comboyne Plateau, 1923-1925. Australian Zoologist, vol. 4, pt. 2, pp. 54-74, 1 map.
 1927. Additional fauna of the Comboyne Plateau, 1925-1926. Australian Zoologist, vol. 4, pt. 5, pp. 295-298.

CHRISTY, CUTHBERT

1923. The white rhinoceros. Jour. Soc. Preservation Fauna Empire, n. s., pt. 3, pp. 63-65.
 1924. Big game and Pygmies. London: pp. xxxi+325, 56 pl., 3 fig., 3 maps.

CHUBB, E. C.

1909. The mammals of Matabeleland. Proc. Zool. Soc. London 1909, pp. 113-125.

CLARK, JAMES L.

1931. The giant eland of southern Sudan. Nat. Hist., vol. 31, no. 6, pp. 581-599, 1 pl., 23 fig., 1 map.

CLIGNY, ADOLPHE

1900. Faune du Sénégal et de la Casamance. In: Lasnet, Chevalier, Cligny, and Rambaud, Une mission au Sénégal. Paris: pp. 275-321, 3 fig.

COLLETT, ROBERT

1897. On a collection of mammals from North and North-west Australia. Proc. Zool. Soc. London 1897, pp. 317-336, 1 pl.
1898. Baeveren i Norge, dens Udbredelse og Levemaade (1896). Bergens Mus. Aarbog 1897, no. 1, pp. 1-127, 12 pl., 6 fig.

COLOSI, GIUSEPPE

1933. Fauna italiana. Torino: pp. xii+642, 35 pl., 518 fig.

COMMITTEE OF EXPERTS. (See HEMMING, FRANCIS (chairman), ET AL.)

COMYN-PLATT, THOMAS

- 1937a. A report on fauna preservation in Ceylon. Jour. Soc. Preservation Fauna Empire, n. s., pt. 30, pp. 36-44.
1937b. A report on fauna preservation in Malaya. Jour. Soc. Preservation Fauna Empire, n. s., pt. 30, pp. 45-52.
1937c. A report on fauna preservation in British North Borneo. Jour. Soc. Preservation Fauna Empire, n. s., pt. 30, pp. 52-55.

COOLIDGE, HAROLD JEFFERSON, JR.

1929. A revision of the genus *Gorilla*. Mem. Mus. Comp. Zoöl., vol. 50, no. 4, pp. 291-381, 21 pl., 19 fig., 2 maps.
1930. Notes on the gorilla. In: The African republic of Liberia and the Belgian Congo (Harvard African Expedition 1926-1927), vol. 2, pp. 623-635, 9 fig., 1 map. Cambridge.
1933. *Pan paniscus*. Pigmy chimpanzee from south of the Congo River. Am. Jour. Phys. Anthrop., vol. 18, pp. 1-57, 2 pl.
1936. Zoological results of the George Vanderbilt African Expedition of 1934. Part IV,—Notes on four gorillas from the Sanga River region. Proc. Acad. Nat. Sci. Philadelphia, vol. 88, pp. 479-501, 2 pl.
1940. The Indo-Chinese Forest Ox or Kouprey. Mem. Mus. Comp. Zoöl., vol. 54, no. 6, pp. 417-531, 11 pl., 12 fig.

COOMANS DE RUITER, L.

1932. Uit Borneo's wonderwereld. Batavia: pp. xii+216, 62 fig.

COQUEREL, CH.

1859. Notes de mammalogie. Rev. et Mag. Zool., ser. 2, vol. 11, pp. 457-468.

CORKILL, NORMAN L.

1929. On the occurrence of the cheetah (*Acononyx [sic] jubatus*) in Iraq. Jour. Bombay Nat. Hist. Soc., vol. 33, no. 3, pp. 700-702, 1 fig.

CORNISH, C. J. (EDITOR)

1901. The living animals of the world. Vol. 1. Mammals. London: pp. viii+384, illus.

CORYNDON, R. T.

1894. On the occurrence of the White or Burchell's Rhinoceros in Mashonaland. Proc. Zool. Soc. London 1894, pp. 329-334, 1 pl.

- CORYNDON, R. T.—*Cont.*
 1921. Elephants in Uganda. Jour. Soc. Preservation Fauna Empire, n. s., pt. 1, pp. 27-30.
- COTTON, W. B.
 1912. Sport in the Eastern Sudan from Souakin to the Blue Nile. London: pp. 1-285.
 1933. The Giant Eland (*Taurotragus derbianus*). Proc. Zool. Soc. London 1933, pp. 1037-1038.
- COUTOULY, F. DE
 1926. Gros et petit gibier en Afrique occidentale française. Bull. Comité Études Hist. Sci. Afrique Occidentale Française, année 1925, pp. 217-261, 559-605, 1 pl.
- CRETZSCHMAR, PHILIPP JAKOB
 1826. Atlas zu der Reise in nördlichen Afrika von Eduard Rüppell. Abth. 1. Zoologie. Säugethiere. Frankfurt am Main: pp. 1-78, 30 pl.
- CUMBERLAND, C. S.
 1895. Sport on the Pamirs and Turkistan steppes. Edinburgh and London: pp. x+278, 1 pl., 1 map.
- CUMMING, ROUALEYN GORDON
 1850. Five years of a hunter's life in the far interior of South Africa. New York: vol. 1, pp. i-xiv, 17-326; vol. 2, pp. i-viii, 9-303.
- CUNNINGHAM, ALYSE
 1921. A gorilla's life in civilization. Bull. New York Zool. Soc., vol. 24, no. 5, pp. 118-124, 9 fig.
- CURTIS, CHARLES P.
 1933. Giant Sable Antelope. In: Hunting trails on three continents, a book of the Boone and Crockett Club. New York: pp. 237-252, 1 pl., 2 maps.
- CUVIER, GEORGES
 1825. Recherches sur les ossemens fossiles, ed. 3, vol. 4. Paris: pp. 1-514, 39 pl.
- CZUDEK, ANDR ZEJ
 1931. The development and future of the upper Silesian bison. [Transl. from original Polish.] Jour. Soc. Preservation Fauna Empire, n. s., pt. 14, pp. 44-46.
- DAMMERMAN, K. W.
 1928. On the mammals of Sumba. Treubia, vol. 10, livr. 2-3, pp. 299-315.
 1929a. Preservation of wild life and nature reserves in the Netherlands Indies. Weltevreden: pp. v+91, 20 pl., 15 fig.
 1929b. On the zoogeography of Java. Treubia, vol. 11, livr. 1, pp. 1-88.
 1929c. Fauna Buruana; Mammalia. Treubia, vol. 7, suppl., livr. 4, pp. 149-164.
- DANFORD, CHARLES G., AND EDWARD R. ALSTON
 1877. On the mammals of Asia Minor. Proc. Zool. Soc. London 1877, pp. 270-281, 1 pl.
 1880. On the mammals of Asia Minor.—Part II. Proc. Zool. Soc. London 1880, pp. 50-64, 1 pl., 7 fig.

DAUKES, C.

1934. Capturing a Nepal rhino. Field, April 14, 1934.

DAVID, ARMAND

1867. Journal d'un voyage en Mongolie fait en 1866. Nouv. Arch. Mus. Hist. Nat. Paris, vol. 3, Bull., pp. 18-96, 8 pl., 4 maps.

DE BEAUFORT, L. F.

1926. Zoögeographie van den Indischen Archipel. Haarlem: pp. 1-202, 8 fig., 1 map.

1928. On the occurrence of *Rhinoceros sondaicus* Desm. in Sumatra. Tijdschrift Nederl. Dierk. Vereeniging, ser. 3, vol. 1, pt. 2, pp. 43-44.

DE BEAUX, OSCAR

1922. Mammiferi abissini e somali. Atti Soc. Italiana Sci. Nat., vol. 61, pp. 21-34.

1926. Mammiferi dell'Abissinia raccolti dal Signor Ignesti addetto alla R. Agenzia Commerciale di Gondar. Atti Soc. Italiana Sci. Nat., vol. 64, pp. 196-218, 1 pl.

1927. Brevi considerazioni sui Ghepardi (*Acinonyx*) africani. Boll. Mus. Zool. Anat. Comp. Genova, ser. 2, vol. 7, no. 13, pp. 1-5.

1928a. Riabilitazione del termine "taeniopus, Heuglin" per l'asino selvatico somalo. Boll. Mus. Zool. Anat. Comp. Genova, vol. 8, no. 27, pp. 1-13.

1928b. Risultati zoologici della Missione inviata dalla R. Società Geografica Italiana per l'esplorazione dell'oasi di Giarabub (1926-1927). Mammiferi. Annali Mus. Civ. Storia Nat. Genova, vol. 53, pp. 39-76.

1932a. Biological ethics. An attempt to arouse a naturalistic conscience. (Transl. from the Italian by Florence Perkes.) Italian Mail and Tribune, Florence, March 19 and 26, April 2, 1932, pp. 1-11 (of reprint).

1932b. Spedizione del Barone Raimondo Franchetti in Dancalia. Mammiferi. Annali Mus. Civ. Storia Nat. Genova, vol. 55, pp. 183-217.

1932c. Spedizione scientifica all'oasi di Cufra (Marzo-Luglio 1931). Mammiferi. Annali Mus. Civ. Storia Nat. Genova, vol. 55, pp. 374-394.

1935. Lo stambecco della Colonia Eritrea. Ministero delle Colonie, Ufficio Studi e Propaganda, Roma: pp. 1-15.

DE LA CHEVASNÉRIE, A.

1936? Rhinocéros asiatiques. (Les *Rhinoceros sondaicus* et *unicornis* et le *Dicerorhinus sumatrensis*.) Le Saint-Hubert, pp. 339-341, 3 fig.

DELACOUR, JEAN

1932. La Mission Zoologique Franco-Anglo-Américaine à Madagascar. Bull. Mus. Nat. Hist. Nat. [Paris], ser. 2, vol. 4, no. 3, pp. 212-221.

DELMÉ-RADCLIFFE, C.

1905. Rough notes on natural history of the country west of Lake Victoria Nyanza. Proc. Zool. Soc. London 1905, vol. 2, pp. 184-191.

DEMIDOFF, E.

1898. Hunting trips in the Caucasus. London: pp. 1-319, illus., map.
1900. After wild sheep in the Altai and Mongolia. London: pp. xii+324, 20 pl., 62 fig., 1 map.
1904. A shooting trip to Kamchatka. London: pp. xvi+302, illus., 2 maps.

DERSCHIED, J. M.

1925. Deux carnassiers intéressants de l'Afrique orientale. Rev. Zool. Africaine, Cercle Zool. Congolais, vol. 13, fasc. 2, pp. [75]-[86], 2 pl., 1 fig.
1928. Notes sur les Gorilles des Volcans du Kivu (Parc National Albert). Annales Soc. Roy. Zool. Belgique, vol. 58, pp. 149-159.

DE VIS, C. W.

1900. A new species of hairy-nosed wombat. Annals Queensland Mus., no. 5, pp. 14-16, 2 pl.

DE WINTON, W. E.

1897. Remarks on the existing forms of Giraffe. Proc. Zool. Soc. London 1897, pp. 273-283, 4 fig.
1899a. List of the mammals obtained by Mr. R. McD. Hawker during his recent expedition to Somaliland. Proc. Zool. Soc. London 1898, pp. 761-768.
1899b. On the Giraffe of Somaliland. Ann. Mag. Nat. Hist., ser. 7, vol. 4, pp. 211-212.

DIDIER, ROBERT, AND PAUL RODE

1935. Les mammifères de France. Arch. Hist. Nat., Soc. Nat. Acclimatation France, no. 10, pp. 1-398, 29 pl., 214 fig.

DOLLMAN, J. GUY

- 1929a. The King Cheetah. Nat. Hist. Mag. [London], vol. 2, no. 9, pp. 1-6, 1 fig.
1929b. The Congo Derby Eland. Nat. Hist. Mag. [London], vol. 2, no. 9, pp. 28-32, 1 fig.
1935a. A new race of Wild Ass from the Sudan, *Asinus asinus diana*, subsp. nov. (With a note by P. H. G. Powell-Cotton.) Proc. Linnean Soc. London 1934-35, pt. 4, pp. 132-134.
1935b. The occurrence of the Chimpanzee in Tanganyika Territory. Proc. Linnean Soc. London 1935-36, pt. 1, pp. 15-16.
1937. Mammals which have recently become extinct and those on the verge of extinction. Jour. Soc. Preservation Fauna Empire, n. s., pt. 30, pp. 67-74.
1940. Two skulls of the Pygmy Hippopotamus presented to the British Museum (Nat. Hist.) by I. R. P. Heslop, Esq., from Southern Nigeria. (Abstract.) Proc. Linnean Soc. London, 152nd session (1939-40), pt. 3, pp. 287-288.

DRACOPOLI, I. N.

1914. Through Jubaland to the Lorian Swamp. London: pp. 1-318, illus., 2 maps.

DRAKE-BROCKMAN, R. E.

1910. The mammals of Somaliland. London: pp. xvii+201, 18 pl., 9 fig.

1921. The preservation of the African elephant. Jour. Soc. Preservation Fauna Empire, n. s., pt. 1, pp. 31-33.

DRUMMOND, W. H.

1875. The large game and natural history of South and South-east Africa. Edinburgh: pp. xxi+428, illus., 1 map.

DU BOCAGE, J. V. BARBOZA.

1857. Memoria sobre a cabra-montez da Serra do Gerez. Mem. Acad. Real Sci. Lisboa, cl. sci. math., phys., e nat., n. s., vol. 2, pt. 1, [6th paper,] pp. 1-20, 2 pl.

DU CHAILLU, PAUL B.

1861. Explorations and adventures in equatorial Africa. New York: pp. xxii+531, illus., 1 map.

DUERST, J. ULRICH

1908. Animal remains from the excavations at Anau, and the horse of Anau in its relation to the races of domestic horses. In: Raphael Pumpelly, Explorations in Turkestan, vol. 2, pt. 6, pp. 339-442, 21 pl.

DUGMORE, A. RADCLYFFE

1910. Camera adventures in the African wilds. New York: pp. xix+233, illus., 1 map.

EDWARDS, GEORGE

1751. A natural history of birds. Pt. 4. London: pp. [6]+158-248, 53 pl.

1758. Gleanings of natural history. Pt. 1. London: pp. 1-108, 51 pl.

EHRENBERG, C. G.

1831. Observations et données nouvelles sur le Tigre du nord et la Panthère du nord, recueillies dans le voyage de Sibérie fait par M. A. de Humboldt, en l'année 1826. Annales Sci. Nat., vol. 21, pp. 387-412.

ELD, PERCY

1842. Further notice of a nondescript species of Deer Calcutta Jour. Nat. Hist., vol. 2, pp. 415-417, 1 pl.

ELIAS, NEY

1874. On Captain Prshewalsky's explorations in Mongolia and northern Tibet, 1870-73. Proc. Royal Geog. Soc. London, vol. 18, no. 1, pp. 76-86.

ELLERMAN, J. R.

1941. The families and genera of living rodents. With a list of named forms (1758-1936) by R. W. Hayman and G. W. C. Holt. Vol. 2. Family Muridae. London: pp. xii+690, 50 fig.

ELLIOT, DANIEL GIRAUD

1883. A monograph of the Felidae. London: pp. xvii+unnumbered pp. accompanying 43 pl., folio.

ELLIOT, DANIEL GIRAUD—*Cont.*

1897. List of mammals from Somali-land obtained by the Museum's East African Expedition. Field Columbian Mus. Publ., zool. ser., vol. 1, no. 6, pp. 107-155, 24 pl.

1907. A catalogue of the collection of mammals in the Field Columbian Museum. Field Columbian Mus. Publ. 115, zool. ser., vol. 8, pp. viii+694, 92 fig.

1913. A review of the Primates. New York: vol. 1, pp. cxxvii+317+xxxviii, 50 pl.; vol. 3, pp. xiv+262+clxviii, 57 pl.

ELWES, G. F. WESTON

1914. Distribution of certain animals in Siam. Jour. Nat. Hist. Soc. Siam, vol. 1, pp. 110-111.

ELWES, H. J.

1899. On the zoology and botany of the Altai Mountains. Jour. Linnean Soc. [London], vol. 27, no. 173, pp. 23-46, 6 fig.

ENDERS, ROBERT K.

1927. A small collection of mammalian remains secured by the University of Michigan Egyptian Expedition. Papers Michigan Acad. Sci., Arts and Letters, vol. 7, pp. 293-298, 1 map.

ENGELMANN, CARLHEINRICH

1938. Über die Grosssäuger Szetschwans, Sikongs und Osttibets. Zeitschr. f. Säugetierkunde, vol. 13, Sonderheft, pp. 1-76, 36 pl., 5 fig., 2 maps.

ESCHSCHOLTZ, FRIEDR.

1829. Zoologischer Atlas . . . Flottecapitains von Kotzebue zweiter Reise um die Welt . . . 1823-1826, Heft 1. Berlin: pp. iv+17, 5 pl.

EVERETT, A. H.

1893. A nominal list of the mammals inhabiting the Bornean group of islands. Proc. Zool. Soc. London 1893, pp. 492-496.

EVERSMANN, EDUARD. (*See also* Eversmann.)

1823. Reise von Orenburg nach Buchara. Berlin: pp. viii+151+35, 3 pl.

EVERSMANN [*sic*], EDUARD

1840. Mittheilungen ueber einige neue und weniger gekannte Säugthiere Russlands. Bull. Soc. Impér. Naturalistes Moscou 1840, no. 1, pp. 3-59, 2 pl.

EWART, J. COSSAR

1905. The multiple origin of horses and ponies. (Abridged from Trans. Highland and Agric. Soc. Scotland, vol. 16, 1904. Reprinted by permission, from Nature, London, April 21, 1904). Ann. Rept. Smithsonian Inst. 1904, pp. 437-455, 2 pl., 3 fig.

EYERDAM, WALTER J.

1932. Kamchatka sable nearing extinction. Jour. Mammalogy, vol. 13, no. 3, pp. 276-277.

FATIO, VICTOR

1869. Faune des Vertébrés de la Suisse. Vol. 1. Histoire naturelle des Mammifères. Genève et Bale: pp. 411+xii+13, 8 pl.

FAUNTHORPE, J. C.

1924. Jungle life in India, Burma, and Nepal. Nat. Hist., vol. 24, no. 2, pp. 174-198, 20 fig., 1 map.

FERRANT, VICTOR

1931. Faune du Grand-Duché de Luxembourg. Quatrième partie, Mammifères. Luxembourg: pp. 1-115.

FINLAYSON, HEDLEY HERBERT

- 1927, 1930a. Observations on the South Australian members of the subgenus, "Wallabia." Trans. Royal Soc. S. Australia, vol. 51, pp. 363-377, 3 pl., 1927; vol. 54, pp. 47-56, 3 pl., 1930.
- 1930b, 1931a. Notes on some South and Central Australian mammals. Trans. Royal Soc. S. Australia, vol. 54, pp. 177-180, 1930; vol. 55, pp. 161-162, 1931.
- 1931b. On mammals from the Dawson Valley, Queensland. Part 1. Trans. Royal Soc. S. Australia, vol. 55, pp. 67-89, 3 pl., 4 fig.
1932. *Caloprymnus campestris*. Its recurrence and characters. Trans. Royal Soc. S. Australia, vol. 56, pp. 148-167, 3 pl., 4 fig., 1 map.
- 1933a. On *Mastacomys fuscus* (Thomas). Trans. Royal Soc. S. Australia, vol. 57, pp. 125-129, 2 pl.
- 1933b, 1935c. On mammals from the Lake Eyre Basin. Part I.—The Dasyuridae. Part 2—The Peramelidae. Trans. Royal Soc. S. Australia, vol. 57, pp. 195-202, 1933; vol. 59, pp. 227-236, 1935.
- 1933c. On the eremian representative of *Myrmecobius fasciatus* (Waterhouse). Trans. Royal Soc. S. Australia, vol. 57, pp. 203-205.
1934. On mammals from the Dawson and Fitzroy Valleys; central coastal Queensland.—Part 2. Trans. Royal Soc. S. Australia, vol. 58, pp. 218-231.
- 1935a. The Red Centre. Man and beast in the heart of Australia. Sydney: pp. 1-146, 52 pl., 1 map.
- 1935b. Notes on some Victorian mammals. Trans. Royal Soc. S. Australia, vol. 59, pp. 221-226, 1 pl.

FITZSIMONS, F. W.

1920. The natural history of South Africa. Mammals. Vol. 4. London: pp. xix+271, 32 pl.

FLACOURT, SIEUR DE

1661. Histoire de la grande isle Madagascar. Paris: pp. [21]+471, 7 pl., 5 maps.

FLEAY, DAVID

1929. The Brush-tailed Phascogale. Victorian Naturalist, vol. 46, no. 6, pp. 135-136, 1 fig.
- 1932a. The rare Dasyures (Native Cats). Victorian Naturalist, vol. 49, no. 3, pp. 63-68, 3 pl., 3 fig.
- 1932b. The Lesser Flying Phalanger ("Sugar Squirrel"). Victorian Naturalist, vol. 49, no. 4, pp. 97-101, 1 pl., 1 fig.
1934. The Brush-tailed Phascogale. First record of breeding habits. Victorian Naturalist, vol. 51, no. 4, pp. 89-100, 3 pl., 4 fig.

FLEAY, DAVID—*Cont.*

1935. Notes on the breeding of Tasmanian Devils. *Victorian Naturalist*, vol. 52, no. 6, pp. 100-105, 2 pl., 1 fig.

FLEROV, CONSTANTINE C.

1929. Preliminary note on the diagnostic characters of the genus *Moschus* Linné (Mammalia, Cervidae). *C. R. Acad. Sci. URSS*, 1928 A, no. 24, pp. 515-519.
1930. The white muzzle deer (*Cervus albirostris* Przew.) as the representative of a new genus *Przewalskium*. *C. R. Acad. Sci. URSS* 1930 A, no. 5, pp. 115-120, 1 fig.
1933. Review of the Palaearctic reindeer or caribou. *Jour. Mammalogy*, vol. 14, no. 4, pp. 328-338, 9 fig., 1 map.

FLINDERS, MATTHEW

1814. *A voyage to Terra Australis*. London: vol. 1, pp. cciv+269, 4 pl.

FLOERICKE, KURT

1930. *Wisent und Elch: zwei urige Recken*. Stuttgart: pp. 1-78, 15 fig.

FLOWER, STANLEY S.

1900. On the Mammalia of Siam and the Malay Peninsula. *Proc. Zool. Soc. London* 1900, pp. 306-379, 1 fig.
1901. Notes on the fauna of the White Nile and its tributaries. *Proc. Zool. Soc. London* 1900, pp. 950-973.
1929. List of the vertebrated animals exhibited in the gardens of the Zoological Society of London, 1828-1927. Vol. 1. Mammals. London: pp. ix+419.
1931. Contributions to our knowledge of the duration of life in vertebrate animals.—V. Mammals. *Proc. Zool. Soc. London* 1931, pp. 145-234.
1932. Notes on the Recent mammals of Egypt, with a list of the species recorded from that kingdom. *Proc. Zool. Soc. London* 1932, pt. 2, pp. 369-450.

FLOWER, WILLIAM HENRY

1892. *The horse*. New York: pp. xiv+204, 1 pl., 26 fig.

FLOWER, WILLIAM HENRY, and RICHARD LYDEKKER

1911. *Lion*. *Encycl. Brit.*, vol. 16, pp. 737-739, 2 fig.

FLOYER, ERNEST A.

1887. Notes on a sketch map of two routes in the Eastern Desert of Egypt. *Proc. Royal Geog. Soc.*, n. s., vol. 9, no. 11, pp. 659-681, 1 map.

FORBES, HENRY O.

1894. *A hand-book to the Primates*. London: vol. 1, pp. xv+286, 22 pl., 7 fig., 1 map; vol. 2, pp. xv+296, 7 pl., 8 maps.
1903. *The natural history of Sokotra and Abd-el-Kuri*. Liverpool: pp. xlvii+598, 33 pl., 87 fig., 2 maps.

FORBES, [Major].

1840. *Eleven years in Ceylon*. Vol. 2. London: pp. 1-356.

FORMOZOW, A. N.

1931. Ueber die Säugetiere der Nördlichen Mongolei. *Folia Zool. et Hydrobiol.*, vol. 3, no. 1, pp. 41-78.

FRANÇA, CARLOS

1909. Le Professeur Barbosa du Bocage 1823-1907. Bull. Soc. Portugaise Sci. Nat., vol. 2, fasc. 1-2, pp. 141-194, 1 portrait, 11 fig.
 1917. Le Bouquetin du Gerez (*Capra lusitanica*). Arquivo Universidade Lisboa, vol. 4, pp. 19-54, 10 pl., 5 fig.

FRASER, LOUIS

- 1845-1849. Zoologica typica. London: pp. viii+unnumbered pages accompanying 70 pl.

FRECHKOP, S.

1935. A propos du Chimpanzé de la rive gauche du Congo. Bull. Mus. Hist. Nat. Belgique, vol. 11, no. 2, pp. 1-43, 24 fig.

FROGGATT, WALTER W.

1921. A bureau of biological survey. Australian Zoologist, vol. 2, pt. 1, pp. 2-8.

FRY, T. B.

1929. Bombay Natural History Society's mammal survey of India, Burmah and Ceylon. Report No. 46 (supplementary) on the second, third and fourth collections from Toungoo, Burmah, made by Mr. J. M. D. Mackenzie, I. F. S., between dates February 9, 1927 to March 2, 1928. Jour. Bombay Nat. Hist. Soc., vol. 33, no. 3, pp. 636-652.

FUTTERER, K.

1901. Durch Asien. Berlin: vol. 1, pp. xxv+545, 43 pl., 203 fig., 1 map.

GADOW, HANS

1897. In northern Spain. London: pp. 1-415, illus., 1 map.

GAIRDNER, K. G.

- 1914a, 1915. Notes on the fauna and flora of Ratburi and Petchaburi districts. Jour. Nat. Hist. Soc. Siam, vol. 1, pp. 27-40, 131-145, 1 map.
 1914b. Note on two rare mammals, Berdmore's Rat (*Hapalomys longicaudatus*) and Fea's Muntjac (*Cervulus feae*). Jour. Nat. Hist. Soc. Siam, vol. 1, pp. 115-116.
 1917. Remarks on *Bos sondaicus* (the Tsine or Banting) and on *Bos sondaicus porteri*. Jour. Nat. Hist. Soc. Siam, vol. 2, pp. 250-251, 1 pl.

GEOFFROY SAINT-HILAIRE, É.

1796. Mémoire sur les rapports naturels des makis *Lemur*, L. et description d'une espèce nouvelle de mammifère. Mag. Encycl., [2d yr.,] vol. 1, pp. 20-50, 1 pl.

GEOFFROY-SAINTE-HILAIRE, [É.]

1812. Suite au tableau des Quadrumanes. Annales Mus. Hist. Nat. [Paris], vol. 19, pp. 156-170.

GEOFFROY SAINT-HILAIRE, É., AND G. F. CUVIER

- 1824-1842. Histoire naturelle des Mammifères. Vols. 1-4. Paris: 431 pl. and separately paged text to each pl.

GEOFFROY SAINT-HILAIRE, I.

1832. Mammifères. In: Bory de Saint-Vincent, Expédition Scientifique de Morée, vol. 3, pt. 1, zool., pp. 10-27.

GEOFFROY-SAINT-HILAIRE, I.

1849. Rapport général sur . . . la domestication et la naturalisation des animaux utiles. Paris: pp. 1-51.

1851a. Note sur plusieurs espèces nouvelles de mammifères, de l'ordre des Primates. C. R. Acad. Sci. [Paris], vol. 31, pp. 873-876, 1850.

GEOFFROY SAINT-HILAIRE, I.

1851b. Catalogue méthodique de la collection des mammifères, de la collection des oiseaux, et des collections annexes [Museum d'Histoire Naturelle de Paris]. Première partie.—Mammifères. Catalogue des Primates. Paris: pp. vii+96.

GEOFFROY-SAINT-HILAIRE, I.

1856. Sur deux Chevaux sauvages, d'une espèce nouvelle (*Equus hemippus*), donnés par S. M. l'Impératrice à la Ménagerie du Muséum d'Histoire Naturelle. C. R. Acad. Sci. [Paris], vol. 41, pp. 1214-1219, 1855.

GESNER, CONRAD

1551. *Historiae animalium* lib. 1. De quadrupedibus viviparis. Zürich: [38]+1104+[11], illus.

GEYR VON SCHWEPPEBURG, H.

1917. Ins Land der Tuareg. Jour. f. Ornithologie, vol. 65, no. 3, pp. 241-312, 1 map.

GIGLIOLI, HENRY H.

1881. *Lophiomys Imhausi* A. Milne-Edwards. Zool. Anz., vol. 4, no. 74, p. 45.

GILES, F. H.

1936. Philology in relation to the tapir. Jour. Siam Soc., Nat. Hist. Suppl., vol. 10, pp. 167-168.

GILLMORE, PARKER

1871. All round the world. London: pp. 1-270, illus.

1888. Days and nights by the desert. London: pp. 1-234, illus.

GLAUERT, L.

1933. The distribution of the marsupials in Western Australia. Jour. Royal Soc. W. Australia, vol. 19, pp. 17-32.

GMELIN, JO. FRID.

1788. *Systema naturae*. Vol. 1. Leipzig: pp. [10]+500.

GMELIN, SAMUEL GOTTLIEB

1774. Reise durch Russland. Vol. 3. St. Petersburg: pp. 1-508, 57 pl.

GOLDFINCH, G. H.

1923. Notes on the African Crested Rat (*Lophiomys imhausi*). Proc. Zool. Soc. London 1923, p. 1091.

GOODWIN, G. G.

1935. Mammals collected in Kazakstan, Central Asia, by the Morden-Graves North Asiatic Expedition, with the description of a new ground squirrel. Am. Mus. Novit. 769, pp. 1-15.

1940. Mammals collected by the Legendre 1938 Iran Expedition. Am. Mus. Novit. 1082, pp. 1-17.

GORDON, SETON

1922. Amid snowy wastes. Wild life on the Spitsbergen archipelago. London: pp. xiv+206, 63 pl., 2 maps.

GORDON, T. E.

1876. The roof of the world. Edinburgh: pp. xiv+172, illus., 1 map.

GOULD, JOHN

- 1841a. On five new species of kangaroos. Proc. Zool. Soc. London 1840, pp. 92-94.
- 1841b. Observations on *Dasyurus Maugei* and *D. viverrinus* of Geoffroy, and description of a new species. Proc. Zool. Soc. London 1840, p. 151.
- 1841c. Description of a new species of *Hypsiprymnus*. Proc. Zool. Soc. London 1840, pp. 178-179.
- 1841d-1842. A monograph of the Macropodidae. London: pt. 1, 17 unnumbered pp., 15 pl., 1841; pt. 2, 14 unnumbered pp., 15 pl., 1842.
1843. On a new species of kangaroo-rat. Proc. Zool. Soc. London 1843, p. 81.
- 1844a. Descriptions of three new species of *Halmaturus* and *Lagorchestes*. Proc. Zool. Soc. London 1844, pp. 31-33.
- 1844b. Exhibition and character of a number of animals, &c. transmitted from Australia by Mr. Gilbert. Proc. Zool. Soc. London 1844, pp. 103-107.
- 1845-1863. The mammals of Australia. London: vol. 1, pp. xli+69, 60 pl.; vol. 2, pp. 1-80, 70 pl.; vol. 3, pp. 1-53, 52 pl.
(Some parts issued as early as 1845. In citations from this work, the actual years of publication of the plates are given, but all text is cited as of 1863.)

GOURDON, MAURICE

1908. Note sur une série de crânes de mammifères des Pyrénées. Bull. Soc. Sci. Nat. Ouest France, ser. 2, vol. 8, pp. 1-34, 2 pl.

GRANDIDIER, ALFRED

- 1867a. Mammifères et oiseaux nouveaux découverts à Madagascar. Rev. et Mag. Zool., ser. 2, vol. 19, pp. 84-88.
- 1867b. Mélanges et nouvelles. Rev. et Mag. Zool., ser. 2, vol. 19, pp. 254-256.
- 1867c. Notes sur les mammifères et les oiseaux observés à Madagascar, de 1865 à 1867. Rev. et Mag. Zool., ser. 2, vol. 19, pp. 313-321.
1868. Description d'une nouvelle espèce de Chirogale, découverte sur la côte ouest de Madagascar. Rev. et Mag. Zool., ser. 2, vol. 20, pp. 49-50.
1870. Description de quelques animaux nouveaux, découverts à Madagascar, en novembre 1869. Rev. et Mag. Zool., ser. 2, vol. 22, pp. 49-50.
1871. Observations sur les Propithèques de Madagascar. C. R. Acad. Sci. [Paris], vol. 72, pp. 231-232.

GRAY, J. E.

1842. Descriptions of some new genera and fifty unrecorded species of Mammalia. Ann. Mag. Nat. Hist., ser. 1, vol. 10, no. 65, pp. 255-267.

GRAY, J. E.—*Cont.*

1870. Catalogue of monkeys, lemurs, and fruit-eating bats in the collection of the British Museum. London: pp. viii+137, 21 fig.
1873*a*. On the Fossane of D'Aubenton (*Fossa d'aubentonii*). Proc. Zool. Soc. London 1872, pp. 869-872, 1 pl., 3 fig.
1873*b*. On the dentition of Rhinoceroses (*Rhinoceroses*), and on the characters afforded by their skulls. Ann. and Mag. Nat. Hist., ser. 4, vol. 11, pp. 356-361, 1 pl.

GRAY, PRENTISS N.

1930. African game-lands. The Sportsman, vol. 8, no. 4, suppl., pp. 1-32, 16 pl.
1933. Along the Livingstone trail. In: Hunting trails on three continents, a book of the Boone and Crockett Club, pp. 103-143, 3 pl. New York.

GREENWOOD, JAMES

1862. Wild sports of the world; natural history and adventure. London: pp. 1-426, illus.

GREGORY, W. K.

1921. Australian mammals and why they should be protected. Australian Mus. Mag., vol. 1, no. 3, pp. 65-74, 21 fig.
1924. Australia, the land of living fossils. Nat. Hist. [New York], vol. 24, pp. 5-15, 11 fig.

GREVÉ, C.

1906. Der kaukasische Wisent. Zool. Beobachter, vol. 47, no. 9, pp. 269-272.

GREY, GEORGE

1841. Journals of two expeditions of discovery in north-west and western Australia, during the years 1837, 38, and 39. London: vol. 2, pp. vii+482, illus.

GROEBEN, G. V. D.

1929. Some principles of rational Wisent-breeding. Part 1: Pure-blood strains. Ber. Internat. Gesell. Erhaltung Wisents, vol. 3, no. 2, pp. 67-76.

GRUVEL, M. A.

1937. North Africa—two vanishing species. Jour. Soc. Preservation Fauna Empire, n. s., pt. 30, pp. 62-64, 1 fig.

GUEHLER, ULRICH. (*See also* GÜHLER.)

1933. Further examples of the Schomburgk deer. Jour. Siam Soc., Nat. Hist. Suppl., vol. 9, no. 1, pp. 147-149, 1 fig.
1936. Notes on an encounter with a man-eating tiger. Jour. Siam Soc., Nat. Hist. Suppl., vol. 10. 171-174.

GÜHLER, U. (*See also* GUEHLER.)

1936. Beitrag zur Geschichte von *Cervus (Rucervus) schomburgki* Blyth. Zeitschr. f. Säugetierkunde, vol. 11, no. 1, pp. 20-31, 2 pl.

GÜNTHER, ALBERT

- 1875*a*. Notice of two new species of mammals (*Propithecus* and *Hemientetes*) from Madagascar. Ann. Mag. Nat. Hist., ser. 4, vol. 16, pp. 125-126.

GÜNTHER, ALBERT—*Cont.*

1875b. Notes on some mammals from Madagascar. Proc. Zool. Soc. London 1875, pp. 78-80, 3 fig., 2 pl.

1899. The wild sheep of the Urmi Islands. Jour. Linnean Soc. [London], zool., vol. 27, no. 177, pp. 374-376, 1 pl.

GUILLEMARD, F. H. H.

1885. Remarks on *Ovis nivicola*. Proc. Zool. Soc. London 1885, pp. 675-678, 2 fig.

GUNN, RONALD

1838. Notices accompanying a collection of quadrupeds and fish from Van Diemen's Land. With notes and descriptions of the new species by J. E. Gray. Ann. Nat. Hist., vol. 1, pp. 101-111.

GYLDENSTOLPE, NILS

1919. A list of the mammals at present known to inhabit Siam. Jour. Nat. Hist. Soc. Siam, vol. 3, pp. 127-175.

1928. Zoological results of the Swedish Expedition to Central Africa 1921. Vertebrata. 5. Mammals from the Birunga Volcanoes, north of Lake Kivu. Arkiv f. Zoologi, vol. 20 A, no. 4, pp. 1-76, 8 pl.

HAAGNER, ALWIN

1920. South African mammals. London: pp. xx+248, 1 pl., 141 fig.

HABLIZL, CARL

1783. Bemerkungen in der persischen Landschaft Gilan und auf den Gilanischen Gebirgen. Neue Nord. Beyträge, vol. 4, pp. 1-104.

HADWEN, SEYMOUR, AND LAWRENCE J. PALMER.

1922. Reindeer in Alaska. U. S. Dept. Agric. Bull. 1089, pp. 1-74, 24 pl., 1 fig., 1 map.

HAMERTON, A. E.

1931. Remarks on trypanosomiasis in relation to man and beast in Africa. Jour. Soc. Preservation Fauna Empire, n. s., pt. 13, pp. 20-26.

HAMILTON, EDWARD

1896. The Wild Cat of Europe. (*Felis catus*.) London: pp. xxi+99, 4 pl., 31 fig.

HAMILTON, [J.] STEVENSON. (See also STEVENSON-HAMILTON; "Sabi.")

1924. The Transvaal Game Reserve. Jour. Soc. Preservation Fauna Empire, n. s., pt. 4, pp. 35-44.

HAMILTON, R. E. A.

1918. The Beatrix or Arabian Oryx (*Oryx leucoryx*) in Central Arabia. Jour. Bombay Nat. Hist. Soc., vol. 26, pp. 283-284, 1 pl.

HANSON, R. C.

1931. The fauna of Assam (India). Jour. Soc. Preservation Fauna Empire, n. s., pt. 14, pp. 35-37.

HARCOURT, EDWARD VERNON

[N. d.] Sporting in Algeria. Hastings and London: pp. 1-187.

- HARMER, S. F.
1922. [Letter on *Rhinoceros sondaicus*.] Jour. Soc. Preservation Fauna Empire, n. s., pt. 2, pp. 16-17.
- HARPER, FRANCIS
1939. The name of the Blesbok. Proc. Biol. Soc. Washington, vol. 52, pp. 89-91.
1940. The nomenclature and type localities of certain Old World mammals. Jour. Mammalogy, vol. 21, no. 2, pp. 191-203; no. 3, pp. 322-332.
- HARRIS, G. P.
1808. Description of two new species of *Didelphis* from Van Diemen's Land. Trans. Linnean Soc. London, vol. 9, pp. 174-178, 1 pl.
- HARRIS, WILLIAM CORNWALLIS
1839. The wild sports of Southern Africa. London: pp. xxiv+387, 7 pl., 1 map.
1840. Portraits of the game and wild animals of Southern Africa. London: pp. 1-175, 30 pl.
- HARTERT, ERNST
1913. Expedition to the Central Western Sahara. III. Notes on ruminants and other large mammals. Novit. Zool., vol. 20, no. 1, pp. 33-37.
- HARTING, J. E.
1880. British animals extinct within historic times [etc.] London: vii+258, illus.
- HATT, ROBERT T.
1934a. The American Museum Congo Expedition manatee and other recent manatees. Bull. Am. Mus. Nat. Hist., vol. 66, art. 4, pp. 533-566, 1 pl., 2 fig.
1934b. The pangolins and aard-varks collected by the American Museum Congo Expedition. Bull. Am. Mus. Nat. Hist., vol. 66, art. 7, pp. 643-672, 8 pl., 2 fig.
1934c. Pangolins. Nat. Hist. [New York], vol. 34, no. 8, pp. 725-732, 10 fig.
- HATTA, SABURO
1928. Some points on the zoo-geography of Japan. Proc. Third Pan-Pacific Sci. Congress, Tokyo, 1926, vol. 1, pp. 1024-1038.
- HAVMÖLLER, R.
1926. A herd of wild elephants in Peninsular Siam. Jour. Siam Soc., Nat. Hist. Suppl., vol. 6, p. 365.
- HAY, OLIVER P.
1913. Description of the skull of an extinct horse, found in central Alaska. Smithsonian Misc. Coll., vol. 61, no. 2, pp. 1-18, 7 fig., 1 map.
- HAY, R. G.
1840. Notes on the Wild Sheep of the Hindoo Koosh . . . Jour. Asiatic Soc. Bengal, vol. 9, pt. 1, pp. 440-443.
- HAYMAN, R. W.
1936. On a collection of mammals from the Gold Coast. (With a note on the leopards by R. I. Pocock.) Proc. Zool. Soc. London 1935, pt. 4, pp. 915-937, 1 pl.

HAYWOOD, A. H. W.

1932. Nigeria. Preservation of wild life. Jour. Soc. Preservation Fauna Empire, n. s., pt. 17, pp. 27-48, 1 map.
- 1933a. Gold Coast. Preservation of wild life. Jour. Soc. Preservation Fauna Empire, n. s., pt. 18, pp. 32-45, 1 map.
- 1933b. Sierra Leone. The preservation of wild life. Jour. Soc. Preservation Fauna Empire, n. s., pt. 19, pp. 21-33, 1 map.
- 1933c. The Gambia. The preservation of wild life. Jour. Soc. Preservation Fauna Empire, n. s., pt. 19, pp. 34-37.

HAZEWINKEL, J. C.

1933. A one-horned Javanese rhinoceros shot in Sumatra, where it was not thought to exist. Illus. London News, Dec. 23, 1933, pp. 1018-1019, 5 figs.

HECHT, GÜNTHER

1932. Über Säugetiere im süditalienischen Hochgebirge. Zeitschr. f. Säugetierkunde, vol. 7, p. 23.

HECK, L., JUN.

1931. Beobachtungen an schwedischen Hirschen. Zeitschr. f. Säugetierkunde, vol. 6, p. 28.

HEDIN, SVEN

1899. Through Asia. Vol. 2. New York and London: pp. i-xii, 653-1255, illus.
1903. Central Asia and Tibet. London and New York: vol. 1, pp. xix+608, illus., 3 maps; vol. 2, pp. xv+664, illus., 1 map.
1904. Adventures in Tibet. London: pp. xvi+487, illus.
1910. Overland to India. London: vol. 1, pp. xix+416, illus., 1 map; vol. 2, pp. xiv+357, illus., 1 map.
1940. The wandering lake. New York: pp. x+291, 31 pl., 80 fig., 10 maps.

HEIM DE BALSAC, H.

1934. Mission saharienne Augieras-Draper 1927-1928: Mammifères. Bull. Mus. Nat. Hist. Nat. [Paris], vol. 6, no. 6, pp. 482-489.
1936. Biogéographie des mammifères et des oiseaux de l'Afrique du Nord. Bull. Biol. France et Belgique, Suppl. 21, pp. 1-446, 16 maps, 7 pl., 16 fig.

HELLER, EDMUND

1912. New rodents from British East Africa. Smithsonian Misc. Coll., vol. 59, no. 16, pp. 1-20.
- 1913a. The white rhinoceros. Smithsonian Misc. Coll., vol. 61, no. 1, pp. 1-77, 29 pl., 3 figs., 1 folding table, 2 maps.
- 1913b. New antelopes and carnivores from British East Africa. Smithsonian Misc. Coll., vol. 61, no. 13, pp. 1-15.

HELLER, K. M.

1892. Der Urbüffel von Célebes: *Anoa depressicornis* (H. Smith). Abhandl. u. Ber. K. Zool. Anthropol.-Ethnogr. Mus. Dresden 1890/91, no. 2, pp. 1-40, 3 pl.

HELMS, RICHARD

1896. Anthropology. [Sci. Results Elder Explor. Exped.] Trans. Royal Soc. S. Australia, vol. 16, pp. 237-332, 32 pl.

- HEMMING, FRANCIS (*chairman*), ET AL.
 1938. Report of the Committee of Experts relating to the species recommended for inclusion in the Annex to the Convention on the occasion of its next revision. Second Internat. Conference Protection Fauna and Flora Africa, London, May, 1938, paper 16, pp. [2]+25 (mimeographed).
- HEMPRICH, F. W., AND C. G. EHRENBERG
 1828-1833. *Symbolae physicae seu icones et descriptiones mammalium*. Decas 1, 1828 [plates published in 1828; part of text not until 1833]. Decas 2, 1830 [published in 1833; *fide* C. D. Sherborn].
- HENFREY, T. H.
 1928. Is game preservation compatible with the agricultural development, with special reference to Tanganyika Territory. *Jour. Soc. Preservation Fauna Empire*, n. s., pt. 8, pp. 117-119.
 1929. The menace to the elephant in Tanganyika Territory. *Jour. Soc. Preservation Fauna Empire*, n. s., pt. 9, pp. 51-53.
- HEPTNER, W.
 1934. Notiz über den südrussischen Tarpan. *Zeitschr. f. Säugetierkunde*, vol. 9, pp. 431-433.
- HEUDE, P. M.
 1894. Notes sur le genre *Capricornis*. *Mém. Hist. Nat. Empire Chinois*, vol. 2, pp. 222-234, 4 pl.
- HEUGLIN, TH. V.
 1861. Forschungen über die Fauna des Rothen Meeres und der Somáli-Küste. *Petermanns Mittheilungen 1861*, Heft 1, pp. 11-32.
- HEUGLIN, M. TH. VON
 1874. Reisen nach dem Nordpolarmeer in den Jahren 1870 und 1871. Dritter Theil: Beiträge zur Fauna, Flora und Geologie. Braunschweig: pp. viii+352, 1 pl.
 1877. Reise in Nordost-Afrika. Vol. 2. Braunschweig: pp. vii+304, 6 pl.
- HEYNSIUS-VIRULY (Mrs.) AND F. C. VAN HEURN
 1936. A survey of data received from the Dutch Indies. *Special Publ. Am. Comm. International Wild Life Protection*, no. 8, pp. 24-73, 1 map.
- HILTON-SIMPSON, M. W.
 1906. Algiers and beyond. London: pp. 1-295, illus., 1 map.
- HILZHEIMER, MAX
 1909. Was ist *Equus equiferus* Pallas? *Naturwissen. Wochenschr.*, vol. 24 (n. s. vol. 8), no. 51, pp. 810-812.
 1912. Die in Deutschland aufbewahrten Reste des Quaggas. *Abhandl. Senckenb. Naturf. Gesell.*, vol. 31, no. 2, pp. 83-105, 6 pl., 2 fig.
 1913. Über neue Gepparden nebst Bemerkungen über die Nomenklatur dieser Tiere. *Sitz.-ber. Gesell. naturf. Freunde Berlin 1913*, no. 5, pp. 283-292, 4 fig.

HILZHEIMER, MAX—*Cont.*

1933. Hat der Vielfrass noch in der Neuzeit in Norddeutschland wild gelebt? *Zeitschr. f. Säugetierkunde*, vol. 8, pp. 219-221.
1936. Über drei neue Formen des Rentieres. *Zeitschr. f. Säugetierkunde*, vol. 11, no. 1, pp. 154-158, 1 fig.

HINDLIP, [Lord]

1906. Sport and travel—Abyssinia and British East Africa. London: pp. 1-332, illus., 2 maps.

HINGSTON, R. W. G.

1930. Report on a mission to East Africa for the purpose of investigating the most suitable methods of ensuring the preservation of its indigenous fauna. *Jour. Soc. Preservation Fauna Empire*, n. s., pt. 12, pp. 21-57.
1932. Exhibit of game animals of the Empire at the Natural History Museum. *Jour. Soc. Preservation Fauna Empire*, n. s., pt. 17, pp. 55-58.

HINTON, M. A. C.

1935. Changes in the British fauna and flora during the past fifty years. (1) Mammals. *Proc. Linnean Soc. London 1935-36*, pt. 1, pp. 33-34.

Ho, Hsi J.

1935. A serow from Wu-hu. *China Jour.*, vol. 23, no. 3, pp. 175-176.

HOBLEY, C. W.

1931. The rhinoceros. *Jour. Soc. Preservation Fauna Empire*, n. s., pt. 14, pp. 18-23.
- 1932a. Wild life and disease. *Jour. Soc. Preservation Fauna Empire*, n. s., pt. 16, pp. 16-28.
- 1932b. The rhinoceros. *Jour. Soc. Preservation Fauna Empire*, n. s., pt. 17, pp. 20-21.
1933. The London Convention of 1900. *Jour. Soc. Preservation Fauna Empire*, n. s., pt. 20, pp. 33-49.
- 1934a. Elephant control. *Jour. Soc. Preservation Fauna Empire*, n. s., pt. 21, pp. 51-57.
- 1934b. The Koala or Australian Native Bear. *Jour. Soc. Preservation Fauna Empire*, n. s., pt. 21, pp. 77-79.
- 1934c. Native trapping methods. *Jour. Soc. Preservation Fauna Empire*, n. s., pt. 23, pp. 19-24.

HODGSON, B. H.

1839. On three new species of Musk (*Moschus*) inhabiting the Hemalayan districts. *Jour. Asiatic Soc. Bengal*, vol. 8, no. 87, pp. 202-203.
1847. On various genera of the ruminants. *Jour. Asiatic Soc. Bengal*, vol. 16, pt. 2, pp. 685-711, 1 pl.

HOLLISTER, N.

1911. A new musk-deer from Korea. *Proc. Biol. Soc. Washington*, vol. 24, pp. 1-2.
1912. New mammals from Canada, Alaska, and Kamchatka. *Smithsonian Misc. Coll.*, vol. 56, no. 35, pp. 1-8, 3 pl.

HOLLISTER, N.—*Cont.*

1918, 1919*b*, 1924. East African mammals in the United States National Museum. U. S. Nat. Mus. Bull. 99: pt. 1, Insectivora, Chiroptera, and Carnivora, pp. 1-194, 55 pl., 3 fig., 1 map, 1918; pt. 2, Rodentia, Lagomorpha, and Tubulidentata, pp. x+184, 43 pl., 2 maps, 1919; pt. 3, Primates, Artiodactyla, Perissodactyla, Proboscidea, and Hyracoidea, pp. viii+164, 56 pl., 2 maps, 1924.

1919*a*. A new name for the wild sheep of northeastern China. Proc. Biol. Soc. Washington, vol. 32, p. 46.

HOLMWOOD, FREDERICK

1878. Remarks upon a young specimen of Temminck's Manis (*Manis temminckii*). Proc. Zool. Soc. London 1878, pp. 632-633.

HOME, EVERARD

1808. An account of some peculiarities in the anatomical structure of the wombat, with observations on the female organs of generation. Philos. Trans. Royal Soc. London 1808, pp. 304-313, 1 pl.

HONE, ELISABETH

1933. African game protection. Special Publ. Am. Committee International Wild Life Protection, vol. 1, no. 3, pp. 1-45, 1 map.

HORSFIELD, THOMAS

1851. A catalogue of the Mammalia in the Museum of the East-India Company. London: pp. vi+212.

HOSE, CHARLES

1893. A descriptive account of the mammals of Borneo. London: pp. 1-78, 3 pl., 1 map.

HOWELL, A. BRAZIER

1929. Mammals from China in the collections of the United States National Museum. Proc. U. S. Nat. Mus., vol. 75, art. 1, pp. 1-82, 10 pl.

HOY, CHAS. M.

1923. The present status of the Australian mammal fauna. Jour. Mammalogy, vol. 4, pp. 164-166.

HUBBACK, THEODORE R.

1923. Game in Malaya. Jour. Soc. Preservation Fauna Empire, n. s., pt. 3, pp. 20-26.

1932. Report of the Wild Life Commission of Malaya. Vol. 2—Recommendations. Singapore: pp. 289+ix, 30 pl., 3 maps.

1936. Principles of wild life conservation. (Reprinted from Game and Gun.) London: pp. 1-24, 5 pl., 1 fig.

1937. The Malayan gaur or seladang. Jour. Mammalogy, vol. 18, no. 3, pp. 267-279, 4 fig.

HUBBARD, WYNANT DAVIS

1926. Notes on the antelopes and zebra of Northern Rhodesia and Portuguese East Africa. Jour. Mammalogy, vol. 7, no. 3, pp. 184-193.

HULL, A. F. BASSET

1923. Protection of our native fauna. Australian Zoologist, vol. 3, pt. 3, pp. 88-91.

1929. Our native fauna — a wasted asset. Australian Zoologist, vol. 6, pt. 1, pp. 6-13.

HUTTON, THOS.

1842. The wild sheep of Afghanistan—"Koh-i-poombur" of the Afghans.—Bearded Sheep of Pennant? Calcutta Jour. Nat. Hist., vol. 2, pp. 514-521, 1 pl.

INUKAI, TETSUO

1932a. Observations on the hibernation lair of the Yezo brown bear. Trans. Sapporo Nat. Hist. Soc., vol. 12, pts. 2-3, pp. 175-179. 5 fig.

1932b. A preliminary note on changes of mammalian fauna since the settlement of Hokkaido. Proc. Imper. Acad. [Tokyo], vol. 8, no. 10, pp. 524-527.

INVERARITY, J. D.

1895. The Indian wild buffalo. Jour. Bombay Nat. Hist. Soc., vol. 10, pp. 41-52, 3 pl.

IRBY, FLORENCE M.

1931. "Mirram"—"Little Happy One." [*Petaurus breviceps*.] Australian Zoologist, vol. 7, pt. 1, pp. 11-14.

IREDALE, TOM, AND E. LE G. TROUGHTON

1934. A check-list of the mammals recorded from Australia. Australian Mus., Mem. 6, pp. xi+122.

IRWIN, A. J.

1914a. Notes on the races of Serow, or Goat-Antelope, found in Siam. Jour. Nat. Hist. Soc. Siam, vol. 1, pp. 19-26.

1914b. Distribution of the "lamang" deer (*Cervus eldi platyceros*). Jour. Nat. Hist. Soc. Siam, vol. 1, pp. 113-115.

JACOBI, ARNOLD

1931. Das Rentier. Zool. Anz., suppl. vol. 96, pp. vii+264, 6 pl., 32 fig.

JANIKOWSKI, T.

1942. The wild horse of Poland. Nature, vol. 150, no. 3815, pp. 681-682, 5 fig.

JARVIS, C. S.

1932. Yesterday and to-day in Sinai. Boston and New York: pp. xv+312, 24 pl., 2 fig., 2 maps.

1935. Sinai. Jour. Soc. Preservation Fauna Empire, n. s., pt. 25, p. 16.

JENNISON, GEORGE

1937. Animals for show and pleasure in ancient Rome. Manchester: pp. xiv+209, 9 pl., 11 fig.

JENTINK, F. A.

1882. Revision of the Manidae in the Leyden Museum. Notes Leyden Mus., vol. 4, no. 25, pp. 193-209.

1885. On two re-discovered antelopes. Notes Leyden Mus., vol. 7, pp. 269-273, 2 pl.

JENTINK, F. A.—*Cont.*

1888. Zoological researches in Liberia. A list of mammals, collected by J. Büttikofer, C. F. Sala and F. X. Stampfli, with biological observations. Notes Leyden Mus., vol. 10, pp. 1-58, 1 map.
1901. On *Cephalophus silvicultor* (Afzelius). Notes Leyden Mus., vol. 22, no. 14, pp. 179-187, 2 pl.

JERDON, T. C.

1874. The mammals of India. London: pp. xxxi+335.

JERNIGAN, T. J.

1908. Shooting in China. Shanghai: pp. 1-313, illus.

JOHNSON, ERIC

1937. List of vanishing Gambian mammals. Jour. Soc. Preservation Fauna Empire, n. s., pt. 31, pp. 62-66.

JOHNSTON, HARRY

1898. On the larger mammals of Tunisia. Proc. Zool. Soc. London 1898, pp. 351-353.
1902. The Uganda Protectorate. Vol. 1. New York and London: pp. xx+470, 42 pl., 253 fig., 7 maps.
1906. Liberia. London: vol. 2, pp. i-xvi, 521-1183, 16 pl., 218 fig., 3 maps.

JOHNSTON, R. F.

1908. From Peking to Mandalay. London: pp. xii+460, illus., map.

JOLEAUD, L.

1927. Études de géographie zoologique sur la Berbérie: Le Mouflon à manchettes. C. R. Soc. Biogéographie, no. 27 (4th yr.), pp. 43-45.
1929. Études de géographie zoologique sur la Berbérie. Les Ruminants. V. Les Gazelles. Bull. Soc. Zool. France, vol. 54, pp. 438-457.

JONES, FREDERIC WOOD

- 1923a. The marsupial genus *Thalacomys*. Records S. Australian Mus., vol. 2, no. 3, pp. 333-352, 9 fig.
- 1923b, 1924, 1925. The mammals of South Australia. Parts 1-3. Adelaide: pp. 1-458, 311 fig.

JONES, F. WOOD, AND D. MANSON

1935. Victoria. Notes on the native fauna. Jour. Soc. Preservation Fauna Empire, n. s., pt. 24, pp. 31-35.

JOURDAN, —

1837. Mémoire sur quelques mammifères nouveaux. C. R. Acad. Sci. [Paris], vol. 5, pp. 521-524.

KABURAKI, TOKIO

- 1934a. Effect of some exotic plants and animals upon the flora and fauna of Japan. Proc. Fifth Pacific Sci. Congress, Canada, 1933, vol. 1, pp. 801-805.
- 1934b. Preservation of zoological natural monuments in Japan. Proc. Fifth Pacific Sci. Congress, Canada, 1933, vol. 5, pp. 4183-4188.

KARÉLINE, G. S.

1841. Voyage de Mr. Karéline. Bull. Soc. Impér. Naturalistes Moscou 1841, no. 3, pp. 559-573.

KAUDERN, W.

1915. Säugetiere aus Madagaskar. Arkiv f. Zoologi, vol. 9, no. 18, pp. 1-101, 4 pl., 3 maps.

KELLER, CONRAD

1902. Die Abstammung der ältesten Haustiere. Zürich: pp. v+232, 81 fig.

KEMP, P. R.

1918. Some notes on *Cervus (Rucervus) schomburgki*. Jour. Nat. Hist. Soc. Siam, vol. 3, pp. 1-9, 1 pl.

KENNION, R. L.

1911. By mountain, lake, and plain. Being sketches of sport in eastern Persia. Edinburgh and London: pp. xiii+283, 51 pl.
1915. Persia, pp. 58-70, 6 pl. In: The gun at home & abroad. The big game of Asia and North America. London.

KERR, A.

1927. Young Malayan Tapir. Jour. Siam Soc., Nat. Hist. Suppl., vol. 7, p. 129, 1 pl.

KERR, ROBERT

1792. The animal kingdom, or zoological system, of the celebrated Sir Charles Linnaeus. London: pp. xii+ [28]+644, 10 pl.

KERSHAW, JAS. A.

1909. Notes on the Hairy-nosed Wombat, *Phascolomys latifrons*, Owen. Victorian Naturalist, vol. 26, no. 8, pp. 118-119.
1934. The Koala on Wilson's Promontory. Victorian Nat., vol. 51, no. 3, pp. 76-77, 1 pl.

KIES, C. H. M. H.

1936. Nature protection in the Netherlands Indies. Special Publ. Am. Comm. International Wild Life Protection, no. 8, pp. 11-23.

KINGHORN, J. R.

1928. Faunal problems. Australian Zool., vol. 5, pt. 3, pp. 205-216.

KINLOCH, ALEXANDER A. A.

1892. Large game shooting: Thibet, Himalayas, northern and central India. Ed. 3. Calcutta: pp. 1-291, illus., 1 map.

KINNEAR, N. B.

1920. The past and present distribution of the lion in south eastern Asia. Jour. Bombay Nat. Hist. Soc., vol. 27, no. 1, pp. 33-39.
1934. [Notes on the Scotch wild cat.] Proc. Linnean Soc. London, session 1933-34, pt. 2, p. 68.

KIRK, JOHN

1865. List of Mammalia met with in Zambesia, East Tropical Africa. Proc. Zool. Soc. London 1864, pp. 649-660.

KLEMM, M.

1930. Ein Photo vom Zobel (*Martes zibellina* L.). Zeitschr. f. Säugetierkunde, vol. 5, p. 367, 1 fig.

KLOSS, C. BODEN

1916. On some Siamese mammals. Jour. Nat. Hist. Soc. Siam, vol. 2, pp. 77-87.
1917. On a third collection of Siamese mammals. Jour. Nat. Hist. Soc. Siam, vol. 2, pp. 288-318.
- 1919a. On a fourth collection of Siamese mammals. Jour. Nat. Hist. Soc. Siam, vol. 3, pp. 49-69.
- 1919b. On mammals collected in Siam. Jour. Nat. Hist. Soc. Siam, vol. 3, pp. 333-407, 2 pl.
1921. A habitat of Schomburgk's deer (*Cervus schomburgki*). Jour. Nat. Hist. Soc. Siam, vol. 4, p. 105.
1927. The One-horned Rhinoceros in the Malay Peninsula. Jour. Federated Malay States Museums, vol. 13, pt. 4, pp. 207-208, 1 pl.
1929. The *Arctictis* of Java. Treubia, vol. 10, livr. 4, p. 497.

KOLBEN, PETER

1731. The present state of the Cape of Good-Hope. Vol. 2. London: pp. xviii+363, 12 pl., 1 map.

KORSAK, WŁODZIMIERZ

1934. The elk. Its status in Poland. (Extracts from Pamphlet No. 40 of State Council for Protection of Nature in Poland.) Jour. Soc. Preservation Fauna Empire, n. s., pt. 23, pp. 76-79.

KOWARZIK, RUD.

1913. Etwas über die Arten der Wildschafe und ihre Verbreitung. Zool. Anzeiger, vol. 41, no. 10, pp. 439-445.

KREFFT, GERARD

1871. The mammals of Australia. Sydney: 51 pp., 15 pl.

KRÜGER, A.

1931. Der Biberschut. Zeitschr. f. Säugetierkunde, vol. 6, pp. 52-56.

KRUMBIEGEL, INGO

1930. Mammalia I. In: Paul Schulze, Biologie der Tiere Deutschlands, Lief. 31, Teil 52. Berlin: pp. 1-224, 102 fig.

KUIPER, K.

1926. On a black variety of the Malay Tapir (*Tapirus indicus*). Proc. Zool. Soc. London 1926, pp. 425-426, 1 pl.

KULL, ALBERT

1894. Ein interessantes Nagetier (*Lophiomys inhausii* M. Edwards). Zool. Garten, vol. 35, no. 5, pp. 134-138, 1 fig.

KUNTZE, ROMAN

1932. Benediktus Dybowski als Säugetierforscher. Zeitschr. f. Säugetierkunde, vol. 7, pp. 39-54, 4 fig.
1935. Mitteilungen über die Systematik und geographische Verbreitung einiger Säugetierarten der polnischen Fauna. Zeitschr. f. Säugetierkunde, vol. 10, pp. 62-72, 2 maps.

KURODA, NAGAMICHI

1928. The mammal fauna of Sakhalin. Jour. Mammalogy, vol. 9, no. 3, pp. 222-229.
1938. A list of the Japanese mammals. Tokyo: pp. [2]+iii+122.

"KURRAJONG"

1931. The extermination of our native fauna. (Extract from *The Queenslander*, 3rd September, 1931.) Jour. Soc. Preservation Fauna Empire, n. s., pt. 15, pp. 84-86.

LACÉPÈDE AND CUVIER.

1801. La ménagerie du Muséum National d'Histoire Naturelle. Paris: pp. 1-9+39 unnumbered pls. and accompanying text.

LADYJENSKY, —

1841. Envoi d'un Djighittay. Bull. Soc. Impér. Naturalistes Moscou 1841, no. 2, pp. 361-362.

LANG, HERBERT

1918. In quest of the rare Okapi. New York Zool. Soc. Bull., vol. 21, no. 3, pp. 1600-1614, 11 fig., 1 map.
1920. The white rhinoceros of the Belgian Congo. New York Zool. Soc. Bull., vol. 23, no. 4, pp. 65-92, 32 fig., 1 map.
1923. Recent and historical notes on the square-lipped rhinoceros (*Ceratotherium simum*). Jour. Mammalogy, vol. 4, no. 3, pp. 155-163, 1 pl., 1 fig., 1 map.
1924. Threatened extinction of the white rhinoceros (*Ceratotherium simum*). Jour. Mammalogy, vol. 5, no. 3, pp. 173-180.

LANKESTER, E. RAY

1902. On *Okapia*, a new genus of Giraffidae, from Central Africa. Trans. Zool. Soc. London, vol. 16, pp. 279-314, 3 pl., 15 fig.
1907. Parallel hair-fringes and colour-stripping on the face of foetal and adult Giraffes. Proc. Zool. Soc. London 1907, pp. 115-125, 1 pl., 12 fig.

LANKESTER, E. RAY, AND W. G. RIDEWOOD

1910. Monograph of the Okapi. Atlas. London: pp. i-viii, 48 pl.

LATASTE, FERNAND

1885. Étude de la faune des vertébrés de Barbarie (Algérie, Tunisie et Maroc). Actes Soc. Linnéenne Bordeaux, vol. 39, pp. 129-299.

LATTIMORE, OWEN

1929. The desert road to Turkestan. Boston: pp. xv+373, 32 pl., 2 maps.

LAUFER, BERTHOLD

1917. The reindeer and its domestication. Mem. Am. Anthrop. Assoc., vol. 4, no. 2, pp. 91-147.

LAURENT, PAUL

1935. Contribution à la connaissance de la faune des vertébrés du Maroc (batraciens, reptiles, mammifères). Bull. Soc. Hist. Nat. Afrique du Nord, vol. 26, no. 9, pp. 344-359.

LAVAUDEN, LOUIS

1924. La chasse et la faune cynégétique en Tunisie. (Ed. 2.) Tunis: pp. 1-59, 16 fig., 1 map.
1926. Les gazelles du Sahara central. Bull. Soc. Hist. Nat. Afrique du Nord, vol. 17, pp. 11-27, 2 pl., 1 fig., 1 map.
1929. Sur le chat sauvage de la Corse. C. R. Acad. Sci. [Paris], vol. 189, no. 23, pp. 1023-1024.

LAVAUDEN, LOUIS—*Cont.*

1930. Notes de mammalogie Nord-Africaine. La gazelle rouge. Bull. Soc. Zool. France, vol. 55, pp. 327-332.
1931. Un nouveau Propithèque de Madagascar (*Propithecus Perrieri*, sp. nov.). C. R. Acad. Sci. [Paris], vol. 193, no. 1, pp. 77-79.
1932. La chasse et la faune cynégétique en Tunisie. Tunis: pp. 1-45.
1933. La diminution et la protection rationnelle de la grande faune africaine. Brazzaville: pp. 1-38, 2 maps.
1934. Les grands animaux de chasse de l'Afrique française (A. O. F., A. E. F. et Cameroun). Faune des Colonies françaises, vol. 5, fasc. 7, pp. 323-497, 20 pl., 30 fig., 4 maps.

LAYARD, AUSTEN HENRY

1850. Nineveh and its remains. Vol. 1. New York: pp. viii+326, 17 pl., 1 map.

LEARED, ARTHUR

1876. Morocco and the Moors. London: pp. 1-365, illus.

LECHE, WILHELM

1904. Zoologie. In: Sven Hedin, Scientific results of a journey in Central Asia 1899-1902, vol. 6, pt. 1, pp. 1-69, 5 pl., 80 fig.

LEDWARD, C. N.

1936. The game sanctuaries of Natal. National Provincial Administration, Pietermaritzburg: pp. 1-32, 32 fig., 1 map.

LEGENDRE, SIDNEY J.

1939. Iran. Nat. Hist., vol. 44, no. 4, pp. 234-241, 12 fig.

LEISTER, CLAUDE W.

1934. Wild sheep, goats and rock antelopes. Bull. New York Zool. Soc., vol. 37, no. 1, pp. 2-26, 39 fig., 1 map.
1935. Trophies of the chase. Bull. New York Zool. Soc., vol. 38, no. 2, pp. 52-65, 19 fig.
1938. Antelopes in retrospect. Bull. New York Zool. Soc., vol. 41, no. 3, pp. 75-93, 26 fig.

LEOPOLD, ALDO

1936. Naturschutz in Germany. Bird-Lore, vol. 38, pp. 102-111, 6 fig.

LEPLAE, EDM.

1925. Les grands animaux de chasse du Congo belge. Ministère des Colonies, Bruxelles: pp. 1-127, illus.

LEPRI, G.

1930. Sopra una nuova sottospecie del genere *Ammotragus*. Atti Pontif. Accad. Sci. Nuovi Lincei, Anno 83, pp. 269-271.

LESLIE, LIONEL A. D.

1931. Wilderness trails in three continents. London: pp. xvi+223, 24 pl.

LE SOUEF, A. S.

- 1923a. The Australian native animals. Australian Zoologist, vol. 3, pt. 3, pp. 108-111, 1 pl.
- 1923b. The Great Grey Kangaroo (*Macropus giganteus*) and its allies. Australian Zoologist, vol. 3, pt. 4, pp. 145-147, 2 pl.
- 1924a. Notes on some rock wallabies, genus *Petrogale*, with descriptions of two new species. Australian Zoologist, vol. 3, pt. 7, pp. 272-276.

LE SOUEF, A. S.—*Cont.*

- 1924*b*. The Australian fauna. Jour. Soc. Preservation Fauna Empire, n. s., pt. 4, pp. 57-59.
1928. The *Macropus robustus* group of Kangaroos. Australian Zoologist, vol. 5, pt. 3, pp. 247-256, 1 pl.
1929. Notes on some mammals from Bass Strait Islands. Australian Zoologist, vol. 5, pt. 4, pp. 329-332, 1 pl.
1930. Occasional notes. Australian Zoologist, vol. 6, pt. 2, pp. 110-111.
1932. How Australian fauna fares. Jour. Soc. Preservation Fauna Empire, n. s., pt. 16, pp. 45-48.

LE SOUEF, A. S., AND HARRY BURRELL

1926. The wild animals of Australasia. With a chapter on the bats of Australia and New Guinea by Ellis Le G. Troughton. London, Calcutta, Sydney: pp. 1-388, 113 fig.

LE SOUËF, W. H. DUDLEY

1907. Wild life in Australia. Christchurch, Wellington, and Dunedin, N. Z.; Melbourne and London: pp. xv+439, illus.

LETCHER, OWEN

1911. Big game hunting in N. E. Rhodesia. London: pp. ix+256.

LE VAILLANT, FRANÇOIS

1790. Voyage . . . dans l'intérieur de l'Afrique, par le Cap de Bonne-Espérance, dans les années 1780, 81, 82, 83, 84, & 85. Paris: vol. 1, pp. xxiii+275, 6 pl.; vol. 2, pp. 1-292, 6 pl.
1795. Second voyage dans l'intérieur de l'Afrique, par le Cap de Bonne-Espérance, dans les années 1783, 84 et 85. Vol. 2. Paris: pp. 1-426+[2], 8 pl.

LEWIS, F.

- 1928*a*. Kangaroos in Victoria. Victorian Naturalist, vol. 45, no. 2, p. 51.
- 1928*b*. Victoria, Australia. Summary of legislative and administrative effort to protect and conserve native fauna. Jour. Soc. Preservation Fauna Empire, n. s., pt. 8, pp. 98-102.
1930. The future of our fauna. Victorian Naturalist, vol. 47, no. 5, pp. 76-82.
1931. Rock Wallaby in Victoria. Victorian Naturalist, vol. 58, no. 6, p. 120.
1934. The Koala in Victoria. Victorian Naturalist, vol. 51, no. 3, pp. 73-76, 2 pl.

LICHTENSTEIN, HENRY

1812. Travels in southern Africa, in the years 1803, 1804, 1805, and 1806. Vol. 1. London: pp. xii+383+[34], 5 pl.
- 1827-1834. Darstellung neuer oder wenig bekannter Säugethiere. Berlin: 50 pl. and accompanying unnumbered pp.

LITTLEDALE, ST. GEORGE

1894. Field-notes on the Wild Camel of Lob-Nor. Proc. Zool. Soc London 1894, pp. 446-448, 1 fig.

LLOYD, LLEWELYN

1854. Scandinavian adventures, vol. 2. London.

LOCH, CHARLES W.

1937. The Javan or Lesser one-horned rhinoceros and its geographical distribution. Jour. Malayan Branch Royal Asiatic Soc., vol. 15, pt. 2, pp. 130-149, 2 pl., 1 map.

LOCHE, [Victor]

1867. Exploration scientifique de l'Algérie pendant les années 1840, 1841, 1842 . . . Sciences physiques, zoologie. Histoire naturelle des mammifères. Paris: pp. 1-123, 7 pl.

LODER, EDMUND GILES

1894. On the "Reem" Antelope of Algeria. Proc. Zool. Soc. London 1894, pp. 473-476.

LÖNNBERG, EINAR

1906. Notes on the geographical distribution of the Okapi. Proc. Zool. Soc. London 1905, vol. 2, pp. 309-310.
1909. Taxonomic notes about Palearctic Reindeer. Arkiv f. Zoologi, vol. 6, no. 4, pp. 1-18, 5 fig.
1912. Mammals collected by the Swedish Zoological Expedition to British East Africa 1911. Kungl. Svenska Vet.-Akad. Handl., vol. 48, no. 5, pp. 1-188, 15 pl., 6 fig.
1917. Mammals collected in Central Africa by Captain E. Arrhenius. K. Svenska Vet.-Akad. Handl., vol. 58, no. 2, pp. 1-110, 12 pl., 11 fig.
1919. Notes on the members of the genera *Cephalophus* and *Sylvicapra* in the Congo Museum. Rev. Zool. Africaine, vol. 7, fasc. 2, pp. 162-185.

LONGMAN, HEBER A.

1923. Is the kangaroo doomed? Australian Zoologist, vol. 3, pt. 3, pp. 103-107.
1924. The zoogeography of marsupials, with notes on the origin of the Australian fauna. Mem. Queensland Mus., vol. 8, pt. 1, pp. 1-15.
1930. The marsupials of Queensland. Mem. Queensland Mus., vol. 10, pt. 1, pp. 55-64.
1939. A central Queensland Wombat. Mem. Queensland Mus., vol. 11, pt. 3, pp. 283-287, 1 pl.

LORD, CLIVE

1928. Existing Tasmanian marsupials. Papers and Proc. Royal Soc. Tasmania 1927, pp. 17-24.

LORD, CLIVE E., AND H. H. SCOTT

1924. A synopsis of the vertebrate animals of Tasmania. Hobart: pp. v+340, illus.

LORENZ-LIBURNAU, LUDWIG VON

1898. Säugetiere von Madagascar und Sansibar. Gesammelt von Dr. A. Voeltzkow. Abhandl. Senckenb. Naturf. Gesell., vol. 21, no. 3, pp. 441-469, 4 pl.

LOUIS, JULIEN ADRIEN HILAIRE

1894. The gates of Thibet. Ed. 2. Calcutta: pp. 1-183, illus., map.

LUCAS, A. H. S., AND W. H. DUDLEY LE SOUËF

1909. The animals of Australia. Mammals, reptiles and amphibians. Melbourne: pp. xi+327, illus.

LUMHOLTZ, CARL

1920. Through central Borneo. Vol. 1. New York: pp. xix+242, illus.

LUNDBERGH, HOLGER

1933. Saving Sweden's wild fauna. Nature Mag., vol. 22, no. 3, p. 132, 1 fig.

LYDEKKER, RICHARD

1885. Catalogue of the fossil Mammalia in the British Museum (Natural History). Part 1. London: pp. xxx+268, 33 fig.

1893-1894. The Royal Natural History. Vol. 1. Mammals. London and New York: xvi+583, illus.

1894. A hand-book to the Marsupialia and Monotremata. London: pp. xvii+302, 38 pl., 11 fig.

1896. A geographical history of mammals. Cambridge: xii+400, 82 fig., 1 map.

1897. On an apparently new Deer from North China, in the menagerie of the Duke of Bedford at Woburn Abbey. Proc. Zool. Soc. London 1896, pp. 930-934, 2 pl.

1898a. On the geographical races of the Banting. Proc. Zool. Soc. London 1898, pp. 276-278, 1 pl.

1898b. The deer of all lands. London: pp. xx+329, 24 pl., 80 fig.

1898c. Wild oxen, sheep, and goats of all lands, living and extinct. London: pp. xiv+318, 27 pl., 61 fig.

1900. The great and small game of India, Burma, & Tibet. London: pp. xviii+416, 9 pl., 62 fig.

1901. The great and small game of Europe, western & northern Asia, and America; their distribution, habits, and structure. London: pp. xx+445, 8 pl., 75 fig.

1902a. Exhibition of, and remarks upon, a mounted head of a Siberian Wapiti. Proc. Zool. Soc. London 1902, vol. 2, p. 79.

1902b. The Wild Sheep of the Upper Ili and Yana Valleys. Proc. Zool. Soc. London 1902, vol. 2, pt. 1, pp. 80-85, 2 pl., 2 fig.

1903a. Note on a Reindeer skull from Novaia Zemlia. Proc. Zool. Soc. London 1902, pt. 2, pp. 360-362, 1 fig.

1903b. Mostly mammals. London: pp. ix+383, 16 pl.

1904a. On the subspecies of *Giraffa camelopardalis*. Proc. Zool. Soc. London 1904, vol. 1, pp. 202-227, 8 pl., 15 fig.

1904b. Note on the Wild Ass of Mongolia. Proc. Zool. Soc. London 1904, vol. 1, pp. 431-432, 2 pl.

1904c. Notes on the specimens of wild asses in English collections. Novit. Zool., vol. 11, pp. 583-596, 4 pl.

1904d. The north Persian wild sheep. Field, vol. 104, no. 2711, p. 1031.

1905a. On old pictures of Giraffes and Zebras. Proc. Zool. Soc. London 1904, vol. 2, pp. 339-345, 5 fig.

1905b. On the Nigerian and Kilimanjaro Giraffes. Proc. Zool. Soc. London 1905, vol. 1, pp. 119-121, 2 pl.

1905c. A new (?) anoa. Field, vol. 106, no. 2747, p. 378.

1905d. Some Tibetan animals. (Reprinted from Knowledge and Illustrated Scientific News, London, September, 1904.) Ann. Rept. Smithsonian Inst. 1904, pp. 429-435, 5 fig.

LYDEKKER, RICHARD—*Cont.*

1908. The game animals of Africa. London: pp. xix+484, 15 pl., 98 fig.
- 1909a. The big sheep of the Thian Shan. *Field*, vol. 13, no. 2925, p. 117.
- 1909b. The Sze-chuen and Bhutan Takins. *Proc. Zool. Soc. London* 1908, pp. 795-802, 1 pl., 4 fig.
- 1909c. On two Chinese Serow-skulls. *Proc. Zool. Soc. London* 1908, pp. 940-944, 2 fig.
- 1909d. On the skull of a Black Bear from Eastern Tibet, with a note on the Formosan Bear. *Proc. Zool. Soc. London* 1909, pp. 607-610, 2 fig.
1910. Aurochs. Beaver. Bison. *Encycl. Brit.*, vol. 2, pp. 926-927; vol. 3, p. 600; vol. 4, p. 11.
- 1911a. On a Wapiti and a Muntjac. *Proc. Zool. Soc. London* 1910, pp. 987-991, 2 fig.
- 1911b. Two undescribed giraffes. *Nature*, vol. 87, no. 2189, p. 484.
- 1911c. On the Mountain Nyala, *Tragelaphus burxtoni*. *Proc. Zool. Soc. London* 1911, pp. 348-353, 1 pl., 1 fig.
- 1912a. The horse and its relatives. New York and London: pp. xii+286, 24 pl., 11 fig.
- 1912b. The ox and its kindred. London: pp. xi+271, 24 pl., 7 fig.
- 1912c. The North Rhodesian Giraffe. *Proc. Zool. Soc. London* 1912, pt. 4, pp. 771-773, 1 pl.
- 1912d. The Bornean Bantin. *Proc. Zool. Soc. London* 1912, pp. 902-906, 3 fig.
- 1913a. The sheep and its cousins. New York: pp. xv+315, 24 pl., 11 fig.
- 1913b. Catalogue of the heads and horns of Indian big game bequeathed by A. O. Hume, C. B., to the British Museum (Natural History). London: pp. xvi+45, 1 pl., 16 fig.
- 1913c, 1915, 1916. Catalogue of the ungulate mammals in the British Museum (Natural History). London: vol. 1, pp. xvii+249, 55 fig., 1913; vol. 4, pp. xxi+438, 56 fig., 1915; vol. 5, pp. xlv+207, 1 portrait, 31 fig., 1916. (See also Lydekker, Richard, and Gilbert Blaine.)
- 1913d. The Transvaal race of the Cape, or Khama, Hartebeest. *Proc. Zool. Soc. London* 1913, pp. 818-821, 1 fig.
- 1914a. The Malay race of the Indian Elephant. *Abstr. Proc. Zool. Soc. London* 1914, no. 130, p. 20.
- 1914b. The Malay race of the Indian Elephant, *Elephas maximus hirsutus*. *Proc. Zool. Soc. London* 1914, pp. 285-288, 3 fig.

LYDEKKER, RICHARD, AND GILBERT BLAINE

1914. Catalogue of the ungulate mammals in the British Museum (Natural History). London: vol. 2, pp. xvi+295, 33 fig.; vol. 3, pp. xvi+283, 50 fig.

LYON, MARCUS WARD, JR.

1904. Classification of the hares and their allies. *Smithsonian Misc. Coll.*, vol. 45, pp. 321-447, 27 pl., 1 fig.

LYON, MARCUS WARD, JR.—*Cont.*

1908. Mammals collected in eastern Sumatra by Dr. W. L. Abbott during 1903, 1906, and 1907, with descriptions of new species and subspecies. Proc. U. S. Nat. Mus., vol. 34, pp. 619-679, 5 pl., 2 maps.
1916. Mammals collected by Dr. W. L. Abbott on the chain of islands lying off the western coast of Sumatra, with descriptions of twenty-eight new species and subspecies. Proc. U. S. Nat. Mus., vol. 52, pp. 437-462.

M'COY, FREDERICK

1867. On a new genus of phalanger. Ann. Mag. Nat. Hist., ser. 3, vol. 20, no. 118, pp. 287-288, 1 pl.

MCCOY, FREDERICK

1883. Natural history of Victoria. Prodrum of the zoology of Victoria. Vol. 1, decas 10. Melbourne and London: pp. 1-35, 10 pl.

MCKEOWN, KEITH C.

1923. The effects of settlement on wild life. Australian Zoologist, vol. 3, pt. 5, pp. 175-178.
1929. A naturalist on the south-west plains [New South Wales]. Australian Mus. Mag., vol. 3, no. 12, pp. 426-431, 7 fig.
1933. Impressions of Tasmania. Australian Mus. Mag., vol. 5, no. 3, pp. 137-143, 7 fig.

MAJOR, C. I. FORSYTH

1894. Über die Malagassischen Lemuriden-Gattungen *Microcebus*, *Opolemur*, und *Chirogale*. Novit. Zool., vol. 1, pp. 2-39, 2 pl.
1907. Exhibition of remains of a Bear from a cavern in Corsica. Proc. Zool. Soc. London 1907, p. 143.

MALBRANT, RENÉ

1936. Faune du centre africain français (Mammifères et Oiseaux). Paris: pp. viii+435, 29 pl., 77 fig., 1 map.

MARTENS, EDUARD v.

1876. Die Preussische Expedition nach Ost-Asien. Zool., vol. 1. Berlin: pp. xii+412, 15 pl.

MARTIN, RENÉ

1910. Mammifères de la France, de la Suisse romane et de la Belgique. Paris: pp. ix+202, 48 pl., 45 fig.

MARTORELLI, GIACINTO

1896. Nota zoologica sopra i Gatti selvatici e le loro affinità colle razze domestiche. Atti Soc. Ital. Sci. Nat. Milano, vol. 35, pp. 249-280, 2 pl.

MATSCHIE, PAUL

1893. Bemerkungen über asiatische Wildesel. Sitz.-ber. Gesell. Naturf. Freunde Berlin 1893, no. 8, pp. 206-208.
- 1894a. Die natürliche Verwandtschaft und die Verbreitung der *Manis*-Arten. Sitz.-ber. Gesell. Naturf. Freunde Berlin 1894, no. 1, pp. 1-11, 3 fig.
- 1894b. Die afrikanischen Wildpferde als Vertreter zoogeographischer Subregionen. Zool. Garten, vol. 35, no. 2, pp. 33-39; no. 3, pp. 65-74, 3 fig.

MATSCHIE, PAUL—*Cont.*

1895. Die Säugethiere Deutsch-Ost-Afrikas. Berlin: pp. xxviii+157, 75 fig.
1898. Einige anscheinend noch nicht beschriebene Säugethiere aus Afrika. Sitz.-Ber. Gesell. naturf. Freunde Berlin 1898, no. 7, pp. 75-81.
- 1903a. Ueber einen Gorilla aus Deutsch-Ostafrika. Sitz.-Ber. Gesell. Naturf. Freunde Berlin 1903, no. 6, pp. 253-259.
- 1903b. Gibt es in Mittelasien mehrere Arten von echten Wildpferden? Naturwissensch. Wochenschrift, vol. 18, no. 49, pp. 581-583, 1 fig.
1911. Ueber einige von Herrn Dr. Holderer in der südlichen Gobi und in Tibet gesammelte Säugetiere. In: K. Futterer, Durch Asien, vol. 3, V, Zoologie (Nachtrag), pp. 1-29.

MAUGHAM, R. C. F.

1914. Wild game in Zambezia. London: pp. 1-376, illus., 1 map.

MAURICE, F.

1927. An international park. Jour. Soc. Preservation Fauna Empire, n. s., pt. 7, pp. 20-22.

MAXWELL, MARCUSWELL

1930. Elephants and other big game studies from *The Times*. London: 1 p., 28 pl.

MAXWELL, MARIUS

1924. Stalking big game with a camera in Equatorial Africa. New York and London: pp. xx+311, 63 pl., 1 map.

MAYDON, H. C. (EDITOR)

1932. Big game shooting in Africa. By H. C. Maydon, the Duke of Gloucester, R. Akroyd, G. Blaine, R. E. Drake-Brockman, E. D. Browne, G. Burrard, A. L. Butler, A. L. Cooper, P. H. G. Powell-Cotton, A. P. Gordon-Cumming, H. L. Duke, Stevenson Hamilton, A. C. Knollys, Denis Lyell, A. T. A. Ritchie, M. W. Hilton Simpson, N. B. Smith, H. G. C. Swayne, J. L. F. Tweedie, H. F. Varian, R. C. Wood. London: pp. 1-445, 141 pl.

MAYDON, H. C.

1933. Distribution of African game. East Africa, April 13, 1933, p. 738.

MENGES, JOSEF

1885. Zweite Reise in das Somaliland und Besteigung des Gan-Libach. Petersmanns Mitteilungen, vol. 31, no. 12, pp. 449-460, 1 map.
1887. Der Wildesel des Somalilandes. (*Equus asinus somalicus*.) Zool. Garten, vol. 28, no. 9, pp. 261-268.
1894. Eine neue Antilope des Somalilandes. Zool. Anzeiger, vol. 17, no. 444, pp. 130-131.

MERTENS, A.

1906. Der Ur, *Bos primigenius* Bojanus. Abhandl. Ber. Mus. Natur- und Heimatk. Magdeburg, vol. 1, no. 2, pp. 45-119, 9 fig.

MERTENS, ROBERT

1936. Die Säugetiere der Inseln Bali, Lombok, Sumbawa und Flores. Zool. Jahrb., Abt. Syst., Ökol. Geog. Tiere, vol. 68, nos. 4/5, pp. 273-324, 2 pl.

MEYER, A. B.

1896. Säugethiere vom Celebes- und Philippinen-Archipel I. Abhandl. Ber. K. Zool. Anthropol.-Ethnogr. Mus. Dresden, vol. 6, no. 6, pp. viii+36, 15 pl.
1903. Bis wie weit in der historischen Zeit ist der Löwe in Griechenland nachweisbar? Zool. Garten, vol. 44, no. 3, pp. 65-73.

MIDDENDORFF, A. TH. V.

1853. Sibirische Reise. Vol. 2, pt. 2. Wirbelthiere, Lief. 1. St. Petersburg: pp. 1-256, 26 pl.

MILLAIS, JOHN GUILLE

1895. A breath from the veldt. London: pp. x+236, 25 pl., 125 fig.
- 1904-1906. The mammals of Great Britain and Ireland. London: vol. 1, pp. xx+365, 88 pl., 1904; vol. 2, pp. xi+299, 73 pl., 1905; vol. 3, pp. xii+384, 88 pl., 1906.
1914. European goats and sheep, pp. 370-379, 2 pl. In: The gun at home and abroad. The big game of Africa & Europe. London.
1915. The Asiatic reindeer and elk, pp. 216-224, 4 pl. In: The gun at home & abroad. The big game of Asia and North America. London.
1924. Far away up the Nile. London: pp. xii+254, 50 pl., 1 map.

MILLER, GERRIT S. [JR.]

1912. Catalogue of the mammals of Western Europe (Europe exclusive of Russia) in the collection of the British Museum. London: pp. xv+1019, 213 fig.
1942. Zoological results of the George Vanderbilt Sumatran Expedition, 1936-1939. Part V.—Mammals collected by Frederick A. Ulmer, Jr., on Sumatra and Nias. Proc. Acad. Nat. Sci. Philadelphia, vol. 94, pp. 107-165, 4 pl.

MILNE-EDWARDS (OR MILNE EDWARDS), ALPHONSE

- 1867a. Nouveau rongeur. L'Institut, vol. 35, no. 1727, pp. 46-47.
- 1867b. Mémoire sur le type d'une nouvelle famille de l'ordre des rongeurs. Nouv. Archives Mus. Hist. Nat. Paris, vol. 3, pp. 81-118, 5 pl.
1871. L'ordre des Lémuriens. Rev. Scientifique, ser. 2, year 1, no. 10, pp. 222-227.

MILNE-EDWARDS (OR MILNE EDWARDS), ALPH., ET ALFRED GRANDIDIER

1867. De l'organisation du *Cryptoprocta ferox*. Annales Sci. Nat., ser. 5, zool., vol. 7, pp. 314-338, 4 pl.
1872. Description d'une nouvelle espèce de Propitèque (*Propithecus sericeus*). Rev. et Mag. Zool., ser. 2, vol. 23, pp. 273-274.
- 1875a-1876. Histoire naturelle des mammifères. In: Grandidier's Histoire physique, naturelle et politique de Madagascar, vol. 6, tome 1, texte, 1. Paris: pp. iv+396, 1 fig. (Pp. 1-192 publ. in 1875; pp. 193-396, in 1876.)

MILNE-EDWARDS (OR MILNE EDWARDS), ALPH., ET ALFRED GRANDIDIER—
Cont.

1875*b*, 1890. Histoire naturelle des mammifères. In: Grandidier's Histoire physique, naturelle et politique de Madagascar. Paris: vol. 9, tome 4, atlas, I, 121 pl., 1 map, 1875; vol. 10, tome 5, atlas, II, pt. 1, 51 pl., 1890.

MILNE EDWARDS, A., A. GRANDIDIER ET H. FILHOL

1896-1897. Histoire naturelle des Mammifères. In: Grandidier's Histoire physique, naturelle et politique de Madagascar. Paris: vol. 10, tome 5, atlas, II, pt. 4, fasc. 41, 37 pl., 1896; vol. 10, pt. 2, tome 6, atlas, III, 20 pl., 1897.

MILNE EDWARDS, H., ET ALPHONSE MILNE EDWARDS

1868-1874. Recherches pour servir à l'histoire naturelle des Mammifères. Paris: vol. 1, pp. 1-394; vol. 2, pp. i-viii, 105 pl.

MILROY, A. J. W.

1934. The preservation of wild life in India. No. 3. Assam. Jour. Bombay Nat. Hist. Soc., vol. 37, no. 1, suppl., pp. 97-104.

MITCHELL, P. CHALMERS

1905. On a young female Giraffe from Nigeria. Proc. Zool. Soc. London 1905, vol. 1, pp. 244-248, 2 fig.

1921. The preservation of the African elephant. Jour. Soc. Preservation Fauna Empire, n. s., pt. 1, pp. 43-47.

1931. Zoos and national parks. Jour. Soc. Preservation Fauna Empire, n. s., pt. 15, pp. 21-43.

MITCHELL, T. L.

1838. Three expeditions into the interior of Eastern Australia. Vol. 2. London: pp. ix+405, illus.

MIVART, ST. GEORGE

1890. Dogs, jackals, wolves, and foxes: a monograph of the Canidae. London: pp. [6]+xxxvi+216, 45 pl., 59 fig.

MJÖBERG, ERIC

1930. Forest life and adventures in the Malay Archipelago. (Translated from the Swedish by A. Barwell.) New York: pp. 1-201, 84 pl., 1 map.

MOHR, ERNA

1921. Die geographische Verbreitung der *Anoa*-Arten auf Celebes. Archiv f. Naturg., vol. 87, Abt. A, no. 6, pp. 208-214, 1 fig., 1 map.

1931. Die Säugetiere Schleswig-Holsteins. Publ. by Naturwissenschaftliche Verein Altona/Elbe. Pp. 1-136, 73 fig.

1933. The status of the wisent on December 31, 1932. Jour. Mammalogy, vol. 14, no. 3, pp. 260-262.

1934*a*. Vom Kambing oetan (*Capricornis sumatrensis* Bechst.). Zool. Garten, vol. 7, nos. 1-3, pp. 24-28, 8 fig.

1934*b*. Wisente in neuen Polen. Sitz.-ber. Gesell. Naturf. Freunde Berlin 1934, pp. 281-284.

1935? Wisente und Urwald in neuen Polen. Naturschutz, vol. 16, no. 8, pp. 1-4 (of reprint), 6 fig.

1936. Weiteres vom Kambing oetan (*Capricornis sumatrensis* Bechst.). Zool. Garten, vol. 8, nos. 10-12, pp. 291-295, 9 fig.

MONARD, A.

- 1930-1933. Mission scientifique suisse dans l'Angola. Resultats scientifiques. Mammifères. Bull. Soc. Neuchateloise Sci. Nat., vol. 54, pp. 73-102, 1 fig., 1930; vol. 55, pp. 51-71, 2 fig., 1931; vol. 57, pp. 45-66, 10 fig., 1933.
1935. Contribution à la mammologie [*sic*] d'Angola et prodrome d'une faune d'Angola. Arquivos Mus. Bocage [Lisboa], no. 6, pp. 1-314, 47 fig., 1 map.

MORALES AGACINO, E.

1935. Mamíferos de Ifni. Bol. Soc. Españ. Hist. Nat., vol. 35, no. 7, pp. 381-393, 1 fig.

MORDEN, WILLIAM J.

1927. Across Asia's snows and deserts. New York-London: pp. xiv + 415, 65 pl., 3 fig., 3 maps.
1930. Saiga antelope and long-haired tiger. Nat. Hist. [New York], vol. 30, no. 5, pp. 539-551, 14 fig.

MORGAN, E. DELMAR

1891. Expedition of the Brothers Grijmailo to the Tian Shan oases and Lob-nor. Proc. Royal Geog. Soc., n. s., vol. 13, no. 4, pp. 208-226, 1 map.

MORRIS, R. C.

- 1935a. Distribution of the Hunting Leopard (*Acinonyx jubatus* Erxl.) in South India. Jour. Bombay Nat. Hist. Soc., vol. 38, no. 2, pp. 386-387.
- 1935b. The preservation of wild life in India. Comments on Mr. Richmond's note. Jour. Bombay Nat. Hist. Soc., vol. 38, no. 2, suppl., pp. 225-230.

MORTON, S. G.

1844. On a supposed new species of Hippopotamus. Proc. Acad. Nat. Sci. Philadelphia, vol. 2, pp. 14-17, 2 fig.

MÜLLER, SALOMON

1839. Over de zoogdieren van den Indischen Archipel. In: C. J. Temminck, Verh. Natuurl. Geschiedenis Nederl. overz. bezittingen, zool., pp. 1-57, 1 pl.

MURRAY, JAMES A.

- N. d. The zoology of Beloochistan and southern Afghanistan. Bombay and London: pp. 1-83.

MUSGRAVE, ANTHONY

1925. The animal life of the Nepean River [New South Wales]. Australian Mus. Mag., vol. 2, no. 6, pp. 209-216, 11 fig.

NASONOV, N. V.

1910. Sur l'*Ovis orientalis* Pall. Bull. Acad. Impér. Sci. St.-Pétersbourg, ser. 6, vol. 4, pt. 1, pp. 681-710, 1 pl., 12 fig.
1911. Les mouflons et les espèces voisines des moutons sauvages. (In Russian.) Bull. Acad. Impér. Sci. St.-Pétersbourg, ser. 6, vol. 5, pt. 2, pp. 1267-1296, 3 pl., 7 fig.
1913. *Ovis arcar* et les formes voisines des moutons sauvages. Bull. Acad. Impér. Sci. St.-Pétersbourg, ser. 6, vol. 7, pp. 3-32, 6 pl., 8 fig.

NASONOV, N. V.—*Cont.*

- 1914a. Les espèces des moutons sauvages du Turkestan décrites par N. Sěvercov. Bull. Acad. Impér. Sci. St.-Pétersbourg, ser. 6, vol. 8, pt. 1, pp. 695-726, 6 pl., 10 fig.
- 1914b. Über *Ovis severtzovi* Nas. und über die Methode der Untersuchungen der Hörner der Wildschafe in systematischer Hinsicht. Bull. Acad. Impér. Sci. St.-Pétersbourg, ser. 6, vol. 8, pt. 1, pp. 761-778, 3 pl., 8 fig.
1921. Sur la "perversion" des cornes des moutons sauvages *O. vignei* Blyth, *gmelinii* Blyth et *urmiana* (Guenther). (In Russian.) Bull. Acad. Sci. Russie, ser. 6, vol. 13, pt. 2, pp. 1215-1246, 5 pl., 8 fig.
1923. Distribution géographique des moutons sauvages du monde ancien. (In Russian.) Petrograd: pp. iv+255, 19 pl., 65 fig., 1 map.

NASONOV, N. V., AND V. Č. DOROGOSTAJSKIJ

1915. Moutons sauvages (*Ovis nivicola potanini*) de la chaîne de montagnes Jablonovoj. (In Russian.) Bull. Acad. Impér. Sci. [Petrograd], ser. 6, vol. 9, pt. 2, pp. 1599-1616, 2 pl., 2 fig.

NAZÁROFF, P. S.

1932. Hunted through Central Asia. Edinburgh and London: pp. xi+332, frontisp.

NEHRING, ALFRED

1890. Ueber Tundren und Steppen der Jetzt- und Vorzeit, mit besonderer Berücksichtigung ihrer Fauna. Berlin: pp. viii+257, 1 fig., 1 map.

NEUMANN, O.

1935. Über afrikanische Wildesel. Zeitschr. f. Säugetierkunde, vol. 10, pp. 152-153.

NEWTON, T. C.

1937. A further criticism of Mr. Collier's "Notes on the preservation of the fauna of Nigeria." Nigerian Field, vol. 6, no. 1, pp. 19-22.

NIEZABITOWSKI, EDUARD R. LUBICZ V.

1934. Bericht über die Säugetiere Polens und ihre geographische Verbreitung. Zeitschr. f. Säugetierkunde, vol. 9, pp. 188-197.

NIKOLSKII, G. A.

1927. [Raising maral.] (In Russian.) [Trans. Siberian Vet. Inst.], no. 8, pp. 113-153, 2 fig.

NOACK, TH.

1884. Neues aus der Tierhandlung von Karl Hagenbeck, sowie aus dem Zoologischen Garten in Hamburg. Zool. Garten, vol. 25, no. 4, pp. 100-115, 4 fig.

- 1889a. Beiträge zur Kenntniss der Säugethierfauna von Süd- und Südwest-Afrika. Zool. Jahrb., Abth. Syst., vol. 4, pp. 94-261, 5 pl.

- 1889b. Zur Säugetierfauna der mantschurischen Subregion. Humboldt, vol. 8, pp. 8-16, 12 fig.

NOACK, TH.—*Cont.*

1894. Über die neue von Herrn J. Menges beschriebene Antilope des Somali-Landes. Zool. Anzeiger, vol. 17, no. 448, pp. 202-204.

1908. Die Giraffe des Sambesi-Gebietes. Zool. Anzeiger, vol. 33, no. 11, pp. 354-356.

OAKLEY, RICHARD

1931. Game preservation in Nigeria. Jour. Soc. Preservation Fauna Empire, n. s., pt. 14, pp. 32-35.

"OBSERVER"

1934. Nigeria. Notes on wild life preservation in the northern provinces. Jour. Soc. Preservation Fauna Empire, n. s., pt. 22, pp. 53-55.

OGILBY, J. DOUGLAS

1892. Catalogue of Australian mammals. Australian Mus., Sydney, Cat. No. 16, pp. xvi+142.

OGILBY, W.

1838. On a new species of marsupial animal found by Major Mitchell on the banks of the River Murray in New South Wales. Proc. Zool. Soc. London 1838, pp. 25-27.

1841. On a new species of antelope (*Antelope cuvieri*). Proc. Zool. Soc. London 1840, pp. 34-35.

OGNEV, S. I. (*or*, OGNEFF, S. I.)

1925. A systematical review of the Russian sables. Jour. Mammalogy, vol. 6, pp. 276-280, 1 pl.

1930. Übersicht der russischen Kleinkatzen. Zeitschrift f. Säugetierkunde, vol. 5, pp. 48-64, 3 pl.

1931, 1935. The mammals of Eastern Europe and Northern Asia. (In Russian.) Moscow and Leningrad: vol. 2, pp. xi+776, 5 pl., 201 fig., 1 map, 1931; vol. 3, pp. viii+752, 12 pl., 295 fig., 19 maps, 1935.

OGNEV ("OGNEFF"), S. I., AND W. G. HEPTNER

1928. Einige Mitteilungen über die Säugetiere des mittleren Kopet-Dag und der anliegenden Ebene (Russisch-Turkestan). Zool. Anzeiger, vol. 75, pp. 258-266.

ØKLAND, FRIDTHJOF

1928. Land- und Süßwasserfauna von Nowaya Semlja. Rept. Sci. Res. Norwegian Exped. Novaya Zemlya 1921. No. 42. Publ. by Norske Vidensk.-Akad. Oslo. Oslo: pp. 1-125, 26 fig.

ONSLow, [EARL OF]

1929. President's address at meeting of October 15, 1928. Jour. Soc. Preservation Fauna Empire, n. s., pt. 9, pp. 5-7.

1932. Address of the President of the Society for the Preservation of the Fauna of the Empire, 1932. Jour. Soc. Preservation Fauna Empire, n. s., pt. 16, pp. 5-9.

OSBORN, T. G. B.

1934. Effect of introduction of exotic plants and animals into Australia. Proc. Fifth Pacific Sci. Congress, Canada, 1933, pp. 809-810.

OSGOOD, W. H.

1932. Mammals of the Kelley-Roosevelts and Delacour Asiatic expeditions. Field Mus. Nat. Hist., publ. 312, zool. ser., vol. 18, no. 10, pp. 193-339, 2 pl., 2 fig., 1 map.

OUSTALET, E.

1902. Sur une nouvelle espèce de rongeur du genre *Lophiomys*. Bull. Mus. Hist. Nat. [Paris], vol. 8, no. 6, pp. 397-402.

OUWENS, P. A.

1910. Contribution à la connaissance des mammifères de Célèbes. Bull. Dépt. Agric. Indes Néerl., no. 38 (Zoöl. 6), pp. 1-7, 1 pl.
1911. Bijdrage tot de kennis der zoogdieren van Celebes. Teysmannia, vol. 2, no. 7, pp. 447-454, 3 pl.

OWEN, [RICHARD]

1863. On the Aye-aye (*Chiromys*, Cuvier; *Chiromys madagascariensis*, Desm.; *Sciurus madagascariensis*, Gmel., Sonnerat; *Lemur psilodactylus*, Schreber, Shaw). Trans. Zool. Soc. London, vol. 5, pt. 2, pp. 33-101, 13 pl.

PAGE, RICHARD

1934. Wild life in Malaya. Jour. Soc. Preservation Fauna Empire, n. s., pt. 23, pp. 34-42.

PALLAS, PETER SIMON

1776. Reise durch verschiedene Provinzen des Russischen Reichs, pt. 3, bk. 2. St. Petersburg: pp. 457-760+[32], 40 pl.
1779. Spicilegia zoologica. Fasc. 13. Berlin: pp. 1-45, 3 pl.
1780. Observations sur l'ane dans son état sauvage ou sur le véritable Onagre des anciens. Acta Acad. Sci. Imper. Petropolitanae 1777, pt. 2, pp. 258-277, 2 pl.
- 1781a. Naturgeschichte und Beschreibung des wilden Halbesels Dshigetäi in den östlichen Wüsteneyen des mittlern Asiens. Neue Nord. Beyträge, vol. 2, pp. 1-21, 1 pl.
- 1781b. Bemerkungen über den Onager der Alten, oder den eigentlichen wilden Esel. Neue Nord. Beyträge, vol. 2, pp. 22-40, 1 pl.
- 1811, 1834-1842. Zoographia Rosso-Asiatica. St. Petersburg: vol. 1, pp. xxii+568+[4], 1811; Icones, fasc. 6, 48 pl., 1834-1842.

PEACOCK, E. H.

1931. Burma. Game Preservation. Extracts from report on, for year ending 31st March, 1931. Jour. Soc. Preservation Fauna Empire, n. s., pt. 15, pp. 53-66.
1933. A game book for Burma and adjoining territories. London: pp. 1-292, 26 pl., 2 fig., 1 map.
- 1934a. Days in the Dawna Mountains [Burma]. Field, March 31, 1934, p. 694.
- 1934b. In ambush for Bison [Gaur]. Jour. Bombay Nat. Hist. Soc., vol. 37, no. 3, pp. 529-531, 3 pl.

PEAKE, HAROLD J.

1933. Early steps in human progress. Philadelphia: pp. xii+256, 74 pl.

PEARSON, HENRY J.

1899. "Beyond Petsora eastward." London: pp. xiv+335, 89 pl., 5 fig., 3 maps.

PEASE, ALFRED E.

1897. On the antelopes of the Aures and Eastern Algerian Sahara. Proc. Zool. Soc. London 1896, pp. 809-814, 3 fig.
1937. Letter to the editor. Jour. Soc. Preservation Fauna Empire, n. s., pt. 31, pp. 80-81.

PEELLE, MILES L.

1931. Notes on the Hokkaido bear *Ursus arctos yesoensis* Lydekker leaving hibernation as reported in Etorofu Islands of the Kurile group. Trans. Sapporo Nat. Hist. Soc., vol. 12, no. 1, pp. 49-53, 1 fig.

PERCIVAL, A. BLAYNEY

1923. Extract from the report of the Game Warden, Kenya Colony. Jour. Soc. Preservation Fauna Empire, n. s., pt. 3, pp. 66-71.

PÉRON, F., AND LOUIS FREYCINET

1816. Voyage de découvertes aux Terres Australes. Vol. 2. Paris: pp. xxxi+471, 1 pl.

PETERS, WILHELM C. H.

1852. Naturwissenschaftliche Reise nach Mossambique . . . in den Jahren 1842 bis 1848 ausgeführt. Zoologie. 1. Säugethiere. Berlin: pp. xvi+202, 46 pl.
1869. Säugethiere. In: Carl Claus von der Decken's Reisen in Ost-Afrika, vol. 3, pt. 1, pp. 3-10, 4 pl. Leipzig and Heidelberg.
1871. Über *Propithecus Deckenii*, eine neue Art von Halbaffen aus Madagascar. Monatsb. K. Preuss. Akad. Wissen. Berlin 1870, pp. 421-424.
1876. Über ein neues Argali-Schaf, *Ovis jubata*, aus dem östlichen Theile der Mongolei, im Norden von Peking. Monatsber. K. Preuss. Akad. Wissen. Berlin 1876, pp. 177-188, 4 pl., 1 fig.

PETIT, G.

1931. Contribution à l'étude de la faune de Madagascar. Pt. 3, Mammalia. Faune des Colonies Françaises, vol. 4, fasc. 5, pp. 559-589.
1933. Le genre "Lepidolemur" et sa répartition géographique. C. R. Soc. Biogéogr., vol. 10, no. 82, pp. 33-37.
1935. Mammifères. In: Contribution à l'étude faunistique de la réserve naturelle du Manampetsa (Madagascar). Annales Sci. Nat., ser. 10, vol. 18, zool., pp. 474-476.

PFIZENMAYER, E. W.

1929. Biologische und morphologische Notizen über den Kaukasuswisent. Abhandl. Math.-Nat. Abt. Bayer. Akad. Wiss., Suppl.-Bd. 11, pp. 497-504, 3 pl.
1930. Vom Wisent, dem untergehenden Wildrind Europas. Aus der Heimat, vol. 43, no. 9, pp. 268-273, 4 fig.
1939. Siberian man and mammoth. London and Glasgow: pp. xii+256, 24 pl., 18 fig., 1 map.

PHILBY, H. STJ. B.

1933. The empty quarter, being a description of the Great South Desert of Arabia known as Rub' al Khali. London: pp. xxiv+433, 32 pl., 3 maps. (List of mammals of Arabia by J. G. Dollman, p. 394.)

PHILLIP, ARTHUR

1789. The voyage of Governor Phillip to Botany Bay [etc.]. London: pp. 7+viii+[11]+x+298+lxxiv, 47 pl., 7 maps.

PHILLIPS, JOHN C.

1925. The Père David deer herd. Jour. Mammalogy, vol. 6, pp. 283-284.

PHYTHIAN-ADAMS, E. G.

1935. The preservation of wild life in India. No. 9. Mysore. Jour. Bombay Nat. Hist. Soc., vol. 38, no. 2, suppl., pp. 241-245.

PIETERS, D.

1932. Ondervindingen en waarnemingen omtrent olifanten in Sumatra. 1. Tropische Natuur, vol. 21, no. 4, pp. 57-59, 1 fig.

PIGOT, R.

1929. A search for Schomburgk's deer. Jour. Siam Soc., Nat. Hist. Suppl., vol. 8, pp. 51-54.

PITMAN, C. R. S.

1934. A report on a faunal survey of Northern Rhodesia with especial reference to game, elephant control and national parks. Government of Northern Rhodesia, Livingstone: pp. xii+500, 3 fig., 11 maps [in separate cover]; index to check list [printed separately], pp. i-xxxii.

1935. The Gorillas of the Kayonsa region, western Kigezi, S. W. Uganda. Proc. Zool. Soc. London 1935, pt. 3, pp. 477-494, 6 pl., 1 map.

POCOCK, R. I.

1904. Exhibition of, and remarks upon, photographs of a mounted specimen of Burchell's Zebra. Proc. Zool. Soc. London 1903, vol. 2, p. 196, 1 fig.

1907. On English Domestic Cats. Proc. Zool. Soc. London 1907, pp. 143-168, 3 pl., 1 fig.

1908. Notes upon some species and geographical races of serows (*Capricornis*) and gorals (*Naemorhedus*), based upon specimens exhibited in the Society's Garden. Proc. Zool. Soc. London 1908, pt. 2, pp. 173-202, 9 fig.

1909. Exhibition of, and remarks upon, the photographs of two Quaggas, or Burchell's Zebras. Proc. Zool. Soc. London 1909, pp. 415-419, 3 fig.

1912. On a rare stag (*Cervus wallichii*) from Nepal recently presented to the Zoological Society by His Majesty King George. Proc. Zool. Soc. London 1912, pp. 558-575, 6 fig.

1916. On some of the cranial and external characters of the Hunting Leopard or Cheetah (*Acinonyx jubatus*). Ann. Mag. Nat. Hist., ser. 8, vol. 18, pp. 419-429, 5 fig.

POCOCK, R. I.—*Cont.*

1922. The quagga. *Jour. Soc. Preservation Fauna Empire*, n. s., pt. 2, pp. 26-37, 3 pl.
- 1927a. Description of a new species of cheetah. *Proc. Zool. Soc. London* 1927, pt. 1, pp. 245-252, 1 pl., 3 fig.
- 1927b. The new cheetah from Rhodesia. *Jour. Soc. Preservation Fauna Empire*, n. s., pt. 7, pp. 17-19, 1 pl.
1929. Tigers. *Jour. Bombay Nat. Hist. Soc.*, vol. 33, no. 3, pp. 505-541, 13 pl.
1930. The lions of Asia. *Jour. Bombay Nat. Hist. Soc.*, vol. 34, no. 3, pp. 638-665, 5 pl., 1 map.
1931. The lion's mane. *Field*, vol. 158, no. 4102, 2 fig.
1932. Black and brown bears of Europe and Asia. *Jour. Bombay Nat. Hist. Soc.*, vol. 35, no. 4, pp. 771-823, 11 fig.; vol. 36, no. 1, pp. 101-138, 2 pl., 12 fig.
1933. The rarer genera of Oriental Viverridae. *Proc. Zool. Soc. London* 1933, pp. 969-1035, 3 pl., 7 fig.
- 1934a. The races of the European wild cat (*Felis silvestris*). *Proc. Linnean Soc. London*, session 1933-34, pt. 2, p. 68.
- 1934b. Preliminary diagnoses of some new races of South Arabian mammals. *Ann. Mag. Nat. Hist.*, ser. 10, vol. 14, pp. 635-636.
- 1935a. The mammals collected in S. E. Arabia by Mr. Bertram Thomas and Mr. H. St. J. Philby. *Ann. Mag. Nat. Hist.*, ser. 10, vol. 15, no. 88, pp. 441-467, 1 fig.
- 1935b. The races of *Canis lupus*. *Proc. Zool. Soc. London* 1935, pt. 3, pp. 647-686, 2 pl.
1937. Mammalia. In: C. Tate Regan, *Natural history*, pp. 605-880, illus. New York.

POLIAKOF, M.

1881. Supposed new species of horse from Central Asia. (Transl. from Russian by E. Delmar Morgan.) *Ann. Mag. Nat. Hist.*, ser. 5, vol. 8, pp. 16-26.

POLLEN, FR.

1868. Notices sur quelques autres mammifères habitant Madagascar et les îles voisines. In: *Recherches sur la faune de Madagascar et de ses dépendances, d'après les découvertes de François P. L. Pollen et D. C. van Dam*, pt. 2, pp. 20-29.

POLLOK, FITZWILLIAM THOMAS

1879. Sport in British Burmah, Assam, and the Cassyah and Jyntiah Hills. 2 vols., illus. London.

PONCINS, EDMOND DE

1895. Shooting *Ovis polii* on the Pamirs. *Jour. Bombay Nat. Hist. Soc.*, vol. 10, pp. 53-62, 1 pl.

PONTOPPIDAN, ERICH

1755. *Natural history of Norway*. London: pp. 1-291, illus., 1 map.

PORTER, ROBERT KER

1821. *Travels in Georgia, Persia, Armenia, ancient Babylonia, &c. &c. during the years 1817, 1818, 1819, and 1820*. Vol. 1. London: pp. xxiii+720, 57 pl., 1 map.

- POUSARGUES, E. DE
 1896-1897. Étude sur les Mammifères du Congo Français. Annales Sci. Nat., ser. 7, vol. 3, pp. 129-416, 1896; vol. 4, pp. 1-150, 1897.
- POWELL-COTTON, P. H. G.
 1902. A sporting trip through Abyssinia. London: pp. 1-531, illus., 1 map.
 1904. In unknown Africa. London: pp. xxiii+619, illus., 2 maps.
 1937. The Northern Hartebeest (*Bubalis buselaphus*). Jour. Soc. Preservation Fauna Empire, n. s., pt. 30, pp. 65-66, 1 fig.
- PREJEVALSKY, N. (See also PRSCHEWALSKI, PRZEWALSKI)
 1876. Mongolia, the Tangut country, and the solitudes of northern Tibet. (Transl. by E. Delmar Morgan.) London: vol. 1, pp. li+287, 8 pl., 3 fig., 1 map; vol. 2, pp. xii+320, 4 pl., 10 fig.
 1879. From Kulja, across the Tian Shan to Lob-nor. (Transl. by E. Delmar Morgan.) London: pp. xii+251, 2 maps.
- PRSCHEWALSKI, N. VON. (See also PREJEVALSKY, PRZEWALSKI.)
 1884. Reisen in Tibet und am oberen Lauf des Gelben Flusses in den Jahren 1879 bis 1880. (Transl. and ed. by Stein-Nordheim.) Jena: pp. xiv+281, 14 pl., 21 fig., 1 map.
- PRZEWALSKI, N. M. (See also PREJEVALSKY, PRSCHEWALSKI.)
 1883. Third journey in Central Asia. From Zaisan through Hami to Tibet and the sources of the Yellow River. (In Russian.) St. Petersburg: pp. iv+ii+473+[2], 108 pl., 10 fig., 2 maps.
- PYCRAFT, W. P.
 1936. The doom of the Mountain Zebra. Illus. London News, vol. 98, no. 2560, p. 850, 3 fig.
- QUOY, [J. R. C.,] ET [J. P.] GAIMARD
 1829. Notice sur l'Antilope à cornes déprimées. Ann. Sci. Nat., vol. 17, pp. 423-426, 1 pl.
 1830. Voyage de découvertes de l'Astrolabe . . . pendant . . . 1826-1827-1828-1829. Zoologie, vol. 1. Paris: pp. 1+3-268.
- RADDE, G.
 1862. Reisen im Süden von Ost-Sibirien in den Jahren 1855-1859 incl. Vol. 1. Die Säugethierfauna. St. Petersburg: pp. [2]+lv+328, 14 pl., 5 maps.
 1893. On the present range of the European Bison in the Caucasus. Proc. Zool. Soc. London 1893, pp. 175-177.
- RADDE, G., AND A. WALTER. (With contributions by W. Blasius.)
 1889. Die Säugethiere Transcaspiens. Zool. Jahrb., Abth. Syst., vol. 4, pp. 993-1094, 1 pl.
- RAFFLES, THOMAS STAMFORD
 1821. Descriptive catalogue of a zoological collection, made . . . in the island of Sumatra and its vicinity. Trans. Linnean Soc. London, vol. 13, pt. 1, pp. 239-274.
- RAMECOURT, GABRIEL DE
 1936. Grandes chasses et petites choses d'Afrique. Paris: pp. 1-384, 49 pl., 1 map.

RAMME, WILLY

1913. Zoologisches aus Krain und Istrien. Sitz.-ber. Gesell. Naturf. Freunde Berlin 1913, no. 2, pp. 90-97, 2 fig.

RAND, A. L.

1935. On the habits of some Madagascar mammals. Jour. Mammalogy, vol. 16, no. 2, pp. 89-104.

RAULIN, V.

1869. Description physique de l'île de Crète. Vol. 2. Paris: pp. viii + 463-1078.

RAVEN, HARRY (OR HENRY) C.

1924. Glimpses of mammalian life in Australia and Tasmania. Nat. Hist. [New York], vol. 24, pp. 16-28, 16 fig.
1929. Strange animals of the island continent. Nat. Hist. [New York], vol. 29, no. 1, pp. 83-94, 17 fig., no. 2, pp. 200-207, 6 fig.
1931. Gorilla: the greatest of all apes. Nat. Hist. [New York], vol. 31, no. 3, pp. 231-242, 12 fig.
1935. Wallace's Line and the distribution of Indo-Australian mammals. Bull. Am. Mus. Nat. Hist., vol. 68, art. 4, pp. ii, 179-293, 10 maps.
- 1936a. Hunting gorillas in West Africa. Sci. Monthly, vol. 43, pp. 313-334, 11 fig.
- 1936b. Gorillas, men and sleeping sickness. Sci. Monthly, vol. 43, pp. 522-540, 14 fig., 1 map.

READE, W. WINWOOD

1863. Notes on the Derbyan Eland, the African Elephant, and the Gorilla. Proc. Zool. Soc. London 1863, pp. 169-173, 1 pl.

REED, W. MAXWELL, AND JANNETTE M. LUCAS

1937. Animals on the march. New York: pp. xvi+335, frontisp., 115 fig.

REICHENBACH, H. G. L.

1836. Praktisch-gemeinnützige Naturgeschichte der Säugthiere des In- und Auslandes. Kupfersammlung, erster Theil mit. 633 Abbildungen der Raubsäugthiere. Leipzig: pp. [28], 78 pl.

REID, JAMES

1837. Description of a new species of the genus *Perameles* (*P. Lagotis*). Proc. Zool. Soc. London 1836, pp. 129-131.

RENSHAW, GRAHAM

1921. The blaauwbok (*Hippotragus leucophaeus* Pall.). Jour. Soc. Preservation Fauna Empire, n. s., pt. 1, pp. 24-26, 1 pl.
1934. More about the Blaauwbok. Jour. Soc. Preservation Fauna Empire, n. s., pt. 23, pp. 31-34, 1 pl.

REYMOND, M.

1932. Note sur les Équidés sauvages rencontrés en Asie Centrale par la Mission Haardt-Audouin-Dubreuil. Bull. Mus. Nat. Hist. Nat. [Paris], ser. 2, vol. 4, no. 7, pp. 807-809, 1 map.

RHOADS, SAMUEL N.

1896. Mammals collected by Dr. A. Donaldson Smith during his expedition to Lake Rudolf, Africa. Proc. Acad. Nat. Sci. Philadelphia 1896, pp. 517-546, 1 pl., 1 fig.

RICHMOND, R. D.

1935. The preservation of wild life in India. No. 7. The Madras Presidency. Jour. Bombay Nat. Hist. Soc., vol. 38, no. 2, suppl., pp. 220-224.

RIDGEWAY, WILLIAM

1905. The origin and influence of the thoroughbred horse. Cambridge: pp. xvi+538, 143 fig.
1909. Contributions to the study of the Equidae; 2. On hitherto unrecorded specimens of *Equus quagga*. Proc. Zool. Soc. London 1909, pp. 563-586, 25 fig.

RIDLEY, H. N.

1895. The mammals of the Malay Peninsula. Nat. Science, vol. 6, pp. 23-29, 89-96, 161-166.
1930. The dispersal of plants throughout the world. Ashford, Kent: pp. xx+744, 22 pl.

RITCHIE, A. T. A.

1931. Kenya Colony. Game Department report, 1930: extracts from. Jour. Soc. Preservation Fauna Empire, n. s., pt. 15, pp. 67-84.

ROBERTS, AUSTIN

1917. Fourth supplementary list of mammals in the collection of the Transvaal Museum. Annals Transvaal Mus., vol. 5, no. 4, pp. 263-278.
1929. New forms of African mammals. Annals Transvaal Mus., vol. 13, pt. 2, pp. 82-121.
1932. Preliminary description of fifty-seven new forms of African mammals. Annals Transvaal Mus., vol. 15, pt. 1, pp. 1-19.
1936. Report upon a survey of the higher vertebrates of north-eastern Zululand. Annals Transvaal Mus., vol. 18, pt. 3, pp. 163-251, 12 pl., 1 map.
1937. The South African antelopes. S. African Jour. Sci., vol. 33, pp. 771-787.

ROBINSON, A. E.

1934. The extinct fauna of north-east Africa. Jour. Soc. Preservation Fauna Empire, n. s., pt. 23, pp. 43-48.

ROBINSON, H. C., AND C. BODEN KLOSS

- 1918, 1923. Results of an expedition to Korinchi Peak, 12,400 ft., Sumatra. 1. Mammals. Jour. Federated Malay States Mus., vol. 8, pt. 2, pp. 1-80, 1 pl., 1918; addenda and corrigenda, pp. 311-319, 2 pls., 1923.

ROCKHILL, WILLIAM WOODVILLE

1891. The land of the lamas. New York: pp. viii+399, illus., 2 maps.

ROOSEVELT, THEODORE

1910. African game trails. New York: pp. xvi+529, 50 pl., 1 map.

ROOSEVELT, THEODORE, AND EDMUND HELLER

1914. Life-histories of African game animals. New York: vol. 1, pp. xxix+420, 25 pl., 11 maps; vol. 2, pp. i-x, 421-798, 25 pl., 29 maps.

- ROOSEVELT, THEODORE [JR.]
1934. Hunting the Tamarao. *Sportsman*, vol. 15, no. 2, pp. 28-33, 9 fig., 1 map.
- ROOSEVELT, THEODORE [JR.], AND KERMIT ROOSEVELT
1926. East of the sun and west of the moon. New York: pp. 1-284, 4 pl.
1929. Trailing the giant panda. New York and London: pp. x+278, 33 pl., 1 map.
- ROOSEVELT, MRS. THEODORE, SR., MRS. KERMIT ROOSEVELT, RICHARD DERBY, AND KERMIT ROOSEVELT
1927. Cleared for strange ports. New York and London; pp. xi+254, 17 pl.
- ROSENHAUER, WILHELM GOTTLIEB
1856. Die Thiere Andalusiens. Erlangen: pp. viii+429, 3 pl.
- ROSEVEAR, D. R.
1937. The Anteaters of Nigeria. *Nigerian Field*, vol. 6, no. 1, pp. 11-14, 4 fig.
- ROTHSCHILD, MAURICE DE, AND HENRI NEUVILLE
1907. Sur une nouvelle Antilope de la vallée de l'Ituri, *Cephalophus ituriensis* nov. sp. *C. R. Acad. Sci. [Paris]*, vol. 144, pp. 98-100.
1911. Recherches sur l'Okapi et les Girafes de l'Est africain. Seconde partie. *Annales Sci. Nat., Zool.*, n. s., vol. 13, pp. 1-186, 6 pl., 51 fig., 1 map.
- ROTHSCHILD, WALTER
1894. *Propithecus majori* sp. nov. *Novit. Zool.*, vol. 1, no. 4, p. 666, 1 pl.
1902. Two new subspecies of *Proteles*. *Novit. Zool.*, vol. 9, p. 443.
1913a. On *Ovis lervia* Pallas and its subspecies. *Novit. Zool.*, vol. 20, pp. 459-460.
1913b. Description of some new forms of antelopes, with notes. *Ann. Mag. Nat. Hist.*, ser. 8, vol. 12, pp. 574-576.
1921. Captain Angus Buchanan's Air Expedition. III. Ungulate mammals collected by Captain Angus Buchanan. *Novit. Zool.*, vol. 28, pp. 75-77.
- RÜPPELL, EDUARD
1829. Reisen in Nubien, Kordofan und dem peträischen Arabien. Frankfurt am Main: pp. xxvi+388, 8 pl., 4 maps.
1835. Neue Wirbelthiere zu der Fauna von Abyssinien gehörig. Säuge-thiere. Frankfurt am Main: pp. 1-40, 14 pl.
- RUSSELL PASHA, T. W.
1934. The ibex of the Eastern Desert of Egypt. *Jour. Soc. Preservation Fauna Empire*, n. s., pt. 23, pp. 16-18, 1 pl.
- RUXTON, A. E., AND ERNST SCHWARZ
1929. On hybrid Hartebeests and on the distribution of the *Alcelaphus buselaphus* group. *Proc. Zool. Soc. London* 1929, pp. 567-583, 2 pl., 1 map.

- "SABI" [=J. STEVENSON HAMILTON]. (See also Hamilton, Stevenson; Stevenson-Hamilton.)
1921. The preservation of the African elephant. Jour. Soc. Preservation Fauna Empire, n. s., pt. 1, pp. 34-42.
1922. Empire fauna in 1922. Jour. Soc. Preservation Fauna Empire, n. s., pt. 2, pp. 38-43.
- ST. LEGER, J.
1936. A key to the species and subspecies of the subgenus *Cephalophus*. Proc. Zool. Soc. London 1936, pp. 209-228.
- SALENSKY, W.
1902. *Equus Przewalskii* Pol. Wissensch. Resultate der von N. M. Przewalski nach Central-Asien Unternommenen Reisen, Zool. Theil, Band 1, Mammalia, Abth. 2, Ungulata, Lief. 1, pp. 1-76, 1 folding table, 4 pl., 6 fig.
- SALESSKI, P.
1934. Die Verbreitung der Paarhufer in Westsibirien. Zeitschr. f. Säugetierkunde, vol. 9, pp. 369-376, 1 map.
- SANDERSON, I. T.
1935. The Percy Sladen Zoological Expedition to the British Cameroons, 1932-33. Proc. Linnean Soc. London, session 1934-35, pp. 25-29.
- SANFORD, GERTRUDE, AND SIDNEY LEGENDRE
1930. In quest of the Queen of Sheba's Antelope. Part 2. Nat. Hist., vol. 30, no. 2, pp. 161-176, 21 fig.
- SARASIN, PAUL AND FRITZ
1905. Reisen in Celebes. Wiesbaden: vol. 1, pp. xviii+381, 6 pl., 119 fig., 7 maps; vol. 2, pp. x+390, 6 pl., 121 fig., 4 maps.
- SATUNIN, KONSTANTIN A.
1896. Vorläufige Mittheilungen über die Säugethierfauna der Kaukasusländer. Zool. Jahrb., Abt. Syst., Geog. Biol., vol. 9, pp. 277-314.
1901. Ueber die Säugethiere der Steppen des nordöstlichen Kaukasus. Mittheil. Kaukas. Mus., vol. 1, pt. 4, pp. 101-155, 1 map.
1906. Die Säugetiere des Talyschgebietes und der Mugansteppe. Mitteil. Kaukas. Mus., vol. 2, pts. 2-4, pp. 263-394, 1 map.
1909. Zur Systematik der Familie Felidae. Mitteil. Kaukas. Mus., vol. 4, pp. 238-256, 8 fig.
- SATUNIN, K. A., AND G. RADDE
1899. Kurze Bemerkungen über die aufgeführten Säugethiere. In: Die Sammlungen des Kaukasischen Museums, vol. 1, Zool., pp. 49-83 (Russian), 84-117 (German), 17 pl., 2 maps.
- SAVAGE, THOMAS S., AND J. WYMAN
1847. On *Troglodytes gorilla*. Proc. Boston Soc. Nat. Hist., vol. 2, pp. 245-247.
- SCALON, N. N.
1931. Säugetiere des nordöstlichen Theiles des Neusibirischen Kreises. Zeitschr. f. Säugetierkunde, vol. 6, pp. 221-224.
- SCHÄFER, ERNST
1933. Berge, Buddhas und Bären. Berlin: pp. xi+316, 32 pl., 2 maps.
1937. Unbekanntes Tibet. Berlin: pp. viii+296, 64 fig., 2 maps.

SCHÄFER, ERNST—*Cont.*

1938. Ornithologische Ergebnisse zweier Forschungsreisen nach Tibet. Jour. f. Ornithologie, vol. 86, Sonderheft, pp. 1-349, 111 fig., 3 maps.

SCHIMPER, —

1848. Note sur une troisième espèce de bouquetin en Europe (*Capra hispanica*). C. R. Acad. Sci. [Paris], vol. 26, pp. 318-320.

SCHINZ, H. R.

1838. Bemerkungen über die Arten der wilden Ziegen. Neue Denkschr. Allg. Schweiz. Gesell. Naturwissens., vol. 2, pp. 1-26, 4 pl.

SCHLEGEL, H.

1866. Contributions à la faune de Madagascar et des îles avoisinantes, d'après les découvertes et observations de M. M. François Pollen et M. D.-C. van Dam. Nederl. Tijdschr. Dierk., vol. 3, pp. 73-89.

1876. Muséum d'Histoire Naturelle des Pays-Bas. Vol. 7. Monographie 40: Simiæ. Leide: pp. [1]+356.

SCHLEGEL, HERM., AND SAL. MÜLLER

1845. Over de ossen van den Indischen Archipel. In: C. J. Temminck, Verh. Natuurl. Geschiedenis Nederl. overz. bezittingen, zool., pp. 195-208, 7 pl.

SCHLEGEL, H., AND FRANÇOIS P. L. POLLEN

1868. Mammifères et oiseaux. In: Recherches sur la faune de Madagascar et de ses dépendances, d'après les découvertes de François P. L. Pollen et D. C. van Dam, pt. 2. Leyde: pp. xix+186, 40 pl.

SCHMIDT, KARL PATTERSON

1938. Our friendly animals and whence they came. Chicago and New York: pp. 1-64, illus.

SCHNEIDER, GUSTAV

1905. Ergebnisse zoologischer Forschungsreisen in Sumatra. Erster Teil. Säugetiere (Mammalia). Zool. Jahrb., Abt. Syst. Geog. Biol., vol. 23, no. 1, pp. 1-172, 3 pl., 2 maps.

SCHOENICHEN, WALTHER

1933. [Transl.:] The protection of nature and the promotion of cultural policies concerning conservation in Germany and in other countries. Naturschutz, Jan., 1933.

SCHOMBURGK, HANS

1912. On the trail of the Pygmy Hippo. An account of the Hagenbeck expedition to Liberia. Bull. New York Zool. Soc., vol. 16, pp. 880-884, 5 fig.

SCHOUTEDEN, H.

1912. Note sur la Girafe du Congo. Rev. Zool. Africaine, vol. 2, fasc. 1, pp. 134-137, 1 map.

- 1913a. Notes sur la faune des mammifères du Katanga. Rev. Zool. Africaine, vol. 2, fasc. 2, pp. 280-288, 2 pl.

- 1913b. Notes sur l'Okapi. Rev. Zool. Africaine, vol. 2, fasc. 3, pp. 482-485.

SCHOUTEDEN, H.—*Cont.*

1927. Les Rhinocéros congolais. Rev. Zool. Africaine, vol. 15, fasc. 2, suppl.: Bull. Cercle Zool. Congolais, vol. 4, fasc. 1, pp. [19]-[30], 3 fig.
- 1930a. Les Pangolins. Rev. Zool. Bot. Africaines, vol. 17, fasc. 4, suppl.: Bull. Cercle Zool. Congolais, vol. 6, fasc. 3, pp. [87]-[95], 3 fig.
- 1930b. Les Gorilles congolais. Rev. Zool. Bot. Africaines, vol. 19, fasc. 2, pp. 298-302.
- 1934a. Photographies de singes rares. Rev. Zool. Bot. Africaines, vol. 24, fasc. 3, suppl.: Bull. Cercle Zool. Congolais, vol. 10, fasc. 3, pp. (62)-(62).
- 1934b. L'Antilope Klipspringer au Manyema. Rev. Zool. Bot. Africaines, vol. 24, fasc. 3, suppl.: Bull. Cercle Zool. Congolais, vol. 10, fasc. 3, p. (62).
- 1934c. Quelques photos intéressantes de singes. Rev. Zool. Bot. Africaines, vol. 24, fasc. 4, suppl.: Bull. Cercle Zool. Congolais, vol. 10, fasc. 4, pp. (86)-(87), 2 fig.
- 1934d. Les mammifères du secteur méridional du Parc National Albert (Kivu). Rev. Zool. Bot. Africaines, vol. 25, fasc. 3-4, pp. 291-304.
- 1935a. L'habitat de l'Okapi s'étend au Lomami. Rev. Zool. Bot. Africaines, vol. 27, fasc. 1, suppl.: Bull. Cercle Zool. Congolais, vol. 12, fasc. 1, pp. (9)-(10).
- 1935b. Mammifères intéressants. Rev. Zool. Bot. Africaines, Bull. Cercle Zool. Congolais, vol. 12, fasc. 3-4, p. (62).
- 1936a. L'Okapi sur la rive gauche du Congo. Rev. Zool. Bot. Africaines, vol. 29, fasc. 1, suppl.: Bull. Cercle Zool. Congolais, vol. 13, fasc. 1, pp. (14)-(15), 1 fig.
- 1936b. Le Gorille du Mayumbe. Rev. Zool. Bot. Africaines, vol. 29, fasc. 1, suppl.: Bull. Cercle Zool. Congolais, vol. 13, fasc. 1, pp. (15)-(16).

SCHREBER, J. C. D.

1776-1777. Die Säugthiere. Erlangen: vol. 3, pp. 283-590, 106 pl.

SCHRENCK, L. v.

1859. Reisen und Forschungen im Amur-Lande. St. Petersburg: vol. 1, pp. xxxi+567, 16 pl., 1 map.

SCHROETER, CARL

1927. The Swiss National Park. Jour. Linnean Soc. [London], Botany, vol. 47, no. 318, pp. 637-643, 3 pl.

SCHUBOTZ, HERMANN

1912. Zoologische Beobachtungen während der II. Wissenschaftlichen Innerafrika-Expedition S. H. des Herzogs Adolf Friedrich zu Mecklenburg 1910/1911. Ber. Senckenb. Naturf. Gesell., vol. 43, pp. 324-358, 13 fig., 1 map.

SCHWARZ, ERNST

1911. Seven new Asiatic mammals, with note on the "*Viverra fasciata*" of Gmelin. Ann. Mag. Nat. Hist., ser. 8, vol. 7, no. 42, pp. 634-640.

SCHWARZ, ERNST—*Cont.*

- 1912a. Notes on Malay tigers, with description of a new form from Bali. *Ann. Mag. Nat. Hist.*, ser. 8, vol. 10, pp. 324-326.
- 1912b. Beiträge zur Kenntnis der Zebras. *Arch. f. Naturg.*, vol. 78, sect. A, pt. 7, pp. 34-57, 6 pl.
1913. Der Bali-Tiger. *Ber. Senckenb. Naturf. Gesell.*, vol. 44, no. 1, pp. 70-73, 7 fig.
1916. Zwei neue Lokalforme des Tigers aus Centralasien. *Zool. Anzeiger*, vol. 47, no. 12, pp. 351-354.
- 1920a. Huftiere aus West- und Zentralafrika. *Ergebn. Zweit. Deutschen Zentral-Afrika-Exped. 1910-1911*, vol. 1, *Zool.*, no. 15, pp. 831-1044, 16 pl., 1 fig., 5 maps.
- 1920b. Fledermäuse aus West- und Zentralafrika. Anhang 1: Halbaffen. Anhang 2: Zahnarme. *Ergebn. Zweit. Deutschen Zentral-Afrika-Exped. 1910-1911*, vol. 1, *Zool.*, no. 15, pp. 1045-1062.
1928. Über diluviale Pferde der *Equus caballus*-Gruppe. *Jahrb. Preuss. Geol. Landesanstalt Berlin 1927*, vol. 48, pp. 429-476, 5 pl., 4 fig.
- 1929a. Ein südpersischer Wildesel im Berliner Zoologischen Garten. *Zool. Garten, N. F.*, vol. 2, nos. 4-6, pp. 85-94, 5 fig.
- 1929b. On the local races and distribution of the black and white Colobus monkeys. *Proc. Zool. Soc. London 1929*, pt. 3, pp. 585-598, 1 map.
1931. A revision of the genera and species of Madagascar Lemuridae. *Proc. Zool. Soc. London 1931*, pp. 399-428.
- 1934a. On the local races of the chimpanzee. *Ann. Mag. Nat. Hist.*, ser. 10, vol. 13, no. 78, pp. 576-583.
- 1934b. Notes on the nomenclature and systematic position of some African mammals. *Ann. Mag. Nat. Hist.*, ser. 10, vol. 14, no. 80, pp. 258-261.
1936. A propos du "*Lemur macaco*" Linnaeus. *Mammalia*, vol. 1, no. 1, pp. 24-25.

SCLATER, PHILIP LUTLEY

1872. Report on additions to the Society's menagerie in February 1872. *Proc. Zool. Soc. London 1872*, pp. 493-496, 4 pl.
1873. Report on additions to the Society's menagerie during the months of June, July, August, and September, 1872. *Proc. Zool. Soc. London 1872*, pp. 789-795, 1 pl., 5 fig.
1876. On the Rhinoceroses now or lately living in the Society's Menagerie. *Trans. Zool. Soc. London*, vol. 9, pp. 645-660, 5 pl., 9 fig.
1880. Description of a new Lemur (*Lemur nigerrimus*). *Proc. Zool. Soc. London 1880*, p. 451, 2 fig.
1884. On some mammals from Somali-land. *Proc. Zool. Soc. London 1884*, pp. 538-542, 2 pl.
1885. [Description of a new species of *Cervulus*.] *Proc. Zool. Soc. London 1885*, pp. 1-2, 1 pl., 1 fig.

SCLATER, PHILIP LUTLEY—*Cont.*

1886. Remarks on the various species of wild goats. *Proc. Zool. Soc. London* 1886, pp. 314-318, 2 pl.
1889. Description of Hunter's Antelope. *Proc. Zool. Soc. London* 1889, pp. 372-377, 1 pl., 3 fig.
1898. Exhibition of, and remarks upon, some specimens of mammals from the Gambia, with a list of the antelopes known from that colony. *Proc. Zool. Soc. London* 1898, p. 349-350.
1901. Remarks upon the newly-discovered African mammal, the Okapi. *Proc. Zool. Soc. London* 1901, vol. 2, pp. 3-6, 1 pl.
1902. Report on the additions to the Society's Menagerie in February 1902. *Proc. Zool. Soc. London* 1902, vol. 1, pp. 137-138, 1 pl.

SCLATER, PHILIP LUTLEY, AND OLDFIELD THOMAS

- 1894-1900. The book of antelopes. London: vol. 1, pp. xxxv+220, 24 pl., 22 fig., 1894-1895; vol. 2, pp. v+194, 22 pl., 22 fig., 1896-1897; vol. 3, pp. v+245, 29 pl., 43 fig., 1897-1898; vol. 4, pp. v+242, 25 pl., 34 fig., 1899-1900.

SCLATER, W. L.

- 1900-1901. The mammals of South Africa. London: vol. 1, pp. xxxi+324, 80 fig., 1 map, 1900; vol. 2, pp. xii+241, 70 fig., 1901.

SCLATER, WILLIAM LUTLEY, AND PHILIP LUTLEY SCLATER

1899. The geography of mammals. London: pp. xviii+335, 1 pl., 50 fig., 8 maps.

SELOUS, FREDERICK COURTENAY

1881. On the South-African Rhinoceroses. *Proc. Zool. Soc. London* 1881, pp. 725-734, 1 pl.
1890. A hunter's wanderings in Africa. Second edition. London: pp. xvii+455, 19 pl., 6 fig., 1 map.
1914. African game, pp. 1-233, 63 pl. In: *The gun at home and abroad. The big game of Africa & Europe.* London.

SEREBRENNIKOV, M. K.

1931. Album einiger osteuropäischer, westsibirischer und turkestanischer Säugetiere II. *Zeitschr. f. Säugetierkunde*, vol. 6, no. 4, pp. 160-163, 9 fig.

SETON, ERNEST THOMPSON

1929. *Lives of game animals.* Vol. 4. Garden City, N. Y.: xxiii+949, 113 pl., 20 maps.

SEURAT, L. G.

1930. Mammifères de l'Algérie. In: *Exploration zoologique de l'Algérie, 1830-1930*, pp. 85-134, map and figs. Paris.
1934. Mission Scientifique du Hoggar. *Zoologie, Mammifères.* *Mém. Soc. Hist. Nat. Afrique du Nord*, no. 4, pp. 11-17, 3 fig.

SEVERTZOFF, N. (*See also* SEVERTZOV.)

1876. The mammals of Turkestan. (Transl. by F. Carl Craemers.) *Ann. Mag. Nat. Hist.*, ser. 4, vol. 18, pp. 40-57, 168-174, 208-225, 325-336, 377-388, 2 fig.

- SEVERTZOV, N. (*See also* SEVERTZOFF.)
 1873. Vertical and horizontal distribution of the Turkestan fauna. (In Russian.) *Izvestia Imper. Obschestvo Liub. Estest., Antrop. i Etnogr.* [Moscow], vol. 8, pt. 2, pp. 1-157, 10 pl., 16 fig.
- SHARLAND, M. S. R.
 1939. In search of the Thylacine. *Proc. Royal Soc. New South Wales* 1938-9, pp. 20-38, 8 fig., 1 map.
- SHAW, GEORGE A.
 1879. A few notes upon four species of Lemurs, specimens of which were brought alive to England in 1878. *Proc. Zool. Soc. London* 1879, pp. 132-136, 1 pl.
 1883. A few rough notes on the Aye-aye. *Proc. Zool. Soc. London* 1883, pp. 44-45.
- SHAW, W. B. K.
 1933. Libyan Desert: note on wild life. *Jour. Soc. Preservation Fauna Empire*, n. s., pt. 20, p. 15, 1 pl.
- SHEBBEARE, E. O.
 1935. Protecting the Great Indian Rhinoceros. *Field*, May 18, 1935, pp. 1229-1231, 1 fig.
- SHELFORD, ROBERT W. C.
 1916. A naturalist in Borneo. (Ed. by Edward B. Poulton.) London: pp. xxvii+331, 32 pl.
- SHITKOW, B. M.
 1904. Ueber einen neuen Hirsch aus Turkestan. *Zool. Jahrb., Syst.*, vol. 20, pp. 91-104, 5 fig.
- SHORTRIDGE, G. C.
 1910. An account of the geographical distribution of the marsupials and monotremes of South-West Australia, having special reference to the specimens collected during the Balston Expedition of 1904-1907. *Proc. Zool. Soc. London* 1909, pp. 803-848, 34 maps.
 1934a. The mammals of South West Africa. London: vol. 1, pp. xxv+437, 16 pl., 7 maps; vol. 2, pp. i-ix, 439-779, 19 pl., 25 maps.
 1934b. Hartmann's Mountain Zebra. *Jour. Soc. Preservation Fauna Empire*, n. s., pt. 22, pp. 13-15, 1 pl.
 1936. Field notes (hitherto unpublished) on Western Australian mammals—south of the Tropic of Capricorn (exclusive of Marsupialia and Monotremata), and records of specimens collected during the Balston Expeditions (November 1904 to June 1907). *Proc. Zool. Soc. London* 1936, pp. 743-749, 1 fig.
- SIBREE, JAMES
 1915. A naturalist in Madagascar. London: pp. 1-320, 37 pl., 3 maps.
- SIMPSON, GEORGE GAYLORD
 1931. A new classification of mammals. *Bull. Am. Mus. Nat. Hist.*, vol. 59, art. 5, pp. 259-293.

SJÖLANDER, DAVID

1922. The distribution and habits of the Argali Sheep of Central Asia. *Jour. North-China Branch Royal Asiatic Soc.*, vol. 53, pp. 131-157, 3 fig., 1 map.

SKOTTSBERG, C.

1934. Report of the Standing Committee for the Protection of Nature in and around the Pacific for the years 1929-32. *Proc. Fifth Pacific Sci. Congress, Canada, 1933*, vol. 1, appendix 2, pp. 385-475.

SMITH, ANDREW

1849. Illustrations of the zoology of South Africa. Mammalia. London: pp. vii+unnumbered pp. accompanying 51 pl.

SMITH, A. DONALDSON

1897. Through unknown African countries. London and New York: pp. xvi+471, illus., 6 maps.

SMITH, CHARLES HAMILTON

1827. Supplement to the order Ruminantia. In: Griffith's Cuvier's Animal kingdom, vol. 4, pp. 33-428, 52 pl. London.

- 1845-1846. Jardine's Naturalists' Library. Vol. 20. Mammalia. Horses. London: pp. 1-352, 34 pl.

1846. Introduction to Mammalia. (Jardine's Naturalist's Library, vol. 15.) London: pp. [3]+17-313, 31 pl.

SMITH, GEOFFREY

1909. A naturalist in Tasmania. Oxford: pp. 1-151, 21 pl., 5 fig.

SMITH, HUGH M.

1926. A herd of wild elephants in Peninsular Siam. *Jour. Siam Soc., Nat. Hist. Suppl.*, vol. 6, pp. 365-366.

SMITH, WILLIAM LORD

1920. The cave tiger of China. *Scribner's Mag.*, Sept., pp. 355-363, 7 fig.

SODY, H. J. V.

1936. Seventeen new generic, specific, and subspecific names for Dutch East Indian mammals. *Natuurk. Tijdschr. Nederl. Indië*, vol. 96, no. 1, pp. 42-55.

SONNERAT, PIERRE

1782. Voyage aux Indes orientales et à la Chine. Vol. 2. Paris: pp. viii+[8]+298, 60 pl.

SOWERBY, ARTHUR DE CARLE

1914. Fur and feather in North China. Tientsin: pp. 1-190, illus.

1917. On Heude's collection of pigs, sika, serows, and gorals in the Sikawei Museum, Shanghai. *Proc. Zool. Soc. London* 1917, pp. 7-26.

1918. Notes upon the Sika-Deer of North China. *Ann. Mag. Nat. Hist.*, ser. 9, vol. 2, no. 7, pp. 119-122.

1920. Notes on Heude's bears in the Sikawei Museum, and on the bears of Palaearctic eastern Asia. *Jour. Mammalogy*, vol. 1, no. 5, pp. 213-233.

1923. The naturalist in Manchuria. Vol. 2. Mammals. Tientsin: pp. xxvii+191, 9 pl., 5 fig.

SOWERBY, ARTHUR DE CARLE—*Cont.*

1933. The Shansi tiger, grey-lag geese and shooting in Shansi. China Jour., vol. 18, no. 3, pp. 166-168, 1 fig.
- 1934a. China's fur trade and fur-bearing animals. China Jour., vol. 20, no. 5, pp. 286-288.
- 1934b. Hunting the Giant Panda. China Jour., vol. 21, no. 1, pp. 30-32, 2 pl.
- 1934c. Game in the Maritime Province. China Jour., vol. 21, no. 1, pp. 40-41.
1935. Some animals and birds in the Shanghai Museum. China Jour., vol. 23, no. 3, pp. 171-175, 6 pl.
1936. Big game animals of the Chinese-Tibetan borderland. China Jour., vol. 25, no. 5, pp. 285-296, 2 maps, 11 pl.
- 1937a. The natural history of West China. China Jour., vol. 26, no. 4, pp. 198-209, 8 pl.
- 1937b. The wolf in China. China Jour., vol. 26, no. 4, pp. 213-214.
- 1937c. Mammals of China, Mongolia, Eastern Tibet and Manchuria requiring protection. China Jour., vol. 27, no. 5, pp. 248-258, 4 pl., 6 fig.

SPENCER, BALDWIN

1896. Mammalia. In: Report on the work of the Horn Scientific Expedition to Central Australia, pt. 2, zoology, pp. 1-52, 4 pl. London and Melbourne.
1897. Description of two new species of marsupials from Central Australia. Proc. Royal Soc. Victoria, vol. 9 (n. s.), pp. 5-11, 1 pl.
1909. Description of a new species of *Sminthopsis*. Proc. Royal Soc. Victoria, vol. 21 (n. s.), pt. 2, pp. 449-451.

SPENCER, BALDWIN, AND J. A. KERSHAW

- 1910a. A collection of sub-fossil bird and marsupial remains from King Island, Bass Strait. Mem. Nat. Mus. Melbourne, no. 3, pp. 5-35, 8 pl.
- 1910b. The existing species of the genus *Phascalomys*. Mem. Nat. Mus. Melbourne, no. 3, pp. 37-63 + [1], 3 pl.

STATHAM, J. C. B.

1924. With my wife across Africa by canoe and caravan. London: pp. 1-324, 32 pl., 3 maps.

STEAD, DAVID G.

1934. The Koala, or Native Bear. Australian Wild Life, vol. 1, no. 1, pp. 13-22, 4 fig.

STEBBING, E. P.

1912. Stalks in the Himalaya. London and New York: pp. 1-321, illus.

STECHOW, E.

1929. Über die einstige Hege des Wisent im Urwalde von Bialowies. Abhandl. Math.-Nat. Abt. Bayer. Akad. Wiss., Suppl.-Bd. 11, pp. 505-507, 1 pl.

STEEDMAN, ANDREW

1835. Wanderings and adventures in the interior of Southern Africa. Vol. 2. London: pp. v+358, 6 pl.

- STEERE, J. B.
 1889. Letter from, containing an account of the "Tameron" of the Philippines. Proc. Zool. Soc. London 1888, pp. 413-415.
 1891. The island of Mindoro. Am. Naturalist, vol. 25, no. 300, pp. 1041-1054, 2 pl.
- STEVENSON-HAMILTON, J. (See also Hamilton, Stevenson; "Sabi.")
 1912a. Animal life in Africa. New York: pp. xvii+539, illus., maps.
 1912b. The local races of Burchell's Zebra. Proc. Zool. Soc. London 1912, pp. 757-763, 5 fig.
 1929. The sable antelope (swart witpens) *Hippotragus niger*. Jour. Soc. Preservation Fauna Empire, n. s., pt. 9, pp. 53-55.
- STIRLING, E. C., AND A. ZIETZ
 1893. Vertebrata. [Sci. Results Elder Explor. Exped.] Trans. Royal Soc. S. Australia, vol. 16, pt. 2, pp. 154-176, 2 pl.
- STOCKLEY, C. H.
 1922a. Notes on Lydekker's "Game Animals of India." Jour. Bombay Nat. Hist. Soc., vol. 28, pt. 2, pp. 529-533, 1 pl.
 1922b. Notes on oorial. Jour. Bombay Nat. Hist. Soc., vol. 28, pt. 4, pp. 1126-1128.
 1928. Big game shooting in the Indian Empire. London: pp. x+200, 36 pl.
 1930. Notes on the mammals of Baluchistan. Jour. Bombay Nat. Hist. Soc., vol. 34, no. 2, pp. 567-568.
 1933. Reported shooting of a Schomburgk deer. Jour. Siam Soc., Nat. Hist. Suppl., vol. 9, p. 149.
 1936. Stalking in the Himalayas and northern India. London: pp. 1-254.
- STOLICZKA, F.
 1874. Description of the *Ovis poli* of Blyth. Proc. Zool. Soc. London 1874, pp. 425-427, 1 pl.
- STONE, WITMER
 1900. Descriptions of a new rabbit from the Liu Kiu Islands and a new flying squirrel from Borneo. Proc. Acad. Nat. Sci. Philadelphia 1900, pp. 460-463.
- STYAN, F. W.
 1886. [Letter relating to some Chinese animals.] Proc. Zool. Soc. London 1886, pp. 267-268.
- SUSHKIN, PETER P.
 1925. The wild sheep of the Old World and their distribution. After Dr. N. Severtzov and Prof. N. Nasonov. Jour. Mammalogy, vol. 6, no. 3, pp. 145-157.
- SUTTON, C. S.
 1934. The Koala's food trees. Victorian Naturalist, vol. 51, no. 3, pp. 78-80.
- SWAYNE, H. G. C.
 1892. Field-notes on the antelopes of northern Somaliland. Proc. Zool. Soc. London 1892, pp. 300-308.
 1894. Further field-notes on the game animals of Somaliland. Proc. Zool. Soc. London 1894, pp. 316-323.

SWINHOE, ROBERT

1864. Extracts from a letter from, respecting animals intended for the Society's menagerie. Proc. Zool. Soc. London 1864, pp. 168-169.
1870. Catalogue of the mammals of China (south of the River Yangtze) and of the island of Formosa. Proc. Zool. Soc. London 1870, pp. 615-653, 8 fig.
1873. On Chinese deer, with the description of an apparently new species. Proc. Zool. Soc. London 1873, pp. 572-576.

SZALAY, A. B.

1930. Die Farbe des Ures. Zool. Garten, vol. 3, nos. 9-10, pp. 255-263.

TAYLOR, EDWARD H.

1934. Philippine land mammals. Monograph 30, Bureau Sci., Manila, pp. 1-548, 25 pl., 25 maps.

TAYLOR, JOHN H.

1936. [Letter to the editor on elephant control.] East Africa, July 9, 1936.

TEICHMAN, ERIC

1937. Journey to Turkistan. London: pp. i-xiv, 15-221, illus., 1 map.

TEMMINCK, C. J.

- 1835-1841. Monographies de mammalogie. Vol. 2. Leyden: pp. 1-392, 45 pl.
- 1842-1845. Mammifères. In: Siebold's Fauna Japonica. Lugduni Batavorum: pp. 1-59, 20 pl.

TENNANT, ROBERT

1885. Sardinia and its resources. Rome and London: pp. 1-311.

THESIGER, WILFRED

1939. A camel journey to Tibesti. Geog. Jour., vol. 94, no. 6, pp. 433-446, 4 pl., 1 map.

THOM, W. S.

1934. Some notes on bison (*Bibos gaurus*) in Burma. Jour. Bombay Nat. Hist. Soc., vol. 37, no. 1, pp. 106-123, 2 pl.

THOMAS, BERTRAM

1932. Arabia Felix. London: pp. xxix+397, 48 pl., 1 map. (List of mammals by J. G. Dollman, pp. 339-341.)

THOMAS, OLDFIELD

1882. On two new Muridae from Tasmania. Ann. Mag. Nat. Hist., ser. 5, vol. 9, pp. 413-416, 4 fig.
- 1887a. Description of a second species of rabbit-bandicoot (*Peragale*). Ann. Mag. Nat. Hist., ser. 5, vol. 19, pp. 397-399.
- 1887b. Report on the Mammalia collected by the officers of H.M.S. 'Flying-Fish' on Christmas Island. Proc. Zool. Soc. London 1887, pp. 511-514, 2 pl.
1888. Catalogue of the Marsupialia and Monotremata in the collection of the British Museum (Natural History). London: pp. xiii+401, 28 pl., 6 fig.
1889. Description of a new species of *Mus* from South Australia. Ann. Mag. Nat. Hist., ser. 6, vol. 3, pp. 433-435, 1 fig.

THOMAS, OLDFIELD—*Cont.*

1891. On some antelopes collected in Somali-land by Mr. T. W. H. Clarke. Proc. Zool. Soc. London 1891, pp. 206-212, 2 pl.
1892. On the antelopes of the genus *Cephalophus*. Proc. Zool. Soc. London 1892, pp. 413-430.
1893. Exhibition of, and remarks upon, a specimen of *Nanotragus livingstonianus* from Northern Zululand. Proc. Zool. Soc. London 1893, pp. 237-239, 1 fig.
1894. On some gazelles brought by Sir Edmund Loder from Algeria. Proc. Zool. Soc. London 1894, pp. 467-472, 1 pl., 2 fig.
1898. On the mammals obtained by Mr. John Whitehead during his recent expedition to the Philippines. With field-notes by the collector. Trans. Zool. Soc. London, vol. 14, no. 7, pp. 377-412, 7 pl.
1900. On the mammals obtained in South-western Arabia by Messrs. Percival and Dodson. Proc. Zool. Soc. London 1900, pp. 95-104.
1903. A new Duiker from West Afrika. Ann. Mag. Nat. Hist., ser. 7, vol. 11, pp. 289-291.
1904. On a collection of mammals made by Mr. J. T. Tunney in Arnhem Land, Northern Territory of South Australia. Novit. Zool., vol. 11, pp. 222-229.
- 1905*a*. New African mammals of the genera *Glauconycteris*, *Lutra*, *Funisciurus*, *Arvicanthis*, *Lophiomys*, and *Procavia*. Ann. Mag. Nat. Hist., ser. 7, vol. 15, no. 85, pp. 77-83.
- 1905*b*. On some Australasian mammals. Ann. and Mag. Nat. Hist., ser. 7, vol. 16, no. 94, pp. 422-428.
- 1906*a*. The Duke of Bedford's zoological exploration in Eastern Asia.—1. List of mammals obtained by Mr. M. P. Anderson in Japan. Proc. Zool. Soc. London 1905, pp. 331-363, 1 pl.
- 1906*b*. On mammals collected in South-west Australia for Mr. W. E. Balston. Proc. Zool. Soc. London 1906, pp. 468-478.
1907. List of further collections of mammals from Western Australia, including a series from Bernier Island, obtained for Mr. W. E. Balston; with field-notes by the collector, Mr. G. C. Shortridge. Proc. Zool. Soc. London 1906, pp. 763-777.
1910. Notes on African rodents. Ann. Mag. Nat. Hist., ser. 8, vol. 6, no. 32, pp. 221-224.
- 1913*a*. Ernst Hartert's expedition to the Central Western Sahara. Mammals. Novit. Zool., vol. 20, pp. 28-33.
- 1913*b*. List of mammals obtained by the Hon. Walter Rothschild, Ernst Hartert and Carl Hilgert in Western Algeria during 1913. Novit. Zool., vol. 20, pp. 586-591.
1921. Notes on Australasian rats, with a selection of lectotypes of Australasian Muridae. Ann. Mag. Nat. Hist., ser. 9, vol. 8, no. 46, pp. 425-433.
1922. On bandicoots allied to *Perameles bougainvillei*. Ann. Mag. Nat. Hist., ser. 9, vol. 10, pp. 143-145.
1923. On some Queensland Phalangeridae. Ann. Mag. Nat. Hist., ser. 9, vol. 11, pp. 246-250.

- THOMAS, OLDFIELD, AND GUY DOLLMAN
 1909. On mammals from Inkerman, North Queensland, presented to the National Museum by Sir William Ingram, Bt., and the Hon. John Forrest. Proc. Zool. Soc. London 1908, pp. 788-794, 1 pl.
- THOMAS, OLDFIELD, AND MARTIN A. C. HINTON
 1923. On the mammals obtained in Darfur by the Lynes-Lowe expedition. Proc. Zool. Soc. London 1923, pp. 247-271.
- THOMAS, OLDFIELD, AND HAROLD SCHWANN
 1906. The Rudd Exploration of South Africa.—V. List of mammals obtained by Mr. Grant in N. E. Transvaal. Proc. Zool. Soc. London 1906, pp. 575-591.
- THOMAS, OLDFIELD, AND R. C. WROUGHTON
 1908. The Rudd Exploration of S. Africa.—X. List of mammals collected by Mr. Grant near Tette, Zambesia. [With field notes by C. H. B. Grant.] Proc. Zool. Soc. London 1908, pp. 535-553.
 1909. On a collection of mammals from western Java presented to the National Museum by Mr. W. E. Balston. [With field notes by G. C. Shortridge.] Proc. Zool. Soc. London 1909, pp. 371-392.
- THOMAS, PHILIPPE
 1884. Recherches stratigraphiques et paléontologiques sur quelques formations d'eau douce de l'Algérie. Mém. Soc. Géol. France, ser. 3, vol. 3, no. 2, pp. 1-57, 4 pl., 3 fig., 1 folding table.
- TINDALE, NORMAN B.
 1925. Natives of Groote Eylandt and of the west coast of the Gulf of Carpentaria. Records S. Australian Mus., vol. 3, no. 1, 61-102, 6 pl., 16 fig., 3 maps.
- TRAILL, THOMAS STEWART
 1824. Some account of an animal of the genus *Bos*, which in India is named *gour*. Edinburgh Philos. Jour., vol. 11, pp. 334-340.
- TREVOR-BATTYE, AUBIN
 1913. See Bate, Dorothea M. A., 1913.
- TRISTRAM, H. B.
 1884. The fauna and flora of Palestine. London: pp. xxii+455, 20 pl.
- TROUËSSART, E. L.
 1884? Histoire naturelle de France. Deuxième partie. Mammifères. Paris: pp. xxiii+359, 148 fig.
 1905. La faune des mammifères de l'Algérie, du Maroc, et de la Tunisie. Causéries scientifiques Soc. Zool. France, vol. 1, no. 10, pp. 343-410.
 1909. Le Rhinoceros blanc du Soudan (*Rhinoceros simus cottoni*). Proc. Zool. Soc. London 1909, pp. 198-200, 3 pl.
 1910. Faune des mammifères d'Europe. Berlin: pp. xvii+266.
- TROUGHTON, ELLIS LE G.
 1923. The "Honey Mouse," *Tarsipes spenserae* Gray. Australian Zoologist, vol. 3, pt. 4, pp. 148-156, 1 pl., 1 fig.
 1924. The honey-eating marsupial mice of Australia. Australian Mus. Mag., vol. 2, no. 4, pp. 127-132, 3 fig.

TROUGHTON, ELLIS LE G.—*Cont.*

1931. The habits and food of some Australian mammals. *Australian Zoologist*, vol. 7, pt. 1, pp. 77-83.
- 1932a. Australian furred animals, their past, present, and future. *Australian Zoologist*, vol. 7, pt. 3, pp. 173-193.
- 1932b. A revision of the rabbit-bandicoots. Family Peramelidae, genus *Macrotis*. *Australian Zoologist*, vol. 7, pt. 3, pp. 219-236, 1 map.
1935. The southern race of the Koala. *Australian Naturalist*, vol. 9, pt. 6, pp. 137-140.
1938. Australian mammals: their past and future. *Jour. Mammalogy*, vol. 19, no. 4, pp. 401-411.
1941. Furred animals of Australia. Sydney: pp. xxvii+374, 25 pl.

TURNER, D. P.

1937. Some notes on the game of the British Somaliland boundary. *Jour. Soc. Preservation Fauna Empire*, n. s., pt. 31, pp. 56-62.

TUTEIN-NOLTHENIUS, A. C.

1929. [Letter to the president on game conditions in Ceylon.] *Jour. Soc. Preservation Fauna Empire*, n. s., pt. 9, pp. 102-106.

UCHIDA, SEINOSUKE

1935. The present condition of the protection of birds and mammals in Japan. Revised edition. Dept. Anim. Industry, Ministry Agric. and Forestry, Tokyo: pp. 1-28, 16 fig.

URBAIN, ACHILLE

- 1937a. Le Kou Prey ou boeuf gris cambodgien. *Bull. Soc. Zool. France*, vol. 62, pp. 305-307, 2 fig.
- 1937b. Le Kou Prey ou boeuf sauvage cambodgien. *Mammalia*, vol. 1, no. 6, pp. 257-258, 1 pl.
1939. Une nouvelle espèce de bovidé asiatique. *C. R. Acad. Sci. [Paris]*, vol. 209, pp. 1006-1007.
1940. Note complémentaire sur le boeuf sauvage du Cambodge (*Bos (Bibos) sauveli* Urbain). *Bull. Mus. Nat. Hist. Nat.*, ser. 2, vol. 11, no. 6, pp. 519-520, 1 fig.

VALENCIENNES, A.

1825. Mémoire sur le genre *Ictides*. *Annales Sci. Nat.*, vol. 4, pp. 57-61, 1 pl.
1856. Description d'une espèce nouvelle de Mouflon (*Ovis anatolica*), rapporté de Bulgardagh par M. Tchihatcheff. *C. R. Acad. Sci. [Paris]*, vol. 43, pp. 65-69.

VAN DEN BRINK, F. H.

1931. Catalogue des mammifères des Pays-Bas trouvés à l'état sauvage. *Bull. Soc. Zool. France*, vol. 56, pp. 163-190.

VAN DER BYL, P. B.

1915. The Caucasus, pp. 35-57, 4 pl.; the Indian Empire, pp. 71-126, 29 pl. In: *The gun at home & abroad. The big game of Asia and North America*. London.

VAUGHAN-KIRBY, F.

1920. The white rhinoceros, with special reference to its habits in Zululand. *Annals Durban Mus.*, vol. 2, no. 20, pp. 223-242, 1 pl.

VERNAY, ARTHUR S.

1930. The lion of India. Nat. Hist. [New York], vol. 30, no. 1, pp. 81-89, 5 fig.

VETULANI, T.

1933. Zwei weitere Quellen zur Frage des europäischen Waldtarpan. Zeitschr. f. Säugetierkunde, vol. 8, pp. 281-282.

VOGT, CARL, und FRIEDRICH SPECHT

1883. Die Säugetiere in Wort und Bild. München: pp. xxii+440, illus.

WAGNER, A.

1841. Beschreibung einer neuen Art von Bandikuts, *Perameles myosurus*, nebst Bemerkungen über *Perameles obesula*. Archiv f. Naturg. (Wiegmann), 7th yr., vol. 1, pp. 289-297.

WAGNER, MORITZ

1841. Reisen in der Regentschaft Algier in den Jahren 1836, 1837 und 1838. Vol. 3. Leipzig: pp. xviii+296.

WAITE, EDGAR R., AND FREDERIC WOOD JONES

1927. The fauna of Kangaroo Island, South Australia. No. 2.—The mammals. Trans. Royal Soc. S. Australia, vol. 51, pp. 322-325.

WALLACE, HAROLD FRANK

1913. The big game of central and western China. London: pp. xviii+318, illus., 2 maps.
1915. China, pp. 156-178, 3 pl.; the deer of Asia, pp. 192-207, 4 pl.; the present condition of Asiatic wapiti, pp. 208-211. In: The gun at home & abroad. The big game of Asia and North America. London.

WARD, ROWLAND

1935. Records of big game. African and Asiatic sections. Tenth ed., edited by Guy Dollman and J. B. Burlace. London: pp. xiii+408, illus.

WATERHOUSE, GEORGE R.

1836. Description of a new genus of mammiferous animals from New Holland, probably belonging to the marsupial type. Proc. Zool. Soc. London 1836, pp. 69-70.
- 1838a. Description of a new genus of mammiferous animals from Australia, belonging probably to the order Marsupialia. Trans. Zool. Soc. London, vol. 2, pp. 149-154, 2 pl.
- 1838b. Characters of some new species of the genera *Mus* and *Phascogale*. Proc. Zool. Soc. London 1837, pp. 75-77.
1841. Marsupialia or pouched animals. Mammalia, vol. 11, in Jardine's Naturalist's Library. Edinburgh: pp. i-xvi, 17-323, 37 pl., 10 fig.
1842. On two new species of marsupial animals from South Australia. Proc. Zool. Soc. London 1842, pp. 47-48.
1846. A natural history of the Mammalia. Vol. 1. Marsupialia, or pouched animals. London: pp. 1-553, 22 pl., 20 fig.

- WEBER, MAX
1890-1891. Mammalia from the Malay archipelago. I. Primates, Prosimiae, Galeopithecidae, Carnivora, Artiodactyla, Edentata, Marsupialia. In: Weber, Zool. Ergebn. Reise Niederl. Ost-Indien, vol. 1, pp. 93-114.
- WEIDHOLZ, A.
1930. Meine beiden Riesen-Elanantilopen (*Taurotragus derbianus congolanus* Rothschild). Zool. Garten, vol. 3, nos. 4-8, pp. 138-144, 3 fig.
- WEIGOLD, HUGO
1924. Weitere Bemerkungen Dr. Weigolds zu den gesammelten Säugtieren. In: Zool. Ergebn. Walter Stötznerschen Expeditionen nach Szetschwan, Osttibet und Tschili, pt. 3. Abhandl. u. Ber. Mus. Tierk. u. Völk. Dresden, vol. 16, no. 2, pp. 71-76.
- WELLBY, M. S.
1898. Through unknown Tibet. London: pp. xiv+440, illus.
- WERTH, E.
1930. Zur Abstammung des Hausesels. Sitz.-ber. Ges. Naturf. Freunde Berlin 1929, pp. 342-355, 3 fig., 1 map.
- WETTSTEIN, OTTO
1928. Beiträge zur Wirbeltierfauna der kroatischen Gebirge. Annalen Naturh. Mus. Wien, vol. 42, pp. 1-45.
- WHITAKER, JOSEPH S.
1897. On the gazelles of Tunisia. Proc. Zool. Soc. London 1896, pp. 815-817.
- WILHELM, J. H.
1933. Das Wild des Okawangogebietes und des Caprivizipfels. Jour. S. W. African Sci. Soc., vol. 6, pp. 51-74, 15 fig.
- WILKINS, G. H.
1928. Undiscovered Australia. London: pp. i-xi, 9-292, 51 pl., 1 map.
- WILSON, ERNEST HENRY
1913. A naturalist in western China. Vol. 2. London: pp. xi+229, 44 pl.
- WINGE, HERLUF
1908. Danmarks Fauna 5. Pattedyr. København: pp. 1-248, 117 fig.
- WOLF, JOSEPH
1861. Zoological sketches. [First series.] Edited, with notes, by Philip Lutley Selater. London: pp. [50], 50 pl.
1867. Zoological sketches, second series. Edited, with notes, by Philip Lutley Selater. London: pp. [1-50], 50 pl.
- WOLLEBAEK, ALF.
1926. The Spitsbergen reindeer (*Rangifer tarandus spetsbergensis*). Result. Norske Statsunderst. Spetsbergenekspeditioner, vol. 1, no. 4, pp. 1-71, 6 pl., 16 fig., 1 map.
- WOOD, RODNEY C.
1928. Game and tsetse-fly in Nyasaland. Jour. Soc. Preservation Fauna Empire, n. s., pt. 8, pp. 110-116.
1929. [Letter to the secretary.] Jour. Soc. Preservation Fauna Empire, n. s., pt. 9, pp. 101-102.

WOOD JONES, FREDERIC. (*See* Jones, Frederic Wood.)

WORCESTER, DEAN C.

1898. *The Philippine Islands and their people*. New York and London: pp. xix+529, illus., 2 maps.

WRANGEL, C. G.

1908. *Die Rassen des Pferdes*. Vol. 1. Stuttgart: pp. viii+632, 1 pl., 87 fig.

WYLDE, AUGUSTUS B.

1888. '83 to '87 in the Soudan. Ed. 2. 2 vols. London.

1901. *Modern Abyssinia*. London: pp. 1-332, illus., map.

YERKES, ROBERT M., AND ADA W. YERKES

1929. *The great apes*. New Haven: pp. xix+652, 172 fig.

YOUNGHUSBAND, F. E.

1888. *A journey across Central Asia, from Manchuria and Peking to Kashmir, over the Mustagh Pass*. Proc. Royal Geog. Soc., n. s., vol. 10, pp. 485-514, 1 map.

ZAMMARANO, VITTORIO TEDESCO

1919. *Come ho rintracciato l' "Ammordorcas [sic] Clarkei" a 4° Nord, 45° 30' Est Greenwich*. Boll. R. Soc. Geog. Italiana, ser. 5, vol. 8, nos. 5-6, pp. 367-369, 1 fig.

1930. *Fauna e caccia*. Ministero delle Colonie, Roma: pp. 1-222, 115 fig., 3 maps.

ZUBKOV, A. I.

1935. *The reindeer of Novaya Zemlya*. Trans. Arctic Inst. [Leningrad], vol. 22, pp. 55-61.

ZUKOWSKY, LUDWIG

1924. *Beitrag zur Kenntnis der Säugetiere der nördlichen Teile Deutsch-Südwestafrikas unter besonderer Berücksichtigung des Grosswildes*. Archiv f. Naturg., vol. 90, Abt. A, no. 1, pp. 29-164, 13 fig.

INDEX

- Aard-wolf, 250
 Cape, 250
 Angola, 251
 Masailand, 251
 Nubian, 250
 Somali, 251
 Transvaal, 251
 Aard-wolves, 250
 abaconis, *Geocapromys ingrahami*, 18
 Abbott, W. L., 247, 314, 390
 aceratos, *Oreotragus*, 671
 Oreotragus oreotragus, 671
 Acinonyx, 274
 guttatus ngorongorensis, 278
 guttatus obergi, 276
 hecki, 281
 jubatus, 274, 286
 jubatus hecki, 280, 281, 289
 jubatus jubatus, 276
 jubatus ngorongorensis, 278
 jubatus obergi, 276
 jubatus raddei, 284, 285
 jubatus raineyi, 278, 279
 jubatus soemmeringii, 280
 jubatus velox, 278, 279
 jubatus venaticus, 12, 283
 raddei, 285
 rex, 274, 276, 286
 Acratocnus comes, 18
 major, 18
 odontrogonus, 18
 Acrocodia, 371
 indica, 372
 adametzi, *Ovis poli*, 584
 Addax, 16, 711
 addax, *Addax nasomaculatus*, 16, 715
 Antilope, 711
 Addax nasomaculatus, 711
 nasomaculatus addax, 715
 nasomaculatus nasomaculatus, 715
 adipicaudatus, *Chirogalus*, 127
 adustus, *Phascolarctos cinereus*, 64, 65, 68
 aedium, *Plagiodontia*, 18
 aegagrus, *Capra hircus*, 626, 627
 Aegoceros (*Capra*) falconeri, 627
 musimon, 573
 Aegoceros koba, 704
 niger kirkii, 705
 Aegoryx algazel, 8, 16, 690
 Aepyprymnus, 93
 rufescens, 84
 aequinoctialis, *Syncerus caffer*, 554
 aethiopicus, *Lophiomys*, 201
 Phractomys, 201
 affinis, *Cervus wallichi*, 460
 africana, *Loxodonta africana*, 8, 16, 316
 africanus, *Asinus*, 322, 345
 Asinus asinus, 16, 345, 350, 352
 Elephas, 316
 agilis, *Macropus*, 110
 agrius, *Felis*, 14, 263
 Felis ocreata, 263
 Aharoni, J., 229, 285, 367, 369, 603, 623, 648, 716
 Ahrens, T. G., 534, 535, 575
 Aigoceros niger, 707
 Aitchison, J. E. T., 286, 307, 363, 570
 Akeley, C. E., 175, 352
 Akroyd, R., 730
 alashanicus, *Cervus canadensis*, 449
 Cervus elaphus, 449
 Albertus Magnus, 332
 albicus, *Castor fiber*, 191
 albifrons, *Arctictis binturong*, 245, 247
 Damaliscus, 656
 Lemur, 135
 Lemur fulvus, 138
 Lemur macaco, 135
 Paradoxurus, 247
 albimanus, *Lemur*, 140
 albipes, *Antechinus*, 29
 Phascogale, 30
 Sminthopsis murina, 30
 albipilis, *Lagostrophus fasciatus*, 96
 albirostris, *Cervus*, 13, 464, 465
 Albrecht, Duke, 224
 albus, *Indris*, 146
 Alcelaphus buselaphus buselaphus, 15, 20, 642
 caama, 15
 caama caama, 648, 650, 652
 caama evalensis, 651, 652
 caama selbornei, 648-650, 653
 lichtensteini, 647
 Alexander, J., 342
 algazel, *Aegoryx*, 8, 16, 690
 Cemas, 690
 algira, *Felis caracal*, 272

- algius, Caracal caracal, 16, 272
 Ali, S., 515, 540
 Allen, G. M., 1, 2, 5, 6, 125, 131, 138, 140, 143, 144, 147, 150, 154, 157, 160, 174, 200, 212, 217, 232, 254, 255, 270, 287, 304, 310, 322, 371, 425, 428, 431, 433, 435, 436, 444, 448, 460, 461, 464, 466, 510, 530, 579, 580, 594, 622, 637, 638, 643, 731
 (See also under Barbour, T.)
 Allen, G. M., and Coolidge, H. J., Jr., 182, 187, 190, 667
 Allen, J. A., 249, 595, 596, 597
 alleni, Ovis, 596
 Ovis nivicola, 596
 Alphéraky, S., 305
 alpinus, Cuon, 448, 451
 Alston, E. R. (See under Danford, C. G.)
 altaica, Ovis argali, 576
 americanus, Lepus, 190
 Ammodorcas clarkei, 675
 ammon, Capra, 576
 Ovis, 557, 577, 599
 Ovis ammon, 576, 583, 592
 Ammotragus lervia, 600
 lervia angusi, 605
 lervia blainei, 601
 lervia fassini, 16, 603
 lervia lervia, 601, 604
 lervia ornata, 16, 601
 lervia sahariensis, 604
 amoyensis, Panthera tigris, 303, 304
 amphibiis, Hippopotamus, 8, 414, 415
 Hippopotamus amphibiis, 414
 Amschler, W., 454
 amurensis, Felis tigris, 299
 Panthera tigris, 304
 anatolica, Ovis, 559
 Ovis ophion, 371, 559, 563
 Anderson, J., 394, 395, 438
 Anderson, J., and de Winton, W. E., 201-203, 251, 281, 347, 485, 487, 602, 619
 Anderson, M. P., 214, 641
 Andersson, C. J., 404
 Andrews, C. W., 122, 207-209
 Andrews, R. C., 304, 324, 355, 449, 461, 580
 Âne de l'Inde (Fr.), 363
 Angas, G. F., 717
 angasii, Tragelaphus, 16, 716, 720
 angolensis, Giraffa camelopardalis, 16, 499
 angusi, Ammotragus lervia, 605
 angustirostris, Rangifer, 483
 anjuanensis, Lemur, 140
 annectens, Capricornis sumatraensis, 641
 Anoa, Common, 11, 550
 Mountain, 11, 553
 Anoa depressicornis, 11, 550, 554
 fergusoni, 11, 550-553
 mindorensis, 11, 548
 quarlesi, 553, 554
 Anteater, Banded, 43
 Scaly, 181, 184
 Anteaters, marsupial, 43
 Antechinus alpinus, 29
 apicalis, 10, 20, 25
 fuliginosa, 30
 Antelope, Angolan Sable, 707
 Beira, 674
 Giant Sable, 16, 707
 Hunter's, 658
 Northern Rhodesian Sable, 705
 South African Roan, 701
 Antelopes, 21, 510
 Anthony, H. E., 7
 antillarum, Oryzomys, 19
 antillensis, Homomysomys, 18
 Antilope Adax (Sp.), 711
 Antilope adax, 711
 bubalis, 643
 buselaphus, 642
 caama, 648
 crispa, 641
 cuvieri, 683
 dammah, 690
 depressicornis, 550
 dorcas, 653
 equina, 701
 leptoceros, 687
 lervia, 601
 leucophaea, 698
 leucoryx, 693
 mhorr, 689
 nasomaculata, 711
 oreotragus, 668
 oryx, 722
 pygargus, 653
 saltatrix, 668
 saltatrixoides, 672
 sumatraensis, 635
 sylvicultrix, 663
 tao, 690
 Antilope chevaline (Fr.), 701
 Arambourg, C., 691
 antiquorum, Camelopardalis, 486
 Equus burchellii, 340, 345
 Giraffa camelopardalis, 485, 486
 Antonius, O., 327, 329, 332, 348-350, 352, 353, 359, 362, 367, 370, 371
 Aoki, B., 199, 214, 215
 Aoudad, 600
 apache, Ursus, 21
 Apes, anthropoid, 164
 Aphaetretus montanus, 18
 aphylla, Reithronycteris, 19

- apicalis, *Antechinus*, 10, 20, 25
 Phascogale, 25
 Potorous tridactylus, 91
 aquaticus, *Hyemoschus*, 8
 Hyemoschus aquaticus, 425
 Moschus, 425
 arcar, *Ovis orientalis*, 572
 Arbuthnot, A. G., 629, 630
 Archbold, R., 135
 Archer, G., and Godman, E. M., 674
 Arctictis, 245
 binturong albifrons, 245, 247
 binturong binturong, 244, 247, 248
 binturong kerkhoveni, 247
 binturong niasensis, 247
 binturong penicillatus, 245, 248,
 249
 binturong whitei, 249
 niasensis, 247
 arcticus, *Rangifer*, 472
 Arctitis [sic] *whitei*, 249
 arctos, *Ursus*, 14, 217, 229
 Ursus arctos, 218
 Argali, *Alatau*, 584
 Altyn-Tagh, 591
 Gobi, 13, 579
 Hume's, 588
 Issyk Kul, 584
 Jair, 581
 Karatau, 586
 Karelin's, 584
 Kashgarian, 588
 Kulja, 583
 Littledale's, 583
 Mongolian, 576
 Pamir, 590
 Semipalatinsk, 13, 581
 Severtzov's, 587
 Siberian, 576
 Tibetan, 592
 argali, *Ovis*, 576
 argurus, *Mus*, 211
 Zyromys argurus, 10, 20, 211
 argyrochaetes, *Capricornis sumatraensis*, 637, 640
 Aristotle, 291, 371
 arkal, *Ovis*, 572
 Ovis vignei, 572
 arkar, *Ovis*, 572
 armeniana, *Ovis ophion*, 561
 Arna [Arn] (*Hindustani*), 538
 arnee, *Bos*, 538
 Bubalus bubalis, 538, 544
 arni, *Bos*, 543
 Arrhenius, E., 174
 Arrui (Sp.), 600
 Artiodactyla, 414
 Arui, 600
 Buchanan's, 605
 Egyptian, 16, 601
 Libyan, 16, 603
 Arui, Saharan, 604
 Sudan, 601
 Aschemeier, C. R., 169
 aschenborni, Oryx, 696
 asiatica, Cervus maral, 451
 asiaticus, Cervus canadensis, 451, 463
 Cervus elaphus, 451
 Leo, 292
 asinus, Asinus, 348, 368
 Asinus asinus, 348
 Asinus, 322
 africanus, 322, 345
 asinus, 348, 368
 asinus africanus, 16, 345, 350, 352
 asinus asinus, 348
 asinus diana, 345, 346
 asinus somaliensis, 16, 346, 348,
 350
 atlanticus, 15, 17, 322, 348, 352
 burchellii, 339
 hamar, 367
 hemionus, 322
 hemionus finschi, 13, 357
 hemionus hemionus, 353
 hemionus hemippus, 12, 20, 367,
 371
 hemionus khur, 13, 363
 hemionus onager, 359, 364, 368,
 371
 hemionus subsp., 371
 hemippus, 368, 369
 onager, 368, 369
 taeniopus somaliensis, 350
 Ass, African Wild, 348
 Algerian Wild, 15, 17, 352
 Atlas Wild, 352
 Baluchi Wild, 363
 Indian Wild, 13, 363
 Mongolian Wild, 353
 North Persian Wild, 359
 Nubian Wild, 16, 345
 Somali Wild, 16, 350
 Syrian Wild, 12, 20, 367
 Transcaspian Wild, 13, 357
 Wild, of Russian Turkestan, 357
 Asses, 21, 322
 Assur-Bani-Pal, 369
 ater, Indris, 155
 Atkinson, T. W., 308, 324, 452
 atlanticus, Asinus, 15, 17, 322, 352
 Equus asinus, 352, 353
 Audad, 600
 Audas, R. S., 620
 Audebert, J. B., 138
 audreyae, Megalomys, 18
 auduboni, Ovis canadensis, 21
 aureus, Oreotragus oreotragus, 671
 Aurochs, 13, 17, 511
 australis, Dusicyon, 19
 austrinus, Rattus culmorum, 205

- Avahi, Eastern Woolly, 156
 Western Woolly, 157
 avahi, *Semnocebus*, 156
 Avahi laniger laniger, 156
 laniger occidentalis, 157
 Avahis, 146
 Avahis laineux occidental (Fr.), 157
 Avahis laineux oriental (Fr.), 156
 Avahis laniger orientalis, 156
 Aye-aye, 17, 158
 Aylmer, G. P. V., 676
- Babault, G., 410
 Babirusa babyrussa, 11
 babyrussa, *Babirusa*, 11
 bactrianus, *Camelus*, 421
 Cervus, 463
 badius, *Colobus*, 8, 162
 Simia (*Cercopithecus*), 162
 Bär, brauner (Ger.), 217
 Bagnold, R. A., 688
 baicalensis, *Cervus canadensis*, 451
 Baikov, N. A., 299
 Bailey, A. M., 213, 625
 Bailey, F. M., 379
 Baines, T., 404
 Baira, 674
 Baker, A. B., 204
 Baker, S. W., 345, 347, 485
 bakeri, *Hippotragus*, 704
 Hippotragus equinus, 704
 Baldacci, —, 225
 Baldwin, C., 100
 Baldwin, J. H., 378
 Baldwin, W. C., 318
 balica, *Panthera tigris*, 310
 Balme, F. N., 499
 Bandicoot, Eastern Barred, 47
 Eastern Pig-footed, 58
 Gunn's Striped, 48
 New South Wales Barred, 10, 20,
 47
 Rabbit-eared, 51
 South Australian Barred, 50
 Tasmanian Barred, 48
 Western Barred, 10, 20, 49
 Western Pig-footed, 59
 Bandicoots, 21, 47
 Bangham, W. N., 374
 Banks, E., 165, 389, 392, 547
 Banteng, Bornean, 11, 528
 Burmese, 527
 Javan, 11, 523
 Malay, 525
 banteng, *Bos*, 523, 526
 banting, *Bos*, 523
 barbarus, *Cervus*, 457
 Cervus elaphus, 8, 16, 457
 Barbour, T., 655
 Barbour, T., and Allen, G. M., 386, 389
 Barclay, F., 299, 300, 302
- Barnard, C., 76
 Barnard, M. R., 219
 barnardi, *Lasiorhinus latifrons*, 76
 Barns, T. A., 173-175
 Baron, L., 159
 Barrow, J., 298, 700
 Barry, H. C., 65, 104
 Barth, H., 489, 643
 Barthélemy, Marquis de [P. Sauvaire],
 396
 Bastereland (Boer), 701
 Bastergemsbok (Boer), 701
 Bat, Cuban Yellow, 18
 Haitian Long-tongued, 19
 Jamaican Long-tongued, 19
 Lesser Falcate-winged, 18
 Long-tailed, 731
 Puerto Rican, 19
 Puerto Rican Long-nosed, 19
 Puerto Rican Long-tongued, 19
 Short-tailed, 731
 Bate, D. M. A., 263, 558
 Bates, D., 713
 batesi, *Dorcatherium aquaticum*, 425
 Hyemoschus aquaticus, 425
 Bats, leaf-nosed, 21
 long-legged, 21
 Baum, H., 653
 Bear, Atlas, 15, 19, 230
 Crowther's, 230
 Manchurian Black, 228
 Old World Brown, 14, 217
 Syrian, 228
 Bear-cat, 244
 Bears, 21, 217
 beatrix, *Oryx*, 693
 Beaver, European, 14, 191
 Beavers, 191
 Becker, J., 294
 Bédé, P., 645
 Beden, 618
 Bedford, Duke of, 191, 469
 bedfordi, *Equus* (*Asinus*) *hemionus*,
 353
 bedfordianus, *Cervus*, 447
 Beira, 674
 Bell, T., 219
 Bell, W., 390
 Belopolski, L. O., 597
 Benhazera, M., 349
 Bennett, E. T., 138, 146, 147, 254, 690
 Bentham, T., 438
 beothucus, *Canis lupus*, 20
 Bequaert, J., 182, 183, 188
 berezovskii, *Moschus*, 431
 Beringe, O. von, 174
 beringei, *Gorilla gorilla*, 168, 173
 beringeri, *Gorilla*, 173
 beringianus, *Ursus arctos*, 218, 228
 bernieri, *Lagorchestes hirsutus*, 96
 Berthold, C., 374

- Bettongia, 93
 campestris, 91
 gaimardi, 10, 20, 78
 gouldii, 83
 lesueur graii, 79, 80
 lesueur harveyi, 79, 80
 lesueur lesueur, 79
 lesueuri, 80, 84
 penicillata, 82
 penicillata gouldii, 83
 penicillata ogilbyi, 83
 penicillata penicillata, 82, 84
 rufescens, 84
 sp., 77
 Bhicharana, P. J., 436, 438
 Biber (Ger.), 191
 Bibos frontalis, 520
 gaurus gaurus, 514
 gaurus hubbacki, 13, 521
 gaurus readei, 517
 sondaicus birmanicus, 527
 sondaicus butleri, 525
 sondaicus lowi, 11, 528
 sondaicus sondaicus, 11, 523
 bicolor, *Propithecus*, 148
 bicornis, *Diceros*, 8
 Diceros bicornis, 396
 Rhinoceros, 396
 Biddulph, J., 558, 584
 bidens, *Heptaxodon*, 18
 biedermani, *Cervus*, 451
 Bièvre (Fr.), 191
 Bigalke, R., 662
 Bighorn, Allen's, 596
 Anadyr, 13
 Badlands, 21
 Clifton's, 598
 Kamchatkan, 595
 Lydekker's, 598
 Syverma, 599
 Verkhoyansk, 598
 Yablonoï, 599
 Bilby, 51
 Barcoo, 55
 Black-footed, 55
 Lesser, 57
 Nalpa, 10, 20, 54
 New South Wales, 53
 Rawlinna, 54
 White-tailed, 56
 Bilkewicz, —, 286
 billardieri, *Macropus*, 113
 billardierii, *Kangurus*, 112
 Thylogale, 112
 billingae, *Taurotragus oryx*, 725
 binoë, *Thylogale eugenii*, 110
 Bintoroeng (Dutch), 244
 binturong, *Arctictis binturong*, 244,
 247, 248
 Viverra, 244
 Binturong, Banka, 247
 Himalayan, 247
 Javanese, 248
 Malay, 244
 Nias, 247
 Palawan, 249
 birmanicus, *Bibos sondaicus*, 527
 Bison, American, 14
 Burmese, 517
 Caucasian, 13, 14, 20, 536
 Eastern, 18
 Indian, 514
 Lithuanian, 14, 531
 Malayan, 521
 Oregon, 19
 bison, *Bison bison*, 14
 Bison bison bison, 14
 bison oregonus, 19
 bison pennsylvanicus, 18
 bonasus bonasus, 14, 531
 bonasus caucasicus, 13, 14, 20, 535,
 536
 caucasicus, 536
 priscus, 532
 bisonophagus, *Ursus rogersi*, 20
 Bissuel, H., 349
 Bizzarri, A., 621
 Blaauw, F. E., 660
 Blaauwbok, 15, 17, 698
 Blaine, G., 625, 698, 708
 (See also under Lydekker, R.)
 blainei, *Ammotragus lervia*, 601
 Ovis lervia, 601
 Oryx gazella, 696
 Blancou, L., 179, 183, 188, 281, 400, 410,
 489, 664, 730
 Blanford, W. T., 199, 230, 271, 275,
 283, 284, 293, 307, 361, 364-366, 372,
 381, 433, 438, 462, 514, 518, 539, 541,
 543 547, 563, 565, 566, 570, 593, 626,
 629, 630
 blanfordi, *Ovis*, 569
 Ovis vignei, 588
 Blasius, J. H., 192, 195, 200, 222, 243,
 259, 266
 Blesbok, 15, 656
 Bligh, A. C. V., 29
 Blue-buck, 698
 Blunt, D. E., 320
 Blyth, E., 231, 232, 294, 306, 308, 349,
 563, 567
 blythi, *Capra*, 625
 Capra hircus, 625
 blythii, *Ceratorhinus*, 393
 Boar, Wild, 14
 bochariensis, *Ovis vignei*, 571
 Bock, C., 635
 Bodenheimer, F. S., 229, 230, 285, 293,
 367, 369, 603, 623, 648, 694, 716
 Boeuf sauvage cambodgien (Fr.), 510
 böhmî, *Equus burchellii*, 341

- bolivari, *Cervus elaphus*, 456
 bonasus, *Bison bonasus*, 14, 531
 Bos, 531
 Bonhote, J. L., 639
 Bontebok, 15, 653
 Bontequagga, 339
 "Boomer," 120
 borealis, *Felis*, 265
 Ovis, 596, 599
 Ovis canadensis, 598
 Ovis nivicola, 599
 Boromys *offella*, 19
 torrei, 19
 Bory de Saint-Vincent, J. B. G. M.,
 262, 263
 Bos *arnee*, 538
 arni, 543
 banteng, 523, 526
 banting, 523
 bonasus, 531
 bubalus, 543
 bubalus fulvus, 543
 bubalis hosei, 546
 caffer, 554
 (*Bubalus depressicornis fergu-*
 soni), 553
 gaurus, 514
 gaurus hubbacki, 521
 gaurus readei, 517
 gnou, 659
 primigenius, 13, 17, 511, 536
 (*Bibos saaveli*), 510
 sondaicus, 523
 sondaicus butleri, 525
 sondaicus lowi, 528
 sondaicus porteri, 527
 Boselaphus *derbianus*, 725
 gigas, 726
 Boswell, R., 34, 39, 42, 73, 121
 Botezat, E., 533
 Boubier, M., 615
 Bouquetin des Alpes (Fr.), 614
 Bouquetin des Pyrénées (Fr.), 606
 Bouquetin du Gerez (Fr.), 608
 Bourdelle, E., 193, 221, 233, 257, 327,
 616
 Bourguignat, J. R., 231
 Bourret, Prof., 386
 Bovidae, 21, 510
 Bowden, J., 219, 271
 Bowen, W. W., 169, 182, 187, 276, 279,
 280, 287, 403, 408, 485, 488, 491-493,
 498, 500, 501, 503, 650, 653, 675, 701,
 721, 722, 727, 730
 Bower, H., 465, 529
 bozasi, *Lophiomys*, 203, 204
 brachyura, *Martes zibellina*, 237
 Mustela, 237
 brachyurus, *Halmaturus*, 87
 Macropus, 88
 Bramley, W. E. J., 687
 Brandao de Mello, A., 711
 Brandt, J. F., 260, 532, 536
 Brandt, J. F., and Ratzburg, J. T. C.,
 558
 Brauns, D., 213, 215
 Brazenor, C. W., 27, 30, 33, 35, 36, 49,
 54, 58, 62, 63, 78, 82, 86, 90, 94, 100,
 102, 104, 105, 113, 210, 211
 Brehm, A., 324, 425, 679
 brevetianus, *Tapirus indicus*, 374
 brevicaudatus, *Indris*, 155
 breviceps, *Petaurus*, 62, 63
 Bridgeman, R. O., 446
 Brincken, — von, 331
 brissonianus, *Propithecus*, 140
 brissonii, *Prosimia*, 140
 Broch, H., 197, 219, 242, 269, 470
 Brocklehurst, H. C., 280, 345, 347, 410,
 486, 487, 492, 618, 620, 621, 691, 692,
 715, 728
 Brooke, V., 607
 brookei, *Cephalophus*, 667
 Cephalophus ogilbyi, 667
 Brotomys *contractus*, 18
 voratus, 18
 Browne, E. D., 279
 Bruce, C. W. A., 441
 brucei, *Rucervus thamin*, 439
 bruneus, *Lemur*, 136
 brunneus, *Lemur*, 156
 Bryden, H. A., 212, 232, 252, 289, 290,
 291, 298, 336, 342, 344, 347, 352, 398,
 401, 404, 406, 418, 459, 486, 494, 500,
 501, 503, 504, 649, 651-653, 657, 660,
 668, 669, 674, 697, 700, 702, 705, 717,
 719, 723, 726
 Bubale (Fr.), 642
 bubalis, *Antilope*, 643
 Bubalus bubalis, 543, 544, 547
 Bubalis *bubastis*, 643, 647
 caama evalensis, 652
 caama selbornei, 650
 Búbalo (Sp.), 642
 bubalus, *Bos*, 543
 Bubalus *arna macrocerus*, 544
 bubalis arnee, 538, 544
 bubalis bubalis, 543, 544, 547
 bubalis fulvus, 543
 bubalis hosei, 546, 548
 bubalis subsp., 545
 depressicornis, 548
 indicus, 548
 macrocerus, 539, 544
 mindorensis, 548
 speirocerus, 544
 bubastis, *Bubalis*, 643, 647
 Buchanan, A., 489, 606
 Bichner, E., 431, 679
 Buck, W. J. (See under Chapman, A.)
 Budge, M. F., 284
 Budgett, J. S., 490, 726

- Buffalo, Bornean, 546
 Cape, 8, 16, 554
 domesticated, 543
 Indo-Chinese, 545
 Long-horned Indian, 544
 Mindoro, 11, 548
 Tamarao or Dwarf of Mindoro, 11
 Upper Assam, 543
 Wild Indian, 538
 Buffon, G. L.: L. de, 249, 336
 bugi, Prosimia, 140
 Bunge, A. von, 598
 (See also under Ledebour, C.)
 Burbridge, B., 176
 Burchell, W. J., 184, 336, 403
 burchellii, Asinus, 339
 Equus burchellii, 8, 339
 Hippotigris burchellii, 15, 20
 Burckhardt, J. L., 416, 485, 619
 Burgess, H. E., 311, 396
 Burnet, N., 67
 Burnham, J. B., 596, 597
 Burrard, G., 271, 434, 530, 567, 569, 571,
 593, 628-630, 632-634
 Burrell, H. (See under Le Souef,
 A. S.)
 Burton, J., 691
 buselaphus, Alcelaphus buselaphus, 15,
 20, 642
 Antilope, 642
 Bushell, S. W., 468, 469
 Bush-goat, 663
 buskensis, Rangifer tarandus, 479, 483
 Butler, A. L., 251, 281, 409, 486, 526,
 638, 639, 727
 butleri, Bibos sondaicus, 525
 Bos sondaicus, 525
 Büttikofer, J., 182, 187, 189, 419, 420,
 667, 668
 Buxton, C., 496
 Buxton, N. G., 597
 buxtoni, Strepsicerus, 720
 Tragelaphus, 16, 720
 Byrne, P. M., 57

 caama, Alcelaphus, 15
 Alcelaphus caama, 648, 650, 652
 Antilope, 648
 caballus, Equus caballus, 332
 Cabra do Gerez (Port.), 608
 Cabra montés (Sp.), 606, 610, 611
 Cabra montés portuguesa (Sp.), 608
 Cabra montez de Portugal (Port.),
 608
 Cabrera, Á., 221, 232, 250, 251, 257, 263,
 266, 272-274, 282, 289, 291, 339, 456-
 458, 606-614, 645, 647, 684, 690, 691,
 712
 Cadell, P., 297
 Cadwalader, C. M. B., 7
 Caesar, Julius, 291, 512

 caffer, Bos, 554
 Syncerus caffer, 8, 16, 554
 Caldwell, K., 402, 496
 californicus, Ursus, 19
 Calinescu, R. J., 194, 226, 234, 259, 268,
 331, 532, 576, 617, 679
 Caloprymnus, 91-93
 campestris, 91
 calura, Phascogale, 28
 calurus, Phascogale, 28
 Cambell, J. S., 498
 cambrica, Macrotis lagotis, 51, 53
 Camel, Wild Bactrian, 421
 Camelidae, 421
 camelopardalis, Cervus, 484
 Giraffa, 484
 Giraffa camelopardalis, 484, 487
 Camelopardalis antiquorum, 486
 capensis, 503
 giraffa, 485, 486
 Camels, 421
 Camelus, 421
 bactrianus, 421
 bactrianus ferus, 421
 dromedarius, 421
 cameroonensis, Taurotragus derbianus,
 729, 730
 Campbell, G. G., 673
 Campbell, J., 404
 campestris, Bettongia, 91
 Caloprymnus, 91
 canadensis, Castor, 191
 Cervus canadensis, 19
 candidus, Propithecus diadema, 147
 caniceps, Mixocebus, 144
 Canidae, 21, 211
 Canis dingo, 9
 hodophilax, 11, 20, 213, 214
 lupus, 14, 215
 lupus beothucus, 20
 lupus hattai, 214
 lupus lupus, 214
 lupus rex, 214
 niger niger, 20
 simensis, 212
 (Simenia) simensis citernii, 213
 viverrinus, 215
 capensis, Camelopardalis, 503
 Elephas, 316
 Giraffa camelopardalis, 16, 498-
 501, 503
 Hippopotamus, 414
 Hippopotamus amphibius, 414,
 415
 Capra ammon, 576
 blythi, 625
 falconeri, 626
 falconeri cashmiriensis, 627, 629,
 631
 falconeri chialtanensis, 632
 falconeri falconeri, 627

- Capra falconeri jerdoni*, 633
falconeri megaceros, 630, 631, 633
gazella, 696
hircus aegagrus, 626, 627
hircus blythi, 625
hircus neglectus, 627
hispanica, 610, 611
ibex, 614
jerdoni, 633
lusitanica, 608
megaceros, 631
nubiana, 618
nubiana mengesi, 622, 623
nubiana nubiana, 16, 618, 622
nubiana sinaïtica, 618, 621
pyrenaica, 14, 606, 609
pyrenaica hispanica, 608, 610, 611
pyrenaica lusitanica, 13, 19, 608
pyrenaica pyrenaica, 13, 20, 606, 610
pyrenaica victoriae, 608, 610, 612
sinaïtica, 621
tatarica, 677
walie, 16, 623
Capricornis, 637
crispus, 641
maritimus, 640
pryerianus, 641
sumatraensis, 637
sumatraensis annectens, 641
sumatraensis argyrochaetes, 637, 640
sumatraensis humei, 641
sumatraensis jamrachi, 641
sumatraensis milne-edwardsi, 637, 641
sumatraensis montinus, 641
sumatraensis robinsoni, 638, 639
sumatraensis rodoni, 641
sumatraensis rubidus, 641
sumatraensis sumatraensis, 11, 635
sumatraensis swettenhami, 638
sumatraensis thar, 641
swinhooi, 641
Caprolagus furnessi, 190
Caracal caracal algiurus, 16, 272
Carnivora, 211
Carnivores, 211
 Carpenter, C. R., and Coolidge, H. J., Jr., 167
 Carpentier, C.-J., 274, 458, 684
 Carruthers, D., 199, 285, 305, 308, 325, 328, 355, 356, 359, 370, 425, 428, 452, 455, 463, 484, 560, 562, 577, 580, 582-585, 588, 589, 591, 593, 596, 622, 623, 648, 682, 693-695, 716
cashmiriensis, *Capra falconeri*, 627, 629, 631
castaneus, *Equus onager*, 353
 Castelli, G., 223-226
Castor, 191
Castor canadensis, 191
 fiber, 14, 191
 fiber albicus, 191
 fiber fiber, 191
 fiber galliae, 191
 fiber vistulanus, 191, 198
 Castoridae, 191
 Cat, Black-tailed Native, 34
 Common Eastern Native, 32
 Geoffroy's Native, 34
 Slender Native, 37
 Viverrine Native, 32
 Cats, 21, 254
 domestic, 9, 11, 14
catta, Lemur, 132
Cattle, 21, 510
caucasicus, *Bison*, 536
 Bison bonasus, 13, 14, 20, 535, 536
 Felis catus, 263
 Felis silvestris, 263
 Ursus arctos, 217
caudatus, *Colobus polykomos*, 161
cavifrons, *Melanarctos*, 228
Cebus polykomos, 161
celeris, *Petrogale*, 105
Cemas algazel, 690
Céphalophe à dos jaune (Fr.), 663
Cephalophus brookei, 667
 coxi, 663, 666
 ituriensis, 665
 jentinki, 666
 longiceps, 667
 ogilbyi, 667, 668
 ogilbyi brookei, 667
 selateri, 663
 sylvicultrix ituriensis, 665
 sylvicultrix sylvicultrix, 663, 665, 666
 thomasi, 663
Ceratorhinus blythii, 393
niger, 393
Ceratotherium, 375
 simum cottoni, 16, 407
 simum simum, 16, 402
Cermenati, —, 223
Cervicapra clarkei, 675
Cervidae, 21, 435
Cervulus crinifrons, 435
Cervus albirostris, 13, 464, 465
 bactrianus, 463
 barbarus, 457
 bedfordianus, 447
 biedermanni, 451
 camelopardalis, 484
 canadensis alashanicus, 449
 canadensis asiaticus, 451, 463
 canadensis baicalensis, 451
 canadensis canadensis, 19
 canadensis merriami, 21
 canadensis wardi, 460, 461
 cashmirianus macneil(i), 460

- Cervus cashmirianus yarkandensis*, 462, 463
corsicanus, 459
 (Elaphurus) *davidianus*, 468
dybowskii, 445
elaphus, 533
elaphus alashanicus, 449
elaphus asiaticus, 451
elaphus barbarus, 8, 16, 457
elaphus bolivari, 456
elaphus corsicanus, 459
elaphus hispanicus, 457
elaphus kansuensis, 460, 461
elaphus maceiilli, 450
elaphus songaricus, 447, 454
elaphus xanthopygus, 447
eldi siamensis, 441
eldii, 439
eustephanus, 454
 (Rusa) *frontalis*, 439
hagenbeckii, 463
hortulorum, 445
isubra, 447
kansuensis, 450
kopschi, 446
lühdorfi, 447
macneilli, 13, 460, 465
mandarinus, 444
mantchuricus, 445
maral asiatica, 451
maral songarica, 454
nippon grassianus, 443
nippon kopschi, 446
nippon mandarinus, 444
nippon mantchuricus, 444, 445
 (Tarandus) *platyrhynchus*, 479
sika, 445
taivanus, 445
tarandus, 469
tarandus spetsbergensis, 479
thoroldi, 464, 465
wachei, 451
wallichii affinis, 460
xanthopygus, 447
yarkandensis, 13, 462
- Chacropus ecaudatus ecaudatus*, 58, 59
ecaudatus occidentalis, 58, 59
Chalinolobus morio, 731
 Chapin, J. P., 169, 180, 182, 187, 189, 276, 279, 280, 408, 491, 492, 506
 Chapman, A., 409
 Chapman, A., and Buck, W. J., 221, 456, 457, 610-613
 Charlemagne, M., 260
Charronia flavigula, 429
 Charter, —, 407, 718
 Chasen, F. N., 208, 246, 311, 313, 374, 387, 396, 522, 527, 546, 550, 638, 639
 Chat sauvage (Fr.), 256
 Chat sauvage de Corse (Fr.), 264
 Chat sauvage de Crète (Fr.), 263
 Chat sauvage de Sardaigne (Fr.), 264
 Cheesman, R. E., 693, 694
 Cheetah, Cooper's, 286
 East African, 278
 Indian, 12, 283
 King, 274, 286
 North African, 281
 Senegal, 281
 South African, 276
 Sudan, 280
 Turkestan, 285
 Cheetahs, 274
Cheirogaleus major, 127
 major crossleyi, 17, 127, 128
 major major, 127, 128
 medius, 126
 medius medius, 126
 medius samati, 126
 milii, 127
 minor, 123
 smithii, 124
 trichotis, 16, 19, 128
 typicus, 127
Cheirogalus coquereli, 125
Cheiomys madagascariensis laniger, 158
 Chevrotain, Bates's Water, 425
 Powell-Cotton's Water, 426
 Water, 8, 425
 Chevrotains, 425
chialtanensis, *Capra falconeri*, 632
 Chigetai, 353
 Chimpanzee, Common, 176
 Eastern, 177
 Lesser, 180
 Long-haired, 177
 Pygmy, 180
 Western, 177
 Chimpanzees, 8, 176
Chirogale melanotis, 128
 sibreei, 128
Chirogalus adipicaudatus, 127
 crossleyi, 128
 gliroides, 123
 samati, 126
 Chisholm, E. C., 36, 65, 85
 Choeropsis, 414
 liberiensis, 8, 16, 419
Choeropus occidentalis, 59
 Choroschichin, A. P., 588
 Christy, C., 183, 409, 412, 509
chrysampyx, Lemur, 141
chrysogaster, Moschus, 433
 Moschus moschiferus, 433
 Chubb, E. C., 186, 670
chukchensis, *Tarandus rangifer*, 483
cinereiceps, Lemur mongoz, 137
cinereus, Lemur, 131
 Lipurus, 64
 Phascalaretos cinereus, 64, 68, 70
citernii, *Canis (Simenia) simensis*, 213

- Civets, 244
 Clapperton, H. (See under Denham, D.)
 Clark, J. L., 311, 443, 519, 546, 728
 Clarke, T. W. H., 676
clarkei, *Ammodorcas*, 675
 Cervicapra, 675
 Clifton, J. T., 598
 Cligny, A., 490
 Cloete, W., 253
 Cobbold, R. B., 591
Cobus hunteri, 658
collaris, Lemur, 137
 Lemur fulvus, 139
 Lemur macaco, 137
 Ursus arctos, 217, 218
 Collett, R., 196, 219, 269
 Collins, B., 727
collium, *Ovis*, 581
 Ovis ammon, 13, 581, 582
 Colobidae, 160
Colobus, Black-and-white, 161
 Gordons' Red, 162
 Kirke's Red, 161, 163
 Red, 162
Colobus badius, 8, 162
 badius gordonorum, 162
 badius kirkii, 163
 kirkii, 163
 polykomos, 8, 161
 polykomos caudatus, 161
 polykomos kikuyuensis, 161
 polykomos satanas, 161
 Colosi, G., 224, 258, 265, 460, 616
colosus, *Ursus*, 19
columbianus, *Geocapromys*, 18
comes, *Acratocenus*, 18
commersonii, Lemur, 127
comosa, *Ovis*, 579
 Comyn-Platt, T., 246, 386, 393, 521, 638, 639
concolor, *Rattus*, 208
congoënsis, *Giraffa camelopardalis*, 16, 490, 499
congolanus, *Taurotragus derbianus*, 16, 729
Connochaetes gnou, 15, 659
constricta, *Sminthopsis murina*, 31
constrictus, *Hippopotamus*, 414
 Hippopotamus amphibius, 414, 415
contractus, *Brotomys*, 18
 Coolidge, H. J., Jr., 7, 168, 169, 171, 173, 174, 177, 180, 510, 511
 (See also under Allen, G. M., and Carpenter, C. R.)
 Coomans de Ruiter, L., 246, 249
 Cooper, A. L., 287
 Coquerel, C., 143
coquereli, *Cheirogalus*, 125
 Microcebus, 17, 125
 coquereli, *Propithecus*, 150
 Propithecus verreauxi, 150, 154
 Corbett, J., 434
corensis, *Felis tigris*, 301
 Panthera tigris, 301
corinna, *Gazella*, 683
 Corkill, N. L., 285
 Cornell, E. B., 511
coronatus, Lemur, 141
 Lemur mongoz, 140, 141
 Propithecus, 151
 Propithecus verreauxi, 151
corsicanus, *Cervus*, 459
 Cervus elaphus, 459
 Coryndon, R. T., 400, 413
 Cotton, W. B., 485, 619, 726-728
cottoni, *Ceratotherium simum*, 16, 407
 Doratherium aquaticum, 426
 Giraffa camelopardalis, 491
 Hippotragus equinus, 701, 703
 Hyemoschus aquaticus, 426
 Rhinoceros simus, 407
 Cougar, Eastern, 21
cougar, *Felis concolor*, 21
coxi, *Cephalophus*, 663, 666
crassicaudata, *Sminthopsis*, 30
 Crawshay, R., 706
 Cretzschmar, P. J., 487
 Cricetidae, 21, 200
crinifrons, *Muntiacus*, 435
crispa, Antilope, 641
crispus, *Capricornis*, 641
cristata, *Viverra*, 250
cristatus, *Proteles*, 250
 Proteles cristatus, 250
Crocidura fuliginosa, 122
 fuliginosa trichura, 8, 10, 20, 122, 208
crossleyi, *Cheirogalus major*, 17, 127, 128
 Chirogalus, 128
 Crowther, Mr., 231, 232
crowtheri, *Ursus*, 15, 19, 230
Cryptoprocta ferox, 17, 254
cubanus, *Solenodon*, 21
 Cuberow (Ethiopian), 212
 Cumberland, C. S., 423, 462
 Cumming, R. G., 298, 318, 417, 503, 657, 697
cunenensis, *Oreotragus oreotragus*, 671
cuon alpinus, 448, 451
 Curtis, C. P., 710
 Cuvier, F., 687
 Cuvier, G., 231, 334, 543, 648
cuvieri, *Gazella*, 16, 683, 686
 Lemur, 140
cycloceros, *Ovis*, 565, 568, 569
 Ovis orientalis, 572
 Ovis vignei, 569
Cynailurus soemmeringii, 280
cynocephala, *Didelphis*, 40

- cynocephalus, *Thylacinus*, 40
 cyprius, *Ovis*, 558
- Dahl, K., 80
- dalai-lamae, *Ovis*, 591
Ovis ammon, 591
- Dalgite, 51
- dama, *Gazella dama*, 689, 690
Halmaturus, 110
Macropus (*Thylogale*), 112
- Damaliscus albifrons*, 656
 dorcas, 15, 653
 hunteri, 658
 phillipsi, 15, 656
- Damaliscus de Hunter* (Fr.), 658
- damanus, *Propithecus*, 151
- damergouensis, *Gazella dama*, 689, 690
- Dammerman, K. W., 314, 374, 389-391,
 523, 552, 636
- damonis, *Propithecus*, 150
- Danford, C. G., and Alston, E. R., 199,
 285, 292, 559, 560
- Darius the Great, 294
- darwini, *Ovis*, 579
Ovis ammon, 13, 579
- Dasyure, Spotted-tailed, 36
- Dasyures, 21, 25
- Dasyuridae, 21, 25
- Dasyurus geoffroii*, 34
 geoffroii fortis, 35
 geoffroii geoffroii, 34
 geoffroyi, 35
 hallucatus, 35
 macrourus, 36
 maculatus, 32, 34, 36
 maugei, 32
 viverrinus, 32, 34, 210
- Daubenton, E. L., 249
- Daubentonia madagascariensis*, 17, 158
- daubentonii, Fossa, 249
- Daubentoniidae, 158
- dauricus, *Ovis argali*, 576
- Dauw (Hottentot), 341
- David, A., 431, 468
- dauidianus, *Cervus* (*Elaphurus*), 468
Elaphurus, 467
- Dawkins, B., 219, 291
- De Beaufort, L. F., 375, 523
- De Beaux, O., 213, 252, 267, 279, 280,
 347, 352, 460, 621, 677, 685, 688, 714
- deckeni, *Propithecus verreauxi*, 149
- deckenii, *Propithecus*, 152
Propithecus verreauxi, 152
- Deer, 21, 435
 Bokhara, 463
 Brow-antlered, 439
 Eld's, 439
 Hainan Brow-antlered, 443
 Himalayan Musk, 433
 Kansu Musk, 431
 Kopsch's, 446
- Deer, Korean Musk, 430
 McNeill's, 13, 460
 Musk, 427
 North African Red, 8, 457
 Père David's, 467
 Red, of central Spain, 456
 Sakhalin Musk, 430
 Schomburgk's, 12, 20, 436
 Siamese Brow-antlered, 441
 Siberian Musk, 427
 Thorold's, 464
 Turkestan, 463
 White-lipped, 13, 464
- Defosse, L., 384, 511, 546
- dejeani, *Rusa unicornis*, 465
- De la Chevasnerie, A., 380, 396
- Delacour, J., 123, 126, 128, 130, 131,
 133, 134, 135, 137, 141-146, 148, 150-
 153, 156, 157, 249, 256, 469, 574
- Demaison, M., 686
- Demidoff, E., 227, 453, 531, 537, 578,
 595, 596
- Denham, D., and Clapperton, H., 410
- Deniker, J., 172
- Depoli, —, 223
- depressicornis, Anoa, 11, 550, 554
 Antilope, 550
 Bubalus, 548
- derbiana, *Thylogale eugenii*, 110
- derbianus, *Boselaphus*, 725
Halmaturus, 109, 110
Taurotragus, 726
Taurotragus derbianus, 16, 725,
 730
- Derscheid, J. M., 175, 179, 253
- De Schauensee, R. M., 304, 527
- Desmarest, A. G., 110
- desmarestii, *Megalomys*, 21
- Devil, Tasmanian, 38
- De Vis, C. W., 76
- De Voogd, C. N. A., 388
- De Winton, W. E., 493
 (See also under Anderson, J.)
- diadema, *Propithecus*, 146, 152
Propithecus diadema, 17, 146-149
- dianae, *Asinus asinus*, 345, 346
- Dibatag, 675
- Dicerorhinus sumatrensis*, 384
sumatrensis lasiotis, 13, 393
sumatrensis niger, 13, 393
sumatrensis sumatrensis, 11, 390
- Diceros, 375
 bicornis, 8
 bicornis bicornis, 396
 bicornis somaliensis, 397
- dichotomus, *Rangifer tarandus*, 479
- Dickson, B., 562
- Didelphis cynocephala*, 40
 penicillata, 26
 tridactyla, 89

- Didelphis ursina*, 38, 72
 viverrina, 32
 Didier, R., and Rode, P., 192, 194, 222,
 233, 257, 265, 266, 574
 dingo, *Canis*, 9
 Dinomyidae, 21
 Diprotodon, 93
 Dixon, A. F. W., 541
 Dobson, G. E., 122
 Dolan, B., 7, 433, 460, 461, 466, 530,
 594
dolgopolovi, *Ovis arcar*, 572
 Ovis orientalis, 572
Dolichohippus, 322
 Dollman, J. G., 179, 346, 347, 407, 419,
 650, 700, 727, 730
 Dolmatoff, —, 533
Domitius Ahenobarbus, 231
dorcas, Antilope, 653
 Damaliscus, 15, 653
 Gazella, 686, 688
Dorcatherium aquaticum batesi, 425
 aquaticum cottoni, 426
Dorcatragus megalotis, 674
Dorogostajskij, V. Č. (See under
 Nasonov, N. V.)
dorreeae, *Lagorchestes hirsutus*, 96
dorsalis, *Lepilemur*, 145
 Lepilemur ruficaudatus, 145
 Doumergue, F., 686
 Dracopoli, I. N., 494
 Drake-Brockman, R. E., 202, 203, 251,
 280, 352, 401, 675, 677
dromedarius, *Camelus*, 421
Dromicia, 31
 Drummond, J. (See under Hutton,
 F. W.)
 Drummond, W. H., 670
 Du Bocage, J. V. B., 608
 Du Chaillu, P. B., 169
 Duiker, Black-headed, 666
 Brooke's, 667
 Ituri Yellow-backed, 665
 Jentink's, 666
 Yellow-backed, 663
 Duke, H. L., 666
 Dumas, P., 294
Dusicyon australis, 19
 Duveyrier, H., 349
 Dybowski, B., 239, 595
dybowskii, *Cervus*, 445
Dziggetai, 353

ecaudatus, *Chaeropus ecaudatus*, 58,
 59
 Perameles, 58
 Echimyidae, 21
 Edentata, 181
 Edentates, 181
edithae, *Nesophontes*, 18
 Edmond-Blanc, F., 511
 Edwards, G., 133, 140, 335, 337
 'edwardsi', *Lepidolemur*, 145
 Propithecus, 148
 Propithecus diadema, 148, 149
Egocerus equinus scharicus, 704
 Ehrenberg, C. G., 308
 (See also under Hemprich, F. W.)
 Eland, Congo Derby, 729
 Congo Giant, 16
 Derby, 725
 East African, 725
 Giant Derby, 726
 Livingstone's, 724
 Mashona, 724
 Nile Derby, 726
 Senegambian Giant, 16
 South African, 722
 Sudani Derby, 726
 West African, 725
 Elande Derby (Fr.), 725
Elaphurus davidianus, 467
elaphus, *Cervus*, 533
Elasmodontomys obliquus, 18
 Eld, P., 439
eldii, *Cervus*, 439
 Rucervus eldii, 439
 Eldred, J., 370
elegans, *Macropus*, 114
 Wallabia, 114
 Elephant, East African, 317
 Malay, 311
 South African Bush, 8, 16, 316
 Sudanese, 317
 Sumatran, 11, 314
 Elephantidae, 310
 Elephants, 310
 Bush, 317
 Forest, 317
 Elephas, 310
 africanus, 316
 africanus toxotis, 316
 capensis, 316
 maximus hirsutus, 311
 maximus sumatranus, 11, 314
 sumatranus, 314
 Elias, N., 424
 Ellerman, J. R., 200
 Elliot, D. G., 124, 126-129, 142, 146,
 147, 155, 160, 165, 168, 260, 291, 302,
 351, 674, 676
 Elwes, G. F. W., 545
 Elwes, H. J., 452
emiliae, *Halmaturus*, 110
 Enders, R. K., 647
 Endrina, 155
 Engelmann, C., 433, 461, 467
 Equidae, 322
equina, Antilope, 701
equinus, *Hippotragus equinus*, 701
Equus, 322, 342
 asinus atlanticus, 352, 353

- Equus burchellii antiquorum*, 340, 345
burchellii böhmi, 341
burchellii burchellii, 8, 339
burchellii selousii, 341
caballus caballus, 332
caballus gmelini, 331
caballus subsp., 13, 17
gmelini, 330, 332, 333
gmelini silvaticus, 332
hagenbecki, 322
hartmannae, 341
hemionus, 353, 358, 371
 (Asinus) *hemionus bedfordi*, 353
 (Asinus) *hemionus finschi*, 357
hemionus indicus, 363
 (Asinus) *hemionus luteus*, 353, 356
hemionus typicus, 355
hemippus, 367-369
indicus, 363
johnstoni, 506, 508
khur, 363
onager, 359, 361, 369
onager castaneus, 353
przewalskii, 13, 322
quagga, 8, 334
silvestris, 333
spp., 328, 330
trouessarti, 339
zebra, 8, 341, 342
zebra hartmannae, 341
zebra zebra, 341
- Eriksson, K., 507
erikssoni, Okapia, 506
erskinei, *Ovis gmelini*, 565, 566, 567
erythromela, *Prosimia*, 142
 Eschscholtz, F., 595
Eucalyptus, food of koala, 64
eugenii, *Kangurus*, 109
 Macropus, 101, 111
 Thylogale, 109
 Thylogale eugenii, 110
europaeus, *Homo sapiens*, 10
eustephanus, *Cervus*, 454
evalensis, *Alcelaphus caama*, 651, 652
 Bubalis caama, 652
everetti, *Rattus*, 206
 Eversmann, E., 198, 358, 679
 Exline, A. W., 549
- faidherbianus*, *Ursus*, 231
falconeri, *Aegoceros* (*Capra*), 627
 Capra, 626
 Capra falconeri, 627
 Falz-Fein, F. von, 333
fasciata, *Perameles*, 10, 20, 47
fasciatus, *Kangurus*, 96
 Lagostrophus, 96
 Myrmecobius, 43
 Myrmecobius fasciatus, 43
fassini, *Ammotragus lervia*, 16, 603
 Fatio, V., 223, 233, 256, 258, 267
- Faunthorpe, J. C., 378
 Faux-loup (Fr.), 250
 Fegan, W. W., 384, 396
 Felidae, 21, 22, 254
Felis agrius, 14, 263
 borealis, 265
 caracal algira, 272
 catus caucasicus, 263
 catus ferus, 262
 catus morea, 262
 concolor cougar, 21
 grampia, 260
 guttata, 281
 isabellina, 271
 jubatus, 276
 lanea, 276
 leo, 288
 leo goojratensis, 292
 leo persicus, 292
 libyca sarda, 264
 lynx, 265
 ocreata agrius, 263
 reyi, 14, 264
 sarda, 14, 258, 264
 silvestris, 264, 265
 (*Catus*) *silvestris*, 256
 silvestris caucasicus, 263
 silvestris grampia, 14, 260
 silvestris morea, 259, 262
 silvestris silvestris, 14, 256, 261, 262, 264
 silvestris tartessia, 263
 tartessia, 263
 tigris, 300, 306
 tigris amurensis, 299
 tigris coreensis, 301
 tigris lecoqi, 304
 (*Tigris*) *tigris septentrionalis*, 306
 tigris sondaicus, 309
 tigris trabata, 306
 venatica, 283
 virgata, 305
fennicus, *Rangifer tarandus*, 14, 476, 479
 Fenton, L. L., 296
fergusoni, *Anoa*, 11, 550-553
 Bos (*Bubalus*) *depressicornis*, 553
ferox, *Cryptoprocta*, 17, 254
 Ferrant, V., 256
 Ferrier, J. P., 307, 366
ferus, *Camelus bactrianus*, 421
 Felis catus, 262
 Finch, B. T., 494
fiber, *Castor*, 14, 191
 Castor fiber, 191
 Filippi, F. de, 284, 286
 Finlayson, H. H., 28, 35, 46, 47, 53, 54, 56, 57, 69, 70, 75, 80-82, 85, 90-93, 95, 96, 100, 104, 109, 111, 114, 116, 117, 119, 210

- finschi, *Asinus hemionus*, 357
 Equus (Asinus) hemionus, 357
 Flacourt, S. de, 149
 flavifrons, *Prosimia*, 137, 138
 flavigula, *Charronia*, 429
 flaviventer, *Lemur*, 142
 Fleay, David H., 27, 34, 37, 40, 48, 107, 113
 Fleming, J. F., 405, 502
 Flerov, C. C., 428, 429, 431, 464, 465, 470, 474, 475, 477, 479, 483
 Flinders, M., 72
 flindersi, *Thylogale*, 78, 108
 Floericke, K., 532, 533, 534
 Flower, S. S., 214, 229, 245, 272, 282, 311, 341, 346, 374, 380, 383, 416, 442, 519, 521, 526, 545, 602, 618, 620, 645, 647, 688, 691, 715
 Flower, W. H., 331
 Flower, W. H., and Lydekker, R., 291
 Floyer, E. A., 618
 Foley, —, 683
 Forbes, H. O., 128, 130, 131, 133, 134, 156-158, 160, 349
 Formozow, A. N., 355, 580
 fortis, *Dasyurus geoffroii*, 35
 Fortunatow, B. K., 536
 Fortunatus, 512
 Fossa, 17, 254
 Lesser, 249
 fossa, *Fossa*, 17, 249, 256
 Viverra, 249
 Fossa daubentonii, 249
 fossa, 17, 249, 256
 Fossane, 17, 249
 Fox, European Red, 9
 Long-eared Kit, 20
 Foxes, 21, 211
 fraenata, *Onychogalea*, 98
 fraenatus, *Macropus*, 98
 França, C., 608, 609
 Fraser, L., 187
 frater, *Monophyllus*, 19
 frederici, *Prosimia*, 135
 Freycinet, L. (See under Péron, F.)
 Frobenius, L., 353
 frontalis, *Bibos*, 520
 Cervus (Rusa), 439
 fuliginosa, *Antechinus*, 30
 Crocidura, 122
 Sminthopsis murina, 30
 Fuliński, B., 197, 226, 260, 268, 513
 fulvus, *Bos bubalis*, 543
 Bubalus bubalis, 543
 Lemur, 134, 136-138, 142
 Lemur macaco, 136
 furcifer, *Lemur*, 129
 Phaner, 125, 129
 furnessi, *Caprolagus*, 190
 Pentalagus, 190
 fuscus, *Mastacomys*, 210
 Futterer, K., 356
 Gacela mohor (Sp.), 689
 Gacela montés (Sp.), 683
 Gadow, H., 221, 257, 607, 608
 Gaimard, J. P. (See under Quoy, J. R. C.)
 gaimardi, *Bettongia*, 10, 20, 78
 Kangurus, 78
 Gairdner, K. G., 245, 372, 519, 527
 Galago madagascariensis, 123
 galapagoensis, *Oryzomys*, 19
 galliae, *Castor fiber*, 191
 Gato montés (Sp.), 256
 Gato sauvage (Sp.), 256
 Gatti, A., 506
 Gatto selvatico (It.), 256
 Gatto selvatico di Sardegna (It.), 264
 Gaur, Burmese, 517
 Indian, 514
 Malayan, 13, 521
 gaurus, *Bibos gaurus*, 514
 Bos, 514
 gazella, *Capra*, 696
 Oryx, 8
 Oryx gazella, 696
 Gazella corinna, 683, 686
 cuvieri, 16, 683, 686
 dama dama, 689, 690
 dama damergouensis, 689, 690
 dama mhorh, 16, 689
 dama ruficollis, 690
 dorcax, 686, 688
 leptoceros, 16, 687
 leptoceros leptoceros, 687
 leptoceros loderi, 687
 loderi, 687, 688
 rufina, 15, 20, 685
 soemmeringi, 676
 Gazella del deserto (Ital.), 687
 Gazelle, Atlas, 683
 Clarke's, 675
 Cuvier's, 16
 Edmi, 683
 Loder's, 687
 Mhorh, 16, 689
 Rufous, 15, 20, 685
 Slender-horned, 16, 687
 Gazelle blanche (Fr.), 687
 Gazelle de Cuvier (Fr.), 683
 Gazelle de montagne (Fr.), 683
 Gazelle des dunes (Fr.), 687
 Gazelle Mohor (Fr.), 689
 Gazelle rouge (Fr.), 685
 Gemsbok, Angolan, 696
 Cape, 8, 696
 Gemsbuck, 696
 Geocapromys columbianus, 18
 ingrahami abaconis, 18

- geoffroi, *Dasyurus*, 34
 Dasyurus geoffroi, 34
 Geoffroy-Saint-Hilaire, É., 135-137, 143
 Geoffroy-Saint-Hilaire, I., 132, 142, 144, 263, 365, 367, 601
 geoffroyi, *Dasyurus*, 35
 Georgi, J. G., 260, 331, 334
 Geppard (Ger.), 274
 Gerrard, E., 339
 Gervais, F. L. P., 458
 Gesner, C., 194
 Geyr von Schweppenburg, H., 349, 605, 712
 Ghepardo (It.), 274
 Ghesquière, J., 180
 Ghor-khar, 359, 363
 gigantea, *Manis*, 181
 Smutsia, 181
 giganteus, *Macropus*, 121
 gigas, *Boselaphus*, 726
 Hydrodamalis, 18
 Taurotragus derbianus, 726
 Glioli, H. H., 201
 Gilbert, J., 26, 29, 31, 63, 64, 87, 88, 97, 98, 101, 119
 gilbertii, *Hypsiprymnus*, 86
 gilberti(i), *Potorous*, 10, 18, 86-88
 Giles, F. H., 373
 Gill, E. L., 344, 649, 661
 gillespiei, *Lasiorhinus latifrons*, 75
 Phascolomys, 75
 Girafe (Fr.), 484
 Girafe d'Angola (Fr.), 499
 Girafe du Baringo (Fr.), 491
 Girafe du Congo (Fr.), 490
 Girafe réticulée (Fr.), 493
 giraffa, *Camelopardalis*, 485, 486
 Giraffa, 506
 camelopardalis, 484
 camelopardalis angolensis, 16, 499
 camelopardalis antiquorum, 485, 496
 camelopardalis camelopardalis, 484, 487
 camelopardalis capensis, 16, 498-501, 503
 camelopardalis congoënsis, 16, 490, 499
 camelopardalis cottoni, 491
 camelopardalis infumata, 498, 500
 camelopardalis nigricans, 493
 camelopardalis peralta, 16, 487
 camelopardalis reticulata, 493
 camelopardalis rothschildi, 491, 495
 camelopardalis thornicrofti, 497
 camelopardalis tippelskirchi, 495
 camelopardalis wardi, 501
 infumata, 498
 reticulata nigrescens, 493
 Giraffa schillingsi, 495
 tippelskirchi, 495
 Giraffe, Angola, 16, 499
 Baringo, 491
 Barotse, 498
 Congo, 16, 490
 Kilimanjaro, 495
 Kordofan, 486
 Masai, 495
 Nigerian, 16, 487
 North Rhodesian, 497
 North Transvaal, 501
 Nubian, 484
 Reticulated, 493
 Sennar, 484
 "Somali," 493
 Southern, 16, 503
 Thornicroft's, 497
 Uganda, 491
 Giraffes, 484
 Giraffidae, 484
 Glauert, L., 26-28, 30-32, 35, 44, 49, 52, 59, 60, 64, 79, 84, 88, 89, 95, 97, 98, 102, 112, 120, 211
 gliroides, *Chirogalus*, 123
 Glitsch, C., 678
 globiceps, *Lepidolemur*, 145
 Glouton arctique (Fr.), 241
 Glutton, 241
 Gmelin, J. F., 155, 158
 Gmelin, S. G., 307, 330, 331, 333, 566
 gmelini, *Equus*, 330, 332, 333
 Equus caballus, 331
 Ovis orientalis, 560
 gmelini(i), *Ovis*, 560, 562, 565
 Ovis gmelin(i), 562, 566
 gnou, *Connochaetes*, 15, 659
 Gnu, White-tailed, 15, 659
 Goat, Persian Wild, 626, 627
 Sind Wild, 625
 Goats, 21, 510
 Godman, E. M. (See under Archer, G.)
 Goldfinch, G. H., 204, 205
 Goodwin, G. G., 7, 300, 360, 362, 430, 449, 678, 680
 goojratensis, *Felis leo*, 292
 Gordon, S., 482
 gordonorum, *Colobus badius*, 162
 Piliocolobus, 162
 Gorilla (Ger.), 168
 Gorilla, Coast, 168
 Mountain, 173
 Gorilla, 164
 beringeri, 173
 gorilla beringei, 168, 173
 gorilla gorilla, 168
 uellensis, 174
 gorilla, Gorilla gorilla, 168
 Trogodytes, 168
 Gorille (Fr.), 168

- Gorille des montagnes (Fr.), 173
 Gould, J., 25, 28, 30, 35, 39, 40, 48,
 49, 52, 59, 60, 65, 75, 79, 80, 82, 84,
 87-91, 93, 94, 95, 97, 98, 101, 103,
 106, 107, 110, 112, 114, 116, 120, 121
 gouldii, Bettongia, 83
 Bettongia penicillata, 83
 Gourdon, M., 607
 Gourin, J., 315, 391
 gracilis, *Macropus*, 110
 graii, *Bettongia lesueur*, 79, 80
 Hypsiprymnus, 79
 Graim, Mrs. T., 7
 grampia, *Felis*, 260
 Felis silvestris, 14, 260
 Grandidier, A., 125, 127, 145, 149, 150
 (See also under Milne Edwards,
 A.)
 grandidieri, *Lepidolemur*, 145
 grandis, *Macrotis lagotis*, 10, 20, 51, 54
 Granit, A. W., 477
 Grant, R., 38
 grassianus, *Cervus nippon*, 443
 Sikaillus, 443
 gravis, *Quemisia*, 18
 Gray, J. E., 47, 49, 60, 104, 110, 124,
 130, 141, 249, 390, 394
 Gray, P. N., 659, 709, 710
 Green, Col., 604, 714
 Green, H. T., 171
 Gregorius, Bishop of Tours, 512
 Gregory, W. K., 10, 68, 170
 Grenfell, W. T., 474
 Grévé, C., 537
 Grey, G., 92, 102, 337, 338
 greyi, *Macropus*, 117
 Macropus (Halmaturus), 116
 Wallabia, 10, 20, 116
 griseorufus, *Microcebus minor*, 123
 griseus, *Hapalemur*, 130, 131, 145
 Hapalemur griseus, 131, 132
 Lemur, 131
 Mioxicebus, 127
 Grizzly, Apache, 21
 Black Hills, 20
 California Coast, 19
 Henshaw's, 21
 Klamath, 20
 Lillooet, 20
 Manchurian, 228
 Mendocino, 19
 Mount Taylor, 20
 Navajo, 19
 New Mexico, 19
 Plains, 19
 Sacramento, 19
 Sonora, 19
 Southern California, 20
 Tejon, 20
 Texas, 20
 Groeben, G., 538
 Grum-Grshimailo brothers, 324
 grunniens, *Poëphagus grunniens*, 531
 Gruvel, M. A., 646
 Grypotherium listai, 18
 Guarmani, C., 370
 Gühler [Guehler], U., 436, 438, 545
 Guépard (Fr.), 274
 Guereza, 161
 Guillemard, F. H. H., 595
 Guilmot, M., 508
 Guldenstädt, A. J. von, 536
 gulo, *Gulo*, 241
 Mustela, 241
 Gulo gulo, 241
 Gunn, R., 39, 40, 49, 113, 121
 gunnii, *Perameles*, 47, 48
 Günther, A., 129, 149, 564
 guttata, *Felis*, 281
 Gyldenstolpe, N., 176, 245, 311, 372,
 383, 442, 519, 527, 545, 666
 Gymnobelideus leadbeateri, 10, 20, 61
 Haagner, A., 185, 298, 649, 651, 661,
 724
 Hablizl, C., 358, 360, 361
 Hacquet, B., 331
 Hadwen, S., and Palmer, L. J., 484
 Hafid, M., 290
 Hagen, B., 246, 388
 Hagenbeck, C., 325, 326, 334
 hagenbecki, *Equus*, 322
 hagenbeckii, *Cervus*, 463
 Hagerup, J., 480
 hainanus, *Rucervus eldii*, 443
 Haines-Watson, W. C., 465. (See also
 Watson, W. C. H.)
 Halbesel, syrischer (Ger.), 367
 Hall, —, 298
 hallucatus, *Dasyurus*, 35
 Halmaturus brachyurus, 87
 dama, 110
 derbianus, 109, 110
 emiliae, 110
 houtmanni, 110
 irma, 119
 parma, 107
 thétis, 106
 hamar, *Asinus*, 367
 Hamilton, E., 257, 259, 260
 Hamilton, R. E. A., 694
 Hamilton, S., 252, 671, 698
 Hanson, R. C., 518
 Hapalemur griseus, 130, 131, 145
 griseus griseus, 131, 132
 griseus olivaceus, 131, 132
 olivaceus, 132
 schlegeli, 131
 simus, 17, 130, 131
 Hare, Amami, 190
 Liu Kiu, 190

- Hare-wallaby, Banded, 96
 Brown, 93
 "Common," 93
 Rufous, 94
 Western, 94
- Hares, 190
- Harmer, S. F., 389
- Harper, F., 8, 332, 656, 724
- Harris, G. P., 38
- Harris, W. C., 334, 405, 417, 501, 660, 669
- harrisi*, *Sarcophilus*, 38
Ursinus, 38
- Harrison, G. L., 7
- harrisoni*, *Proteles cristatus*, 251, 252
- Hartebeest, Angolan Red, 652
 Black, 659
 Bubal, 15, 20, 642
 Cape Red, 15, 648
 Hunter's, 658
 Northern Red, 650
- Hartebeest, Rooi (Boer), 648, 650
- Hartert, E., 605, 644, 684, 688
- Harting, J. E., 192, 194, 196, 219
- hartmannae*, *Equus*, 341
Equus zebra, 341
- harveyi*, *Bettongia lesueur*, 79, 80
Perameles, 80
- Hatt, R. T., 182, 187-190
- Hatta, S., 199, 214, 215, 642
- hattai*, *Canis lupus*, 214
- Hattock (Madagascar), 145
- Hauchecorne*, F., 258
- Havmöller, R., 313
- Hay, D., 690
- Hay, O. P., 329
- Hay, R. G., 569, 570
- Hayman, R. W., 187, 190
- Haywood, A. H. W., 171, 178, 179, 400, 417, 419, 489, 490, 667
- Hazewinkel, J. C., 387, 388
- Hecht, G., 224, 575
- hecki*, *Acinonyx*, 281
Acinonyx jubatus, 280, 281, 289
- Hedin, S., 305, 323, 356, 362, 421, 423, 425, 462, 529, 530, 584, 592, 594
- Heim de Balsac, H., 274, 282, 291, 605, 645, 684-686, 689, 712
- heinsii*, *Ovis*, 586
- Helfer and Helfer, 199
- Helladotherium tigrinum*, 506
- Heller, E., 162, 203, 251, 279, 280, 403, 409, 550
 (See also under Roosevelt, T.)
- Helms, R., 45, 95
- Hemigalus*, 245
- hemionus*, *Asinus*, 322
Asinus hemionus, 353
Equus, 353, 358, 371
- Hémippe de Syrie* (Fr.), 367
- hemippus*, *Asinus*, 368, 369
Asinus hemionus, 12, 20, 367, 371
Equus, 367-369
- Hemming, F., 200, 621
- Hemprich, F. W., and Ehrenberg, C. G., 229, 621, 622, 691
- henrii*, *Ovis*, 592
- henshawi*, *Ursus*, 21
- Heptaxodon*, 21
bidens, 18
- Heptaxodontidae*, 21
- Heptner, W. G., 198, 199, 227, 235, 241, 244, 270, 272, 286, 300, 306, 309, 332, 359, 449, 453, 455, 464, 479, 483, 562, 571, 573, 581, 586, 587, 590, 595, 632, 681
 (See also under Ogneff, S. I.)
- Herberstein, S. von, 513
- herberti*, *Petrogale*, 104
- Herodotus, 231, 291, 332, 364
- Herola* (*Galla*), 658
- hessi*, *Manis*, 189, 190
- Heteropsomys insularis*, 18
- Heude, P. M., 510, 527, 637, 640
- Heuglin, M. T. von, 281, 346, 475, 486, 602, 618, 687
- Hewitt, J., 298
- Hexolobodon*, Haitian, 18
- Hexolobodon phenax*, 18
- Heynsius-Viruly*, Mrs., and Van Heurn, F. C., 246, 248, 310, 315, 374, 388-392, 523, 552, 554, 636
- Higgins, J. C., 439, 518, 527
- Hildén, K., 477
- Hilton-Simpson, M. W., 459
- Hilzheimer, M., 243, 279, 286, 304, 337, 338, 349, 457, 479, 483, 536
- hindei*, *Lophiomys ibeanus*, 204, 205
- Hingston, R. W. G., 497, 658
- Hinton, M. A. C., 262
- Hipparion*, 353
- Hippopotamidae*, 414
- Hippopotamus*, 414
amphibius, 8, 414, 415
amphibius amphibius, 414
amphibius capensis, 414, 415
amphibius constrictus, 414, 415
amphibius kiboko, 414
amphibius tschadensis, 415
capensis, 414
constrictus, 414
 (Tetraprotodon) *liberiensis*, 419
- Hippopotamus*, Angola, 414
 Cape, 414
 East African, 414
 Nigerian, 415
 Northern, 414
 Pygmy, 8, 16, 419
- Hippopotamuses*, 8, 414
- Hippotigris*, 342

- Hippotigris burchellii burchellii*, 15, 20
 quagga, 15, 19
 zebra zebra, 15
Hippotrague noir d'Angola (Fr.), 707
Hippotragus bakeri, 704
 equinus cottoni, 701, 704
 equinus equinus, 701
 equinus koba, 704
 equinus langheldi, 701, 704
 equinus scharicus, 704
 langheldi, 704
 leucophaeus, 15, 17, 698
 niger kaufmanni, 706
 niger kirkii, 705
 niger niger, 705, 707
 niger roosevelti, 707
 niger variani, 707
 variani, 16, 707
hirsutus, *Elephas maximus*, 311
 Lagorchestes, 80, 94, 95
 Lagorchestes hirsutus, 94
 Vombatus hirsutus, 73
Hirtz, M., 194, 225, 256, 259, 267, 617
hispanica, *Capra*, 610, 611
 Capra pyrenaica, 608, 610, 611
hispanicus, *Cervus elaphus*, 457
Ho, H. J., 638
Hobley, C. W., 67, 171, 379, 380, 399,
 401, 417, 418, 620, 651, 654
Hodgson, B. H., 433, 544
hodgsonii, *Ovis*, 592
 Ovis ammon, 579, 580, 584, 592
hodophilax, *Canis*, 12, 20, 213, 214
Hoel, A., 481, 482
Hoffmansegg, J. C. von, 608
Hollister, N., 201, 203-205, 252, 279,
 431, 483, 492, 576
Hollsten, J., 478
Holmwood, F., 186
holomelas, *Propithecus*, 148
 Propithecus diadema, 148, 149
Home, E., 72
Homer, 371
Homo, 177
 sapiens europaeus, 10
Homopsomys antillensis, 18
Hone, E., 459, 714, 719
Honey Mouse, 60
Honey Possum, 60
Hopkinson, H. C. B., 282
horriaeus, *Ursus*, 19
horribilis, *Ursus horribilis*, 19
Horse, Lamut Wild, 328
 Mongolian Wild, 322
 Przewalski's, 13, 322
Horses, 21, 322
 European Wild, 13, 17, 330
Horsfield, T., 309
hortulorum, *Cervus*, 445
Hose, C., 248, 547
 hosei, *Bos bubalis*, 546
 Bubalus bubalis, 546, 548
Hosie, A., 432, 465
Hoskins, G. A., 487
houtmanni, *Halmaturus*, 110
Howell, A. B., 449
Hoy, C. M., 35, 38, 100, 111
Hubback, T. R., 312, 521, 522, 526, 639
hubbacki, *Bibos gaurus*, 13, 521
 Bos gaurus, 521
Hubbard, W. D., 703, 705
Hume, A. O., 462
humei, *Capricornis sumatraensis*, 641
 Ovis ammon, 585, 586, 588, 590
Hunter, H. C. V., 658, 593
Hunter, J. A., 399
hunteri, *Cobus*, 658
 Damaliscus, 658
Hutia, Cuban Short-tailed, 18
 Crooked Island, 18
 Great Abaco, 18
 Hispaniolan, 18
 Narrow-toothed, 18
Hutton, F. W., and Drummond, J.,
 731
Hutton, T., 569, 570, 632
Hydrodamalidae, 21
Hydrodamalis gigas, 18
Hyemoschus, 425
 aquaticus, 8
 aquaticus aquaticus, 425
 aquaticus batesi, 425
 aquaticus cottoni, 426
Hypsiprymnus gilberti(i), 86, 87
 graii, 79
 murinus, 89, 90
 ogilbyi, 83
 platyops, 88
 white, 78
Hystricomorph, Puerto Rican, 18

ibeanus, *Lophiomys*, 202, 204
 Lophiomys ibeanus, 204
Ibex, Abyssinian, 16, 623
 Alpine, 614
 of central Spain, 610
 Gredos, 610
 Mediterranean, 611
 Nubian, 16, 618
 Portuguese, 13, 19, 608
 Pyrenean, 13, 20, 606
 Sinaitic, 621
 Sind, 625
 South Arabian, 623
 Spanish, 14
ibex, *Capra*, 614
Ietermago (Boer), 184
Ijzer Magauw (Boer), 184
imhausi(i), *Lophiomys*, 201-204
indica, *Acrocodia*, 372

- indicus*, *Bubalus*, 548
 Equus, 363
 Equus hemionus, 363
 Tapirus, 372
Indri, 146, 155
indri, *Indri*, 155
 Lemur, 155
Indri indri, 155
 niger, 155
Indriidae, 146
Indris, 155
Indris albus, 146
 ater, 155
 brevicaudatus, 155
 longicaudatus, 156
 variegatus, 155
indutus, *Zyromys argurus*, 211
infumata, *Giraffa*, 498
 Giraffa camelopardalis, 498, 500
inornata, *Petrogale*, 104
Insectivora, 122
Insectivores, 122
 Antillean, 18, 19, 21
insularis, *Heteropsomys*, 18
interjecta, *Macrotis lagotis*, 51, 54, 55
Inukai, T., 215, 227, 240, 642
Inverarity, J. D., 352, 539
Inyala, 716
Iredale, T., and Troughton E. Le G.,
 6, 26, 29, 36, 54, 104, 107, 108, 110
irma, *Halmaturus*, 119
 Wallabia, 119
Irwin, A. J., 441
isabellina, *Felis*, 271
 Lynx lynx, 270, 271
isabellinus, *Ursus arctos*, 218
Isolobodon, Haitian, 18
 Puerto Rican, 18
Isolobodon levir, 18
 portoricensis, 18
Isoodon nauticus, 78
isphaganica, *Ovis gmelinii*, 563
 Ovis orientalis, 563
isubra, *Cervus*, 447
itatsi, *Mustela*, 240
ituriensis, *Cephalophus*, 665
 Cephalophus sylvicultrix, 665
Ivanauskas, T., 197, 226, 234, 242, 268

Jackal, *Maanhaar* (Boer), 250
Jackson, F. J., 557
Jackson, H. M. G., 287
Jackson, R. W., 676
Jacobi, A., 469, 470, 472, 473, 477, 478,
 482, 483, 484
Jacobus, Mr., 446
Jafry, H. A., 294
Jagiello, W., 513
jamrachi, *Capricornis sumatraensis*,
 641
Janikowski, T., 330, 332, 333

Jardine, W., 337
Jarvis, C. S., 623, 695
Jennison, G., 353, 512
Jentink, F. A., 182, 187, 189, 190, 663,
 664, 667
jentinki, *Cephalophus*, 666
Jerdon, T. C., 364, 365, 380
jerdoni, *Capra*, 633
 Capra falconeri, 633
Jobaert, A. J., 179, 184, 278, 413, 491,
 556, 665, 704, 706, 724, 729
Johannesen, H., 480
Johnson, E., 178, 274, 490, 663, 726
Johnson, M., 321
Johnston, H., 163, 189, 232, 289, 290,
 413, 427, 459, 492, 507, 508, 647, 706
johnstoni, *Equus*, 506, 508
 Okapia, 16, 484, 506
Joleaud, L., 459, 605, 644, 683, 685, 686,
 688, 690
Jones, F. W., 27, 28, 30, 32, 34, 35, 37,
 38, 44, 45, 47, 50, 51, 54-56, 58,
 66, 72, 74, 75, 77, 80, 83, 90, 91,
 94, 102, 105, 109, 111, 113, 116-
 118, 206, 211
 (See also under Waite, E. R.)
Jones, F. W., and Manson, D., 37, 107
jonesi, *Leporillus*, 78
Jordan, K., 459
Jourdan, —, 119
jubata, *Ovis*, 579
 Ovis ammon, 592
jubatus, *Acinonyx*, 274, 286
 Acinonyx jubatus, 276
 Felis, 276
Junker, W., 508, 728
Juvenal, 231

Kaburaki, T., 191, 216, 642
"Kameel" (Boer), 501
kamtschadalis, *Martes zibellina*, 236,
 239
kanei, *Mustela erminea*, 642
Kangaroo, Forester, 120
 Tasmanian, 120
Kangaroos, 21, 77
Kangurus billardieri, 112
 eugenii, 109
 fasciatus, 96
 gaimardi, 78
 pencillatus, 102
kansuensis, *Cervus*, 450
 Cervus elaphus, 450, 461
Karéline [Karelin], G. S., 286, 581
karelini, *Ovis*, 584, 585, 586, 589
 Ovis ammon, 583, 584
Kaudern, W., 125, 128, 132, 133, 139,
 140, 142, 143, 145, 151-153, 157, 158,
 160, 255
Kaufman, D. E., 314
kaufmanni, *Hippotragus niger*, 706

- Keller, C., 513, 525
 Kellogg, R., 7
 Kelsall, H. J., 311
 Kemp, P. R., 436
 kenneerleyi, *Ursus*, 19
 Kennion, R. L., 307, 362, 570, 572, 573, 626, 632
 kerkhoveni, *Arctictis binturong*, 247
 Kerr, R., 143
 Kershaw, J. A., 71, 75, 163
 (See also under Spencer, B.)
 Kessler, K. T., 198, 260
 khur, *Asinus hemionus*, 13, 363
 kiboko, *Hippopotamus amphibius*, 414
 Kieffer, A., 373, 385, 442, 519, 527, 640
 kikuyuensis, *Colobus polykomos*, 161
 Kinloch, A. A. A., 434, 539, 544
 Kinnear, N. B., 261, 262, 293, 295
 Kirby, F. V., 298, 398, 669. (See also
 Vaughan-Kirby, F.)
 Kirk, J., 163, 186
 kirkii, *Aegocerus niger*, 705
 Colobus, 163
 Colobus badius, 163
 Hippotragus niger, 705
 Kishida, K., 215, 244
 klamathensis, *Ursus*, 20
 Klemm, M., 239
 Kling and Büttner, 668
 Klippspringer (Ger.), 668
 Klippspringer, Abyssinian, 672
 Angola, 671
 Cape Colony, 668
 Marsabit, 671
 Masai, 671
 Nyasa, 671
 Somali, 672
 Transvaal, 670
 Kloss, C. B., 245, 384, 386, 436, 438, 519, 526, 527
 (See also under Robinson, H. C.)
 knochenhaueri, *Loxodonta africana*, 317
 Koala, New South Wales, 64
 Queensland, 68
 Victorian, 70
 Koalas, 64
 koba, *Aegocerus*, 704
 Hippotragus equinus, 704
 Kolben, P., 298, 398, 417, 555, 722
 Komàrec, J., 224
 Koningsberger, J. C., 524
 kopschi, *Cervus*, 446
 Cervus nippon, 446
 Korsak, W., 271
 Kou Prey (Cambodian), 510
 Kowarzik, R., 584
 Kozlov, P. K., 580, 594
 kozlovi, *Ovis*, 579, 580
 Koźmian, K., 331
 Krefft, G., 29, 30, 31, 93
 Krüger, A., 192, 194, 195, 197, 198, 199
 krugeri, *Leo leo*, 298
 Krumbiegel, I., 222, 233, 258, 266, 532, 575
 Krynitzki, —, 198
 Kuiper, K., 374
 Kulan, 353
 Transcaspian, 357
 Kulan, transkaspischer (Ger.), 357
 Kull, A., 202
 Kulon, 353
 Kuntze, R., 191, 198, 234, 239, 241, 595
 Kuroda, N., 191, 199, 214, 215, 244, 270, 430, 474, 642
 Lacépède and Cuvier, 136
 Ladyjensky, —, 358
 Lagorchestes *hirsutus*, 80, 94, 95
 hirsutus bernieri, 96
 hirsutus dorraeae, 96
 hirsutus hirsutus, 94
 leporides, 93
 Lagostrophus *fasciatus*, 96
 fasciatus albigilis, 96
 lagotis, *Macrotis*, 56
 Macrotis lagotis, 51, 54-56
 Perameles, 51
 Peragale, 56
 Thalacomys, 54
 Lagreze, A., 385
 Lama, 421
 Lamang (Siamese), 441
 Lamberti, P. A., 536
 lanatus, Lemur, 156
 lanea, *Felis*, 276
 Lang, H., 182, 188, 343, 407, 408, 410-412, 507, 509, 654, 657, 661
 Langdon, J., 252
 langheldi, *Hippotragus*, 704
 Hippotragus equinus, 701, 704
 laniger, *Avahi laniger*, 156
 Cheiomys madagascariensis, 158
 Lemur, 156
 Lankester, E. R., 508
 laristanica, *Ovis*, 564, 570
 Larsen, C. A., 474
 larvatus, *Potamochoerus*, 255
 Lasiorhinus *latifrons barnardi*, 76
 latifrons gillespiei, 75
 latifrons latifrons, 74
 lasiotis, *Dicerorhinus sumatrensis*, 13, 393
 Rhinoceros, 393
 Ursus, 228
 Ursus arctos, 218, 228
 Lataste, F., 232, 273, 458, 643, 646, 684, 712
 latifrons, *Lasiorhinus latifrons*, 74
 Phascolomys, 74, 75
 latipes, *Oryx leucoryx*, 693, 694

- Lattimore, O., 326, 356, 424, 580
 Laufer, B., 473, 484
 Laurent, P., 274, 282
 Lavauden, L., 154, 171, 178, 264, 273,
 282, 289, 290, 320, 350, 401, 409, 410,
 416, 419, 484, 490, 643, 684-691, 713,
 714, 730
 Layard, A. H., 369, 370
 Layard, E. L., 654
 Lazdin, V. P., 571
 leadbeateri, *Gymnobelideus*, 10, 20, 61
 Leche, W., 421, 422
 lecoqi, *Felis tigris*, 304
 Panthera tigris, 304
 Ledebour, C., and Bunge, A. von, 577
 Leeuw (Boer), 297
 Legendre, S. J., 362
 LeGendre, S. (See under Sanford, G.)
 Lemur, Black, 134
 Broad-nosed Gentle, 130
 Brown, 136
 Collared, 137
 Coquerel's Dwarf, 17, 125
 Crossley's Mouse, 17, 128
 Crowned, 141
 Fork-tailed, 129
 Fulvous, 136
 Geoffroy's Fat-tailed, 126
 Gray, 17, 131
 Hairy-eared Mouse, 16, 19, 128
 Mayotte, 139
 Milius's Mouse, 127
 Miller's Dwarf, 123
 Mongoose, 140
 Olivaceous, 132
 Red-bellied, 142
 Red-fronted, 138
 Red-tailed, 145
 Ring-tailed, 132
 Ruffed, 142
 Samat's Fat-tailed, 126
 Sanford's, 134
 Smith's Dwarf, 124
 Tufted-eared Mouse, 128
 Weasel, 144
 White-faced, 135
 White-fronted, 135
 Lemur albifrons, 135
 albimanus, 140
 anjuanensis, 140
 bruneus, 136
 brunneus, 156
 catta, 132
 chrysampyx, 141
 cinereus, 131
 collaris, 137
 commersonii, 127
 coronatus, 141
 cuvieri, 140
 flaviventer, 142
 fulvus, 134, 136-138, 142
 fulvus albifrons, 138
 Lemur fulvus collaris, 139
 fulvus rufus, 137, 138, 139
 fulvus sanfordi, 134
 furcifer, 129
 griseus, 131
 indri, 155
 lanatus, 156
 laniger, 156
 leucomystax, 134
 macaco, 134, 135, 138
 macaco albifrons, 135
 macaco collaris, 137
 macaco fulvus, 136
 macaco macaco, 134
 macaco mayottensis, 139
 macaco rufus, 135, 138
 macaco sanfordi, 134
 macaco variegatus, 142
 mayottensis, 139
 mongoz, 136, 138, 140
 mongoz cinereiceps, 137
 mongoz coronatus, 140, 141
 mongoz mongoz, 140
 mongoz nigrifrons, 141
 murinus, 123
 nigerrimus, 137
 nigrifrons, 140
 prehensilis, 123
 psilodaactylus, 158
 pusillus, 123
 ruber, 142, 143
 rubriventer, 142
 rufifrons, 138
 rufiventer, 142
 rufus, 138
 simia-sciurus, 140
 variegatus, 142
 varius, 142
 Lemuridae, 21, 123
 Lemurs, 21, 123
 lenensis, *Rangifer tarandus*, 483
 leo, *Felis*, 288
 Leo leo, 15, 20, 288
 Leo asiaticus, 292
 leo krugeri, 298
 leo leo, 15, 20, 288
 leo melanochaitus, 15, 19, 297
 leo persicus, 12, 292
 leo senegalensis, 289
 leo subsp., 13, 17, 291
 melanochaitus, 297
 spelaeus, 291
 León berberisco (Sp.), 288
 Leopard, Indian Hunting, 283
 Leopards, Hunting, 274
 Lepidolemur edwardsi, 145
 globiceps, 145
 grandidieri, 145
 leucopus, 145
 microdon, 144
 mustelinus rufescens, 145

- Lepilemur dorsalis*, 145
 mustelinus, 144, 145
 pallidicauda, 145
 ruficaudatus, 144, 145
 ruficaudatus dorsalis, 145
 ruficaudatus leucopus, 145
Leplae, E., 161, 175, 416, 496, 506, 509, 703, 706
Leporidae, 190
leporides, Lagorchestes, 93
 Macropus, 93
Leporillus jonesi, 78
Lepri, G., 604
leptoceros, Antilope, 687
 Gazella, 16, 687
 Gazella leptoceros, 687
Lepus americanus, 190
lervia, *Ammotragus*, 600
 Ammotragus lervia, 601, 604
 Antilope, 601
Le Souef, A. S., 47, 50, 60, 65, 68, 73, 82, 99, 102, 103-105, 108, 112, 116, 121, 206, 211
Le Souef, A. S., and Burrell, H., 27-29, 36-38, 44, 64-66, 75, 78, 89, 91, 99, 104, 106, 108, 113, 120
Le Souëf, W. H. D., 44
Lesson, R. P., 233
lesueur, Bettongia *lesueur*, 79
lesueuri, Bettongia, 80, 84
Letcher, O., 420
Letourneux, M., 231
leucomystax, Lemur, 134
leucophaea, Antilope, 698
leucophaeus, *Hippotragus*, 15, 698
leucopus, *Lepidolemur*, 145
 Lepilemur ruficaudatus, 145
leucoryx, Antilope, 693
 Oryx, 648, 693
leucura, *Macrotis leucura*, 56
 Peragale, 56
Le Vaillant, F., 503, 698, 700
levir, *Isolobodon*, 18
Lewis, F., 70, 71, 106
liberiensis, *Choeropsis*, 8, 16, 419
 Hippopotamus (Tetraprotodon), 419
Lichanotus mitratus, 155
Lichtenstein, H., 336, 700
lichtensteini, *Alcelaphus*, 647
liebrectsi, *Okapia*, 506
Lilford, Lord [T. L. P.], 259
Lince (Sp., It.), 265
Link, H. F., 608, 609
Lion, Asiatic, 12, 292
 Barbary, 15, 20, 288
 Cape, 15, 19, 297
 European, 13, 17, 291
 Indian, 292
 Sabi, 298
 Lion de Barberie (Fr.), 288
Lipurus cinereus, 64
listai, *Grypotherium*, 18
Lister, J. J., 206, 208
Littledale, St. G., 423, 578, 582, 596
littledalei, *Ovis ammon*, 583, 585, 586, 589
 Ovis sairensis, 583
Livingstone, D., 318, 404, 418
livingstonianus, *Nesotragus*, 673
 Nesotragus livingstonianus, 672, 673
livingstonii, *Oreas*, 724
 Taurotragus oryx, 724
Llewelyn, R., 726
Lloyd, J., 470
Lloyd, L., 244
Loch, C. W., 381-387, 389, 390, 393, 396
Loche, V., 231, 643, 684
Loder, E., 688
loderi, *Gazella*, 687, 688
longicaudata, *Sminthopsis*, 31
longicaudatus, *Indris*, 156
 Manis, 187
 Pholidotus, 189
 Sminthopsis, 31
 Uromanis, 189
longiceps, *Cephalophus*, 667
longipilis, *Panthera tigris*, 299, 303
 Tigris, 299
longirostris, *Nesophontes*, 18
Longman, H. A., 35, 58, 76-78, 91, 100, 107
Lönningberg, E., 174, 197, 205, 221, 227, 242, 269, 270, 399, 470-472, 477, 494, 509, 665
Lönningberg, E., and Mjöberg, E., 86
Lophiomysidae, 200
Lophiomys, 200
 aethiopicus, 201
 bozasi, 203, 204
 ibeanus, 202, 204
 ibeanus hindei, 204, 205
 ibeanus ibeanus, 204
 imhausi(i), 201-204
 smithi, 201, 202
 testudo, 204
 thomasi, 203
Lord, C. E., 37, 39, 41, 49, 73, 91, 113, 121
Lord, C. E., and Scott, H. H., 34, 37, 38, 40, 112, 121
Lorenz-Liburnau, L. von, 140, 141, 151, 152, 157, 339
Louis, J. A. H., 434
Loup de terre (Fr.), 250
Loupy, M. J., 386
Loveridge, A., 163
lowi, *Bibos sondaicus*, 11, 528
Lowitz, T., 536

- Loxodonta*, 310, 316
 africana africana, 8, 16, 316
 africana knochenhaueri, 317
 africana oxyotis, 317
 africana zukowskyi, 316
Luchs (Ger.), 265
luciae, *Megalomys*, 19
lühdorfi, *Cervus*, 447
Lumholtz, C., 82
lunata, *Onychogalea*, 100
lunatus, *Macropus*, 100
lupus, *Canis*, 14, 215
 Canis lupus, 214
lusitanica, *Capra*, 608
 Capra pyrenaica, 13, 19, 608
luteus, *Equus* (*Asinus*) *hemionus*, 353, 356
Luther, A., 477
lutreola, *Mustela*, 233
lutreolus, *Rattus*, 210
Lycaon pictus, 719
Lydekker, R., 5, 34, 37, 41, 58, 65, 93, 105, 107, 200, 210, 212, 213, 227, 232, 241, 244, 245, 271, 272, 274, 289, 295, 296, 310, 311, 314, 317, 328, 330, 332, 337, 348, 352, 358, 360, 364, 366, 368, 376, 381, 388, 394, 410, 425, 428, 433, 436, 438, 441, 443, 446, 447, 451, 452, 454, 458, 460, 462-464, 467-470, 475, 477, 485, 487, 488, 491, 495, 497, 501, 510, 512-514, 517, 520, 521, 523, 526-529, 531-533, 536, 541, 543, 544, 547, 548, 550, 553, 557, 563, 565-568, 570, 572-574, 579, 581-583, 585, 589, 590, 593, 595, 596, 598, 599, 614, 618, 622, 625-627, 630, 632-634, 639, 641, 648, 650, 679, 705, 721, 724
 (See also under Flower, W. H.)
Lydekker, R., and Blaine, G., 485, 486, 488, 492, 493, 499, 503, 506, 510, 648-651, 665, 668, 672, 674, 677, 678, 693, 699, 712, 720
lydekkeri, *Ovis borealis*, 598, 599
 Ovis nivicola, 598
Lyell, D., 497, 665, 703, 705
Lynx (Fr.), 265
Lynx, *Barbary*, 16, 272
 European, 265
 Tibetan, 271
Lynx caracal (Fr.), 272
lynx, *Felis*, 265
 Lynx lynx, 265
Lynx lynx isabellina, 270, 271
 lynx lynx, 265
 lynx wrangeli, 270
 pardellus, 266
Lyon, M. W., Jr., 191, 246, 247, 314, 390
macaco, *Lemur*, 134, 135, 138
 Lemur macaco, 134
Maclatchy, A. R., 161, 169, 183, 188, 664
Maclear, J. P., 122, 206, 208
macleari, *Rattus*, 8, 10, 20, 123, 206, 208, 209
Macleay, W., 261
M'Neill, M., 446, 461
macneilli, *Cervus*, 13, 460, 465
 Cervus elaphus, 450
macneil(i), *Cervus cashmirianus*, 460
Macneillshirsch (Ger.), 460
macrocerus, *Bubalus*, 539, 544
 Bubalus arna, 544
macrodon, *Mustela*, 19
Macromerus typicus, 146
macromongoz, *Prosimia*, 136
Macropodidae, 21, 77
Macropus agilis, 110
 billardieri, 113
 brachyurus, 88
 (*Thylogale*) *dama*, 112
 elegans, 114
 eugenii, 101, 111
 fraenatus, 98
 giganteus, 121
 giganteus tasmaniensis, 120
 gracilis, 110
 greyi, 117
 (*Halmaturus*) *greyi*, 116
 leporides, 93
 lunatus, 100
 (*Halmaturus*) *manicatus*, 119
 parryi, 114, 115
 ruficollis, 121
 tasmaniensis, 120
macrootis, *Vulpes macrootis*, 20
Macrootis lagotis, 56
 lagotis cambrica, 51, 53
 lagotis grandis, 10, 20, 51, 54
 lagotis interjecta, 51, 54, 55
 lagotis lagotis, 51, 54-56
 lagotis nigripes, 51, 55
 lagotis sagitta, 51, 55
 leucura leucura, 56
 leucura minor, 57
macroura, *Manis*, 189
macrourus, *Dasyurus*, 36
maculata, *Viverra*, 36
maculatus, *Dasyurus*, 32, 34, 36
madagascariensis, *Daubentonia*, 17, 158
 Galago, 123
 Sciurus, 158
magister, *Ursus*, 20
Mähnenschaf (Ger.), 600, 604
Maitre, M. H., 396
major, *Acratocnus*, 18
 Cheirogaleus, 127
 Cheirogaleus major, 127, 128
 Phyllonycteris, 19

- Major, C. I. F., 126, 127, 208
 majori, Propithecus, 153, 154
 Propithecus verreauxi, 153
 Makaroff, V. N., 240, 430
 Maki à fourche (Fr.), 129
 Maki à fraise (Fr.), 137
 Maki à front blanc (Fr.), 135
 Maki brun (Fr.), 136
 Malbrant, R., 281, 350, 410, 488, 601,
 715, 730
 Manatee, African, 16
 mandarinus, Cervus, 444
 Cervus nippon, 444
 manicatus, Macropus (Halmaturus),
 119
 Manidae, 181
 Manis, 181
 gigantea, 181
 hessi, 189, 190
 longicaudatus, 187
 macroura, 189
 temminckii, 184
 tetradactyla, 189
 tricuspis, 186, 188
 Manning, —, 398
 Manson, D. (See under Jones, F. W.)
 manchuricus, Cervus, 445
 Cervus nippon, 444, 445
 Maral (Russ.), 451
 Maralhirsch (Ger.), 451
 Marazzani, L., 201
 Marchand, Col., 508
 Marguerite, Général, 289, 290
 maritimus, Capricornis, 640
 Markhor, Astor, 627
 Cabul, 631
 Chialtan, 632
 Pir Panjal, 629
 Suleman, 633
 Marl, 49
 Mármol Carvajal, L. de, 645
 Marriner, T., 229
 Marsden, W., 388, 390
 Marsupialia, 25
 Marsupial Mouse, Freckled, 10, 20, 25
 Marsupial Wolf, 40
 Marsupials, 25
 Marte zibelline (Fr.), 235
 Marten, Black, 244
 Martens, E. von, 215
 Martes martes, 235
 zibellina, 235
 zibellina brachyura, 237
 zibellina kamtschadalia, 236, 239
 zibellina princeps, 236, 238, 239
 zibellina sahalinensis, 235, 236, 239
 zibellina sajanensis, 236, 238
 zibellina yeniseensis, 236, 238
 zibellina zibellina, 236, 238
 Martial, 231
 Martin, R., 194, 222, 233, 266, 574
 Martorelli, G., 265
 Mason, F. V., 62
 Mastacomys, 205
 fuscus, 210
 Matschie, P., 173, 174, 182, 184, 186–
 189, 252, 347, 357, 359, 495, 496, 599,
 664, 668
 Mattenklodt, —, 403
 maugei, Dasyurus, 32
 Maugham, R. C. F., 278
 Maurice, F., 267
 "Mawas" (Sumatra), 164
 Maydon, H. C., 213, 251, 278, 279, 281,
 287, 347, 399, 401, 459, 486, 496, 498,
 602, 619, 625, 645, 658, 665, 666, 675,
 677, 683, 684, 698, 705–707, 709, 710,
 715, 717, 719, 721, 728, 730, 731
 mayottensis, Lemur, 139
 Lemur macaco, 139
 medius, Cheirogaleus, 126
 Cheirogaleus medius, 126
 megaceros, Capra, 631
 Capra falconeri, 630, 631, 633
 Megalomys audreyae, 18
 desmarestii, 21
 luciae, 19
 Megalonychidae, 21
 megalotis, Dorcatragus, 674
 Oreotragus, 674
 Megatheriidae, 18
 Melanarctos cavifrons, 228
 melanocephala, Prosimia, 137
 melanochaitus, Leo, 297
 Leo leo, 15, 19, 297
 melanotis, Chirogale, 128
 Mendesantilope (Ger.), 711
 mendocinensis, Ursus, 19
 Menges, J., 351, 486, 674
 mengesi, Capra nubiana, 622, 623
 meridionalis, Ursus arctos, 218
 Mérito, Marquis del, 614
 merriami, Cervus canadensis, 21
 Merrill, E. D., 550
 Mertens, A., 512
 Mertens, R., 523
 Mesa, P. de, 549
 Meyer, A. B., 293, 548
 mhor, Antilope, 689
 Gazella dama, 16, 689
 "Mias" (Borneo), 164
 Microcebus coquereli, 17, 125
 minor, 125
 minor griseorufus, 123
 murinus murinus, 123, 124
 murinus smithii, 124
 myoxinus, 123, 124
 rufus, 123
 smithii, 125
 microdon, Lepidolemur, 144
 micromongoz, Prosimia, 140

- Microtus oeconomicus*, 239
 pennsylvanicus nesophilus, 19
micrus, *Nesophontes*, 18
Middendorff, A. T. von, 429, 447, 597, 599
middendorffi, *Ovis*, 596
milii, *Cheirogaleus*, 127
Millais, J. G., 192, 194, 196, 198, 199, 219, 261, 262, 265, 470, 473, 475, 483, 484, 574, 730
Miller, G. S., Jr., 192, 218, 233, 241, 247, 257, 260, 261, 263, 265, 375, 391, 459, 477, 478, 573
Miller, J. H., 305, 325, 355, 356, 359, 455, 463, 484, 560, 577, 578, 582-585, 682
Millet, F., 380, 396
Milne Edwards, A., 152, 202, 431, 444, 468
Milne Edwards, A., and Grandidier, A., 147-153, 155, 157, 254, 255
milne-edwardsi, *Capricornis sumatraensis*, 637, 641
Milroy, A. J. W., 379, 382, 394, 518, 545
Mi-lu (Chinese), 467
mindorensis, *Anoa*, 11, 548
 Bubalus, 548
minima, *Prosimia*, 123
Mink, European, 233
 Sea, 19
minor, *Cheirogaleus*, 123
 Macrotis leucura, 57
 Microcebus, 125
 Peragale, 57
Mioicebus griseus, 127
miselius, *Thalacomys minor*, 56
Mission Zoologique Franco-Anglo-Américaine, 123, 126, 128, 130, 131, 133-135, 137, 141-146, 148, 150-153, 156, 157, 160, 249, 256
Mitchell, P. C., 538, 616
mitratus, *Lichanotus*, 155
Mivart, St. G., 212-216
Mixocebus caniceps, 144
Miyoshi, M., 241, 270, 430
Mjöberg, E., 314, 375, 391, 392, 528, 635
 (See also under Lönnberg, E.)
Mohr, E., 233, 534-536, 550
Molina, A. de, 221
Monard, A., 185, 188, 252, 403, 500, 652, 709
Moncrieff, P., 731
Monestrol, M. de, 384
mongolica, *Ovis argali*, 576
Mongoose, 244
mongoz, *Lemur*, 136, 138, 140
 Lemur mongoz, 140
Monkeys, *Colobus*, 8, 160
 leaf-eating, 160
Monophyllus frater, 19
montanus, *Aphaetretus*, 18
montinus, *Capricornis sumatraensis*, 641
Morden, W. J., 305, 325, 455, 462, 463, 590, 591, 680, 682
morea, *Felis catus*, 262
 Felis silvestris, 259, 262
Morgan, E. D., 324
morio, *Chalinolobus*, 731
Morris, R. C., 284, 515
Morse, I., 562
moschatus, *Nesotragus*, 672
Moschidae, 427
moschiferus, *Moschus*, 427
 Moschus moschiferus, 427, 431
Moschus aquaticus, 425
 berezovskii, 431
 chrysogaster, 433
 moschiferus, 427
 moschiferus chrysogaster, 433
 moschiferus moschiferus, 427, 431
 moschiferus parvipes, 429, 430
 moschiferus sachalinensis, 430
 moschiferus sifanicus, 431
 parvipes, 430
 sibiricus, 427
 sifanicus, 431
Moschustier (Ger.), 431
Mouflon, Cyprian, 14, 558
 European, 573
 Sardinian, 573
Mouflon à Manchettes (Fr.), 600, 601, 604
Mouflon de Corse (Fr.), 573
Mouflon de Cypre (Fr.), 558
Mouflon d'Europe (Fr.), 573
Mouse, Gull Island Meadow, 19
 House, 9
Mouse-deer, 425
Mouse-Sminthopsis, Slender, 29
Mufione (Ital.), 573
Mufione berbero (Ital.), 600
Müller, S., 523
Muntiacus crinifrons, 435
Muntjac, Hairy-fronted, 435
Muridae, 21, 205
murina, *Phascogale*, 29
 Sminthopsis, 29, 31
 Sminthopsis murina, 29, 31
murinus, *Hypsiprymnus*, 89
 Lemur, 123
 Microcebus murinus, 123, 124
Murray, G. W., 602, 619
murrayi, *Rattus*, 78
Mus, 205
 argurus, 211
 nacleari, 206
 musculus, 208
 nativitatis, 208, 209
 rattus, 207

- musculus, Mus, 208
 Musgrave, A., 103
 Musil, A., 370
 musimon, Aegoceros, 573
 Ovis, 573
 Musk-rat, Barbuda, 18
 Martinique, 21
 Santa Lucia, 19
 Musk-shrew, Christmas Island, 122
 Mustela brachyura, 237
 erminea kanei, 642
 gulo, 241
 itatsi, 240
 lutreola, 233
 macrodon, 19
 zibellina, 235
 Mustelidae, 21, 232
 mustelinus, Lepilemur, 144, 145
 mutus, Poëphagus, 528
 Poëphagus grunniens, 528
 myosura, Perameles myosura, 10, 49
 myosuroides, Perameles, 49
 myoxinus, Microcebus, 123, 124
 Myrmecobiidae, 43
 Myrmecobius fasciatus, 43
 fasciatus fasciatus, 43
 fasciatus rufus, 44, 45
 rufus, 45, 47
 Myscebus palmarum, 123
 Mystacina tuberculata, 731
 Mystacinidae, 731

 nanus, Syncerus, 554
 nasomaculata, Antelope, 711
 nasomaculatus, Addax, 711
 Addax nasomaculatus, 16, 715
 Nasonov, N. V., 7, 558, 561-565, 567,
 570-572, 576, 577, 579-582, 586-595
 Nasonov, N. V., and Dorogostajskij,
 V. Č., 600
 Natalidae, 21
 Natalus primus, 18
 Native Bear, 64
 nativitatis, Mus, 208, 209
 Rattus, 8, 10, 20, 123, 207, 208
 nauticus, Isoodon, 78
 navaho, Ursus texensis, 19
 Nazároff, P. S., 359, 455, 464, 586, 680
 Neave, S. A., 186
 neglectus, Capra hircus, 627
 Nehring, A., 193, 593
 Nemorhaedus swettenhami, 638
 Neofelis, 245
 nesophilus, Microtus pennsylvanicus,
 19
 Nesophontes edithae, 13
 longirostris, 18
 micrus, 18
 paramicrus, 19
 zamicrus, 18
 Nesophontidae, 21

 Nesoryzomys swarthy, 21
 Nesotragus livingstonianus, 673
 livingstonianus livingstonianus,
 672, 673
 livingstonianus zuluensis, 672
 moschatus, 672
 Neumann, A. H., 390, 494, 672, 717
 Neville, H. (See under Rothschild,
 M. de.)
 ngorongorensis, Acinonyx guttatus,
 278
 Acinonyx jubatus, 278
 niasensis, Arctictis, 247
 Arctictis binturong, 247
 Nicholson, J. W., 541
 Niezabitowski, E. R. L. von, 243, 260,
 332, 679
 niger, Aigoceros, 707
 Canis niger, 20
 Ceratorhinus, 393
 Dicerorhinus sumatrensis, 13, 393
 Hippotragus niger, 705, 707
 Indri, 155
 Vombatus hirsutus, 73
 nigerrimus, Lemur, 137
 nigrescens, Giraffa reticulata, 493
 nigricans, Giraffa camelopardalis, 493
 nigrifrons, Lemur, 140
 Lemur mongoz, 141
 nigrimontana, Ovis, 586-588
 Ovis ammon, 586
 nigripes, Macrotis lagotis, 51, 55
 Thalacomys, 55
 Nikolskii, G. A., 454
 nivicola, Ovis, 13, 595, 599
 Ovis nivicola, 595, 596
 Noack, T., 190, 351, 498, 674
 Nøis, D., 482
 Nordenskiöld, A. E., 480
 Nörz (Ger.), 233
 notina, Perameles myosura, 47, 50
 Novibos sauveli, 510
 nubiana, Capra, 618
 Capra nubiana, 16, 618, 622
 Numbat, Rusty, 45
 South Australian, 45
 West Australian, 43
 Nyala, 16, 716
 Mountain, 16, 720
 Nyctereutes procyonoides orestes, 217
 procyonoides procyonoides, 217
 procyonoides ussuriensis, 217
 procyonoides viverrinus, 215

 Oakley, R., 400, 489
 obergi, Acinonyx guttatus, 276
 Acinonyx jubatus, 276
 obliquus, Elasmodontomys, 18
 obtusa, Phyllonycteris, 19
 occidentalis, Avahi laniger, 157
 Chaeropus ecaudatus, 58, 59

- occidentalis*, *Choeropus*, 59
 Pseudocheirus, 63
 Pseudochirus, 63
ocularis, *Prosimia*, 140
Oderra, M., 384
odontrigonus, *Acratocnus*, 18
oeconomicus, *Microtus*, 239
offella, *Boromys*, 19
Ogilby, J. D., 36, 107
Ogilby, W., 58, 683
ogilbyi, *Bettongia penicillata*, 83
 Hypsiprymnus, 83
 Cephalophus, 667, 668
Ogneff [Ognev], S. I., 7, 216, 222, 227,
 234-236, 238-240, 242, 243, 260, 263,
 269, 270, 272, 286, 299, 301, 305, 307,
 309
Ogneff [Ognev], S. I., and Heptner,
 W. G., 573, 627
Okapi, 16, 484, 506
Okapia, 508
 erikssoni, 506
 johnstoni, 16, 484, 506
 liebrechtsi, 506
Økland, F., 476
Olaus Magnus, 244
olivaceus, *Hapalemur*, 132
 Hapalemur griseus, 131, 132
Omar Kháyyám, 360
Onager, of *Anatolia*, 371
 Persian, 359
onager, *Asinus hemionus*, 360, 364, 368,
 371
 Asinus, 368, 369
 Equus, 359, 361, 369
Onychogalea fraenata, 98
 lunata, 100
Onza (Sp.), 274
ophion, *Ovis*, 558
 Ovis ophion, 14, 558, 566
Opolemur thomasi, 126
Opossum, *Leadbeater's*, 10, 20, 61
 Western Ring-tailed, 63
Orang-utan, 8, 11, 164
Oreas livingstonii, 724
oregonus, *Bison bison*, 19
oreotragus, *Antilope*, 668
 Oreotragus oreotragus, 668
Oreotragus aceratos, 671
 megalotis, 674
 oreotragus aceratos, 671
 oreotragus aureus, 671
 oreotragus cunenensis, 671
 oreotragus oreotragus, 668
 oreotragus porteousi, 672
 oreotragus saltatrixoides, 672
 oreotragus schillingsi, 671
 oreotragus somalicus, 672
 oreotragus transvaalensis, 670
 saltator porteusi, 672
 schillingsi, 671
 somalicus, 672
orestes, *Nyctereutes procyonoides*, 217
orientalis, *Avahis laniger*, 156
 Ovis, 565
 Ovis musimon, 558
 Ovis orientalis, 565
ornata, *Ammotragus lervia*, 16, 601
 Ovis, 601
Orso bruno (Ital.), 217
oryx, *Antilope*, 722
 Taurotragus oryx, 722
Oryx, *Arabian*, 693
 Scimitar, 8, 690
 White, 16, 690
Oryx aschenborni, 696
 beatrux, 693
 gazella, 8
 gazella blainei, 696
 gazella gazella, 696
 leucoryx, 648, 693
 leucoryx latipes, 693, 694
Oryzomys antillarum, 19
 galapagoensis, 19
 victus, 19
Osgood, W. H., 213, 721
Oso (Span.), 217
Otto, E., 391
Ours brun (Fr.), 217
Oustalet, E., 202, 203
Ouwens, P. A., 553, 554
Ovis alleni, 596
 ammon, 557, 577, 599
 ammon ammon, 576, 583, 592
 ammon collium, 13, 581, 582
 ammon dalai-lamae, 591
 ammon darwini, 13, 579
 ammon hodgsonii, 579, 580, 584,
 592
 ammon humei, 585, 586, 588, 590
 ammon jubata, 592
 ammon karelini, 583, 584
 ammon littedalei, 583, 585, 586,
 589
 ammon nigrimontana, 586
 ammon poli(i), 581, 583, 585, 589,
 590
 ammon przevalskii, 576
 ammon sairensis, 581
 ammon severtzovi, 587
 ammon typica, 578
 anatolica, 558
 arcar dolgopolovi, 572
 argali, 576
 argali altaica, 576
 argali dauricus, 576
 argali mongolica, 576
 arkal, 572
 arkar, 572
 blanfordi, 569
 borealis, 596, 599
 borealis lydekkeri, 598, 599

- Ovis canadensis auduboni*, 21
canadensis borealis, 598
collium, 581
comosa, 579
cycloceros, 565, 568, 569
cyprius, 558
dalai-jamae, 591
darwinii, 579
gmelini(i), 560, 562, 565
gmelini erskinei, 565, 566, 567
gmelini(i) *gmelini*(i), 562, 566
gmelinii isphaganica, 563
gmelinii urmiana, 563
heinsii, 586
henrii, 592
hodgsonii, 592
jubata, 579
karelini, 584-586, 589
kozlovi, 579, 580
laristanica, 564, 570
lervia blainei, 601
lervia sahariensis, 604
middendorffi, 596
musimon, 573
musimon orientalis, 558
nigrimontana, 586, 587, 588
nicicola, 13, 595, 599
nicicola alleni, 596
nicicola borealis, 599
nicicola lydekkeri, 598
nicicola nicicola, 595, 596
nicicola potanini, 599
ophion, 558
ophion anatolica, 371, 559, 563
ophion armeniana, 561
ophion ophion, 14, 558, 566
ophion urmiana, 563
orientalis, 565
orientalis arcar, 572
orientalis cycloceros, 572
orientalis dolgopolovi, 572
orientalis gmelini, 560
orientalis isphaganica, 563
orientalis orientalis, 565
ornata, 601
poli(i), 557, 586, 588-591
poli adametzi, 584
saiensis, 581, 582
saiensis littledalei, 583
severtzovi, 587
storcki, 595, 596
vignei, 564, 567, 590
vignei arkal, 572
vignei blanfordi, 588
vignei bochariensis, 571
vignei cycloceros, 569
vignei punjabiensis, 568
vignei varenzovi, 572
vignei vignei, 567, 568, 571
 Owen, R., 159
- Ox*, Cambodian Wild, 510
 European Wild, 511
 Indo-Chinese Forest, 510
oxyotis, *Loxodonta africana*, 317
Ozanna roosevelti, 707
- Pademelon*, Dama, 109
 Flinders Island, 108
 Parma, 107
 Red-necked, 106
 Rufous-bellied, 112
 Tasmanian, 112
 White-throated, 107
- Page, R., 522
 Pallary, P., 686
 Pallas, P. S., 198, 260, 330, 331, 333,
 354, 358, 360, 361, 428, 430, 451, 478,
 678, 679
pallidicauda, *Lepilemur*, 145
pallidior, *Proteles cristatus*, 250
palmarum, *Myscebus*, 123
 Palmer, L. J. (See under Hadwen, S.)
Pan, 164
paniscus, 180
satyrus paniscus, 180
satyrus verus, 177
troglodytes, 8
troglodytes schweinfurthii, 177,
 179
troglodytes troglodytes, 176
troglodytes verus, 177
- Pangolin*, Black-bellied, 189
 Giant, 181
 Long-tailed, 189
 Pale-bellied, 186
 Pointed-scaled, 186
 South African, 184
 Three-cusped, 186
 White-bellied, 186
- Pangolin à longue queue* (Fr.), 189
Pangolin géant (Fr.), 181
Pangolin tricuspidé (Fr.), 186
Pangolins, 181
paniscus, *Pan*, 180
Pan satyrus, 180
- Panolia platyceros*, 441
- Panthera tigris amoyensis*, 303, 304
tigris amurensis, 304
tigris balica, 310
tigris coreensis, 301
tigris lecoqi, 304
tigris longipilis, 299, 303
tigris sondaica, 309
tigris styani, 303, 304
tigris sumatrae, 310
tigris tigris, 304, 306
tigris virgata, 305
- Paradoxurus albifrons*, 247
paramicrus, *Nesophontes*, 19
pardellus, *Lynx*, 266
 Parkins, S., 337

- parma, *Halmaturus*, 107
 Thylogale, 10, 20, 107
Parocnus serus, 18
parryi, *Macropus*, 114, 115
parvipes, *Moschus*, 430
 Moschus moschiferus, 429, 430
Paterson, W., 298, 417, 555
pattersonianus, *Taurotragus oryx*, 725
Peacock, E. H., 372, 380, 383, 394, 395,
 439, 440, 517, 518, 520, 527, 542, 543
Peake, H. J., 328, 348
Pearson, H. J., 475
pearsoni, *Petrogale*, 78
 Rangifer tarandus, 475
Pease, A. E., 232, 289, 291, 293, 646,
 684, 688, 712
pencillata, *Petrogale*, 104
 Petrogale pencillata, 102
pencillatus, *Kangurus*, 102
penicillata, *Bettongia*, 82
 Bettongia penicillata, 82, 84
 Didelphis, 26
penicillatus, *Arctictis binturong*, 245,
 248, 249
pennsylvanicus, *Bison bison*, 18
Pentalagus furnessi, 190
Peragale lagotis, 56
 leucura, 56
 minor, 57
peralta, *Giraffa camelopardalis*, 16,
 487
Perameles ecaudatus, 58
 fasciata, 10, 20, 47
 gunnii, 47, 48
 harveyi, 80
 lagotis, 51
 myosura myosura, 10, 20, 49
 myosura notina, 47, 50
 myosuros, 49
Peramelidae, 21, 47
Percival, A. B., 279, 495, 557
Perissodaetyla, 322
Péron, F., 97
Péron, F., and *Freycinet, L.*, 73
perrieri, *Propithecus*, 154
persicus, *Felis leo*, 292
 Leo leo, 12, 292
perturbans, *Ursus*, 20
pervagor, *Ursus*, 20
Petaurus breviceps, 62, 63
Peters, W. C. H., 152, 186, 706
Petit, G., 124, 133, 140, 144, 145, 146,
 150, 256
Petrogale celeris, 105
 herberti, 104
 inornata, 104
 pearsoni, 78
 pencillata, 104
 pencillata pencillata, 102
 xanthopus, 104, 105, 106
 xanthopus xanthopus, 104
Pevtzoff, M. V., 577, 582, 589, 592
Pfizenmayer, E. W., 323, 329, 536, 537,
 598
Phalangeridae, 21, 60
Phalangers, 21, 60
Phaner furcifer, 125, 129
Phascogale, Large Brush-tailed, 26
 Red-tailed, 28
Phascogale albipes, 30
 apicalis, 25
 calura, 28
 calurus, 28
 murina, 29
 tapoatafa pirata, 27
 tapoatafa tapoatafa, 26
Phascolarctidae, 64
 cinereus adustus, 64, 65, 68
 cinereus cinereus, 64, 68, 70
 cinereus victor, 64, 65, 70
Phascolumys gillespiei, 75
 latifrons, 74, 75
Phatages, 181
Phataginus tricuspidis, 186, 189
phenax, *Hexolobodon*, 18
Philby, H. St. J. B., 696
Phillip, A., 36
Phillips, J. C., 1, 7, 229, 360, 364, 371,
 400, 416, 438, 469, 622, 642
Phillips, J. E. T., 666
phillipsi, *Damaliscus*, 15, 656
Pholidotus longicaudatus, 189
Phractomys aethiopicus, 201
phylarchus, *Rangifer tarandus*, 474,
 475, 483
Phyllonycteris major, 19
 obtusa, 19
Phyllops vetus, 18
Phyllostomidae, 21
Phythian-Adams, E. G., 284
pictus, *Lycaon*, 719
Pieters, D., 314
Pietri, A. V., 511
Pigot, R., 436
Piliocolobus gordonorum, 162
Pinkie, 51
pirata, *Phascogale tapoatafa*, 27
Pitman, C. R. S., 176, 186, 252, 497,
 498, 665, 703, 705, 720, 724
Plagiodontia aedium, 18
 spelaum, 18
Platou, H., 219, 220
platyceros, *Panolia*, 441
 Rucervus eldii, 441
platyops, *Hypsiprymnus*, 88
 Potorous, 10, 20, 87, 88, 90
platyrhynchus, *Cervus (Tarandus)*,
 479
 Rangifer, 479
Pleske, T. D., 477
Pliny, 231, 291, 371

- Pocock, R. I., 214, 215, 227, 228, 230, 245, 248, 249, 256, 264, 274, 283, 284, 287, 288, 295-298, 301, 304, 306-309, 351, 450, 694
- Poëphagus grunniens grunniens, 531
grunniens mutus, 528
mutus, 528
- Poiret, J. L. M., 231
- Poliakof [Poljakoff], M., 323, 331, 334, 358, 680
- poli(i), Ovis, 557, 586, 588-591
Ovis ammon, 581, 583, 585, 589, 590
- Pollen, F. P. L., 143, 155, 157, 158
(See also under Schlegel, H.)
- Pollok, F. T., 379, 380, 382
- Polybius, 459
- polykomos, Cebus, 161
Colobus, 8, 161
- Pompey, 291
- Poncins, E. de, 590, 674
- Pongidae, 164
- Pongo, 164
pygmaeus, 8, 11, 164
wurmbi, 164
- Pontoppidan, E. L., 244
- Poole, E. L., 4, 7
- porteousi, Oreotragus oreotragus, 672
Oreotragus saltator, 672
- Porter, R. K., 369
- porteri, Bos sondaicus, 527
- portoricensis, Isolobodon, 18
- Potamochoerus larvatus, 255
- potanini, Ovis nivicola, 599
- Potoroo, 89
- Potorous, 93
gilberti(i), 10, 18, 86-88
platyops, 10, 20, 87, 88, 90
tridactylus apicalis, 91
tridactylus tridactylus, 89
- Potter, H. B., 418, 673, 718
- Pouched Mouse, Brush-tailed, 26
"Common," 29
Gray, 29
Lesser Brush-tailed, 28
Long-snouted, 60
Slender-tailed, 29
- Powell-Cotton, P. H. G., 347, 491, 625, 646, 731
- prehensilis, Lemur, 123
- Prejevalsky [Prejvalski; Prschewalski; Przhevsky; Przevalski; Przewalski], N., 238, 323, 324, 334, 422, 423, 431, 462, 465, 528, 579, 580, 583, 592, 594
- Primates, 123
- primigenius, Bos, 13, 17, 511, 536
- primus, Natalus, 18
- princeps, Martes zibellina, 236, 238, 239
- priscus, Bison, 532
- Proboscidea, 310
- Proboscideans, 310
- procyonoides, Nyctereutes procyonoides, 217
- Propithecus bicolor, 148
brissonianus, 140
coquereli, 150
coronatus, 151
damanus, 151
demonis, 150
deckenii, 152
diadema, 146, 152
diadema candidus, 147
diadema diadema, 17, 146-149
diadema edwardsi, 148, 149
diadema holomelas, 148, 149
diadema sericeus, 146
edwardsi, 148
holomelas, 148
majori, 153, 154
perrieri, 154
sericeus, 147
verreauxi, 147, 149, 154
verreauxi coquereli, 150, 154
verreauxi coronatus, 151
verreauxi deckeni(i), 149, 152
verreauxi majori, 17, 153
verreauxi verreauxi, 149
- Propithèque à diadème (Fr.), 146
- Propithèque couronné (Fr.), 151
- Propithèque de Coquerel (Fr.), 150
- Propithèque de Decken (Fr.), 152
- Propithèque d'Edwards (Fr.), 148
- Propithèque de Verreaux (Fr.), 149
- Propithèque soyeux (Fr.), 147
- Prosimia brissonii, 140
bugi, 140
erythromela, 142
flavifrons, 137, 138
frederici, 135
macromongoz, 136
melanocephala, 137
micromongoz, 140
minima, 123
ocularis, 140
rufipes, 142
xanthomystax, 137
- Proteles cristatus, 250
cristatus cristatus, 250
cristatus harrisoni, 251, 252
cristatus pallidior, 250
cristatus septentrionalis, 251
cristatus terms, 251
cristatus transvaalensis, 251
- Protelidae, 250
- pruinus, Ursus arctos, 218
- pryerianus, Capricornis, 641
- przevalskii, Ovis ammon, 576
- Przewalski. (See Prjevalsky.)
- przewalskii, Equus, 13, 322
- Pseudocheirus occidentalis, 63

- Pseudochirus occidentalis*, 63
psilodactylus, Lemur, 158
punjabiensis, *Ovis vignei*, 568
pusillus, Lemur, 123
pygarus, Antilope, 653
pygmaeus, Pongo, 8, 11, 164
 Simia, 164
pyrenaica, Capra, 14, 606, 609
 Capra *pyrenaica*, 13, 20, 606, 610
pyrenaicus, *Ursus arctos*, 217, 218, 221
- Quagga, 8, 15, 19, 322, 334
quagga, Equus, 8, 334
 Hippotigris, 15, 19
quarlesi, Anoa, 553, 554
 "Quemi" of Oviedo, 18
Quemisia gravis, 18
 Quoy, J. R. C., and Gaimard, J. P., 550
- Raalten, G. von, 389
 Rabbit, European, 9
 Rabbit-bandicoot, 51
 Lesser, 57
 White-tailed, 56
 Rabbits, 190
 Raccoon-dog, Japanese, 215
 Radde, G., 271, 299, 301, 306, 354, 429, 448, 451, 537, 561, 579
 Radde, G., and Walter, A., 286, 357, 358, 572
raddei, *Acinonyx*, 285
 Acinonyx jubatus, 284, 285
 Raffles, T. S., 245, 388, 390
raineyi, *Acinonyx jubatus*, 278, 279
 Ramecourt, G. de, 170, 402, 417, 730
 Ramsay, E. P., 37
 Ramsay, W., 477
 Rand, A. L., 124, 126, 130, 132, 133, 136, 137, 139, 142, 144, 146, 150, 153, 156, 157, 160, 250, 256
Rangifer angustirostris, 483
 arcticus, 472
 platyrhynchus, 479
 tarandus, 14
 tarandus buskensis, 479, 483
 tarandus dichotomus, 479
 tarandus fennicus, 14, 476, 479
 tarandus lenensis, 483
 tarandus pearsoni, 475
 tarandus phylarchus, 474, 475, 483
 tarandus setoni, 474
 tarandus silvicola, 476
 tarandus tarandus, 469, 477-479
 tarandus transuralensis, 483
 tarandus sibiricus, 475, 483
 tarandus valentinae, 483
- Rat, Broad-toothed, 210
 "Bulldog," 20, 208
 Captain Maclear's, 8, 20, 206
 Chatham Island Rice, 19
 Rat, Christmas Island Burrowing, 8, 208
 Goba Maned, 203
 Hispaniolan Spiny, 18
 Imhaus's Crested Bush, 202
 Imhaus's Maned, 202
 Jackson's Maned, 204
 Jamaican Rice, 19
 James Island Rice, 21
 Larger Cuban Spiny, 19
 Lesser Cuban Spiny, 19
 Mau Maned, 204
 St. Vincent, 19
 South Australian Spiny-haired, 205
 "Spinifex," 94
 Sudan Maned, 201
 Uaragess Maned, 203
 White-tailed, 10, 20, 211
- Rat-kangaroo, Broad-faced, 10, 20, 88
 Brush-tailed, 82
 "Common," 89
 Dark, 89
 Desert, 91
 Gaimard's, 10, 20, 78
 Gilbert's, 10, 18, 86
 Gould's, 83
 Gray's, 79
 Harvey's, 80
 Lesueur's, 79
 Long-nosed, 89
 Ogilby's, 83
 Plain, 91
 Rufous, 84
 St. Francis Island, 77
- Rats, African Maned, 200
 giant, 21
 House, 9, 11
 Old World, 21, 205
 spiny, 21
- rattus*, Mus, 207
 Rattus, 208, 211
- Rattus*, 205
 concolor, 208
 culmorum austrinus, 205
 culmorum vallesius, 206
 culmorum youngi, 206
 everetti, 206
 lutreolus, 210
 macleari, 8, 10, 20, 123, 206, 208, 209
 murrayi, 78
 nativitatis, 8, 10, 20, 123, 207, 208
 rattus, 208, 211
 xanthourus, 206
- Ratzeburg, J. T. C. (See under Brandt, J. F.)
 Raulin, V., 263
 Raven, H. C., 37, 38, 170-172, 552
 Reade, W. W., 725

- readei, *Bibos gaurus*, 517
 Bos gaurus, 517
 Reese, L., 91, 92
 Rehn, J. A. G., 172
 Reid, A. R., 41
 Reid, C. A. M., 67
 Reid, J., 52
 Reindeer, 14
 Eurasian, 483
 Finland, 14, 476
 Lapland, 469
 Novaya Zemlya, 14, 475
 Sakhalin, 474
 Scandinavian, 469
 Spitsbergen, 479
 Reithronycteris aphylla, 19
 Renne (Fr.), 469
 Renshaw, G., 700
 Rentier (Ger.), 469
 reticulata, *Giraffa camelopardalis*, 493
 rex, *Acinonyx*, 274, 276, 286
 Canis lupus, 214
 reyi, *Felis*, 14, 264
 Reymond, M., 327
 Rhinoceros, 375
 bicornis, 396
 bicornis somaliensis, 397
 lasiotis, 393
 simus, 402
 simus cottoni, 407
 sondaicus, 11, 13, 379, 381, 390, 393,
 395, 396
 sumatrensis, 383-385, 387-390, 394,
 396
 unicornis, 375, 381, 384
 Rhinoceros, Black or Hook-lipped, 8,
 396
 Burchell's, 402
 Chittagong, 393
 Great Indian, 375
 Great One-horned, 375
 Hairy-eared Sumatran, 393
 Javan, 11, 13, 381
 Malaccan, 393
 Nile White, 407
 Northern White, 16, 407
 Smaller One-horned, 381
 Somali Black, 397
 Southern White, 16, 402
 Square-lipped, 402
 Square-mouthed, 402
 Sumatran, 11, 390
 Rhinocéros blanc du Soudan (Fr.),
 407
 Rhinocéros blanc du Sud (Fr.), 402
 Rhinocéros de la Sonde (Fr.), 381
 Rhinocéros de Sumatra (Fr.), 390
 Rhinocéros unicorne (Fr.), 375
 Rhinoceroses, 12, 13, 375
 Rhinocerotidae, 375
 Richmond, R. D., 514, 540
 Ridgeway, W., 326, 337, 338, 339, 357,
 364, 368, 369, 371
 Ridley, H. N., 311, 373, 386, 391, 521,
 526, 639
 Riebeck, — van, 318, 397
 Riesenschuppentier (Ger.), 181
 Ringtail, Western, 63
 Ritchie, A. T. A., 496, 658
 Roan, Angolan, 704
 East African, 704
 Gambian, 704
 Nile, 704
 Shari, 704
 Roberts, A., 186, 251, 277, 298, 502,
 505, 655, 661, 671-673, 702, 724
 Robinson, H. C., 639
 Robinson, H. C., and Kloss, C. B., 246,
 635
 robinsoni, *Capricornis sumatraensis*,
 638, 639
 Roborovsky, V. I., 592, 594
 Roche, —, 304, 311, 442, 519, 527, 546
 Rockhill, W. W., 529
 Rock-wallaby, Bar-tailed, 104
 Brush-tailed, 102
 Yellow-footed, 104
 Rode, P. (See under Didier, R.)
 Rodent, giant Puerto Rican, 18
 Rodentia, 190
 Rodents, 190
 agoutilike, 18
 hamsterlike, 21, 200
 rodoni, *Capricornis sumatraensis*, 641
 Roosevelt, K., 302, 409
 (See also under Roosevelt, T., Jr.)
 Roosevelt, T., 305
 Roosevelt, T., and Heller, E., 279, 280,
 403, 408, 409, 491-493, 495, 658, 727
 Roosevelt, T., Jr., 549
 Roosevelt, T., Jr., and Roosevelt, K.,
 432, 455, 586, 591
 roosevelti, *Hippotragus niger*, 707
 Ozanna, 707
 Rosenhauer, W. G., 612
 Rosevear, D. R., 183
 Ross, D., 275, 399, 555, 706
 Rothschild, M. de, and Neuville, H.,
 666
 Rothschild, W., 154, 251, 604, 605, 729,
 730
 rothschildi, *Giraffa camelopardalis*,
 491, 495
 ruber, Lemur, 142, 143
 rubidus, *Capricornis sumatraensis*, 641
 rubriventer, Lemur, 142
 Rucervus eldii eldii, 439
 eldii hainanus, 443
 eldii platyceros, 441
 schomburgki, 12, 20, 436
 thamin, 439
 thamin brucei, 439

- Rüppell, E., 212, 281, 485, 487, 625
 rufescens, *Aepyprymnus*, 84
 Bettongia, 84
 Lepidolemur mustelinus, 145
ruficaudatus, *Lepilemur*, 144, 145
ruficollis, *Gazella dama*, 690
 Macropus, 121
rufifrons, *Lemur*, 138
rufina, *Gazella*, 15, 20, 685
rufipes, *Prosimia*, 142
rufiventer, *Lemur*, 142
rufogrisea, *Wallabia rufogrisea*, 116
rufum, *Stenoderma*, 19
rufus, *Lemur*, 128
 Lemur fulvus, 137-139
 Lemur macaco, 135, 138
 Microcebus, 123
 Myrmecobius, 45, 47
 Myrmecobius fasciatus, 44, 45
Rusa unicolor dejeani, 465
 Russell, T. W., 602, 603, 619, 620, 647,
 692, 715, 716
 Russo, Dr., 644
 Ruxton, A. E., and Schwarz, E., 642-
 644, 647, 648
 Rytchkof [Rytshkov; Rytshkov], P.,
 198, 331, 357
- Sabaneeff, L. P., 260
 "Sabi" (J. S. Hamilton), 719
 Sable, *Bargus*, 236
 Japanese, 237
 Kamchatka, 236
 Russian, 235
 Sakhalin, 236
 Sayan, 236
 Tobolsk, 236
 Yenisei, 236
 Sable Antelope, *Angolan*, 707
 East African, 707
 Giant, 707
 Northern Rhodesian, 705
 South African, 707
 Sables, *Siberian*, 12
sachalinensis, *Moschus moschiferus*,
 430
sagitta, *Macrotis lagotis*, 51, 55
 Thalacomys, 55
sahalinensis, *Martes zibellina*, 235, 236,
 239
sahariensis, *Ammotragus lervia*, 604
 Ovis lervia, 604
Saiga, 12, 677
Saiga tatarica, 677
Saing, *Burmese*, 527
 St. John, O., 230, 284, 293, 307, 361,
 563, 565, 566
 St. Leger, J., 663, 665, 666, 667
saiensis, *Ovis*, 581, 582
 Ovis ammon, 581
sajanensis, *Martes zibellina*, 236, 238
- Salensky*, W., 323-325, 327
Salesski, P., 428, 453, 484, 578, 680
Salim Ali, 284
saltatrix, *Antilope*, 668
saltatrixoides, *Antilope*, 672
 Oreotragus oreotragus, 672
samati, *Cheirogaleus medius*, 126
 Chirogalus, 126
Sambesi-Giraffe (Ger.), 498
Sanderson, —, 502
Sanderson, I. T., 171
Sandwith, H., 159
Sanford, G., and LeGendre, S., 721
sanfordi, *Lemur fulvus*, 134
 Lemur macaco, 134
Sanger, E. B., 102
Sangnai (Manipuri), 439
Sapi Utan (Malayan), 525
Sarasin, P., and F., 551, 553, 554
Sarcophilus harrisii, 38
sarda, *Felis*, 14, 258, 264
 Felis libyca, 264
satanas, *Colobus polykomos*, 161
Satunin, K. A., 199, 227, 286, 306, 561,
 679
satyrus, *Simia*, 164
Saunders, C. R., 717
sauveli, *Bos* (*Bibos*), 510
 Novibos, 510
Savage, T. S., and Wyman, J., 168
Savory, B. W., 179
Scalon, N. N., 484
Schäfer, E., 433, 461, 464-467
scharicus, *Egocerus equinus*, 704
 Hippotragus equinus, 704
Schenk, J., 194, 225, 234, 259, 267, 575
schillingsi, *Giraffa*, 495
 Oreotragus, 671
 Oreotragus oreotragus, 671
Schimper, W. P., 612
Schinz, H. R., 607, 615, 616, 617
Schlegel, H., 134, 139, 142, 143, 152
Schlegel, H., and Pollen, F. P. L., 125,
 129, 131, 134, 139, 145, 254, 255
schlegeli, *Hapalemur*, 131
Schlesinger, G., 223, 224, 234, 259, 267,
 576, 617
Schmarda, L. K., 199
Schmitz, E., 229
schmitzi, *Ursus*, 229
 Ursus syriacus, 230
Schneider, G., 635
Schomburgk, H., 420
schomburgki, *Rucervus*, 12, 20, 436
Schouteden, H., 172, 183, 412, 491, 508,
 666
Schreber, J. C. D. von, 249, 333, 483
Schrenck, L. von, 199, 214, 244, 271,
 300, 429-431, 447, 474, 484
Schubotz, H., 183

- Schulman, H., 478
 Schulz and Hammer, 403
 Schuppentier, dreizachige (Ger.), 186
 Schuppentier, langschwanzige (Ger.), 189
 Schwarz, E., 124-127, 129-145, 147-149, 151, 153, 154, 156-158, 161, 188, 248, 249, 309, 310, 335, 338, 364, 366, 486, 487, 489, 730
 (See also under Ruxton, A. E.)
 Schweinfurth, G., 619, 727, 728
 schweinfurthii, *Pan troglodytes*, 177, 179
 Troglodytes, 177
 Sciurus madagascariensis, 158
 Selater, P. L., 339, 394, 435, 508, 617, 658, 724, 726
 Selater, P. L., and Thomas, O., 643, 646, 647, 649, 650, 653, 660, 663, 664, 668, 669, 672, 674, 676, 678, 679, 683, 686, 687, 699, 706, 712, 717, 725, 726
 Selater, W. L., 184, 248, 250, 252, 253, 271, 276, 298, 316, 318, 334, 337, 342, 397, 398, 403, 404, 417, 501-503, 555, 654, 660, 661, 668, 669, 701, 702, 723
 sclateri, *Cephalophus*, 663
 Scott, H. H. (See under Lord, C. E.)
 scrofa, *Sus*, 14
 Sea-cow, Steller's, 18, 21
 Seladang (Malayan), 521
 selbornei, *Alcelaphus caama*, 648, 649, 650, 653
 Bubalis caama, 650
 Selenarctos, 228
 Selous, F. C., 341, 347, 349, 404-406, 418, 484, 499, 502, 504, 505, 650, 651, 653, 656, 658, 660, 670, 702, 705, 717, 720, 723, 724
 selousi, *Taurotragus oryx*, 724
 selousii, *Equus burchellii*, 341
 Semenoff, M. W. P., 456, 589
 Semnocebus avahi, 156
 senegalensis, *Leo leo*, 289
 Trichechus, 16
 septentrionalis, *Felis (Tigris) tigris*, 306
 Proteles cristatus, 251
 Serebrennikov, M. K., 571
 sericeus, *Propithecus*, 147
 Propithecus diadema, 146
 Serow, Japanese, 641
 Malayan, 638
 Sumatran, 11, 635
 Tonkin, 640
 White-maned, 637
 Serows, Asiatic, 641
 serus, *Parocnus*, 18
 Seton, E. T., 269
 setoni, *Rangifer tarandus*, 474
 Seurat, L. G., 605, 645
 Severnyi Olenj (Russ.), 469
 Severtzoff [Severtzov], N., 286, 299, 308, 358, 451, 452, 454-456, 531, 583, 585, 587, 589, 599, 680
 severtzovi, *Ovis*, 587
 Ovis ammon, 587
 Shapu, 567
 Sharland, M. S. R., 42
 Sharpe, A., 719
 Shaw, G. A., 124, 125, 127, 130, 133, 160
 Shaw, T., 231
 Shaw, W. B. K., 688, 715
 Shebbeare, E. O., 376, 379
 Sheep, 21, 510
 Anatolian Red, 559
 Anatolian Wild, 371, 559
 Armenian Red, 561
 Asiatic Wild, 13
 Barbary, 600
 Cyprian Red, 558
 Cyprian Wild, 558
 Elburz Red, 565
 Erzerum, 562
 Ispahan, 563
 Karatau, 586
 Laristan, 564
 Marco Polo's, 590
 Old World Wild, 557
 Severtzov's, 587
 Urmian Red, 563
 Shelford, R. W. C., 391, 528, 547
 shinanensis, *Sorex*, 642
 Shitkov, B. M., 463
 Shoemaker, H. W., 225, 259, 267, 616
 Shortridge, G. C., 25, 27, 28, 31, 35, 44, 50, 52, 60, 61, 63, 64, 79, 84, 87-89, 95, 96, 97, 101, 111, 112, 184, 185, 248, 251-253, 275, 277, 298, 318, 319, 322, 342, 345, 397, 403, 405, 415, 418, 499, 500, 502, 503, 648, 649, 651, 653, 657, 659, 661, 662, 669, 670, 671, 697, 702, 703, 707, 723
 Shrew, Christmas Island, 8, 20, 122
 Shrews, 21, 122
 siamensis, *Cervus eldi*, 441
 sibiricus, *Moschus*, 427
 Rangifer tarandus, 475, 483
 Sibree, J., 124, 255
 sibreei, Chirogale, 128
 Sidenreng, Prince of, 551
 Siebold, P. F. von, 215
 Siedlecki, M., 197, 226, 234, 243, 260, 268
 Sifaka, Black, 149
 Coquerel's, 150
 Crowned, 151
 Diademed, 17, 146
 Decken's, 152
 Major's, 17, 153

- Sifaka, Milne-Edwards's, 148
 Perrier's, 154
 Silky, 147
 Verreaux's, 149
 Sifakas, 146
 sifanicus, Moschus, 431
 Moschus moschiferus, 431
 Sika, Manchurian, 445
 North China, 444
 Shansi, 443
 South China, 446
 sika, Cervus, 445
 Sikaillus grassianus, 443
 silvaticus, Equus gmelini, 332
 Silvela, M., 611
 silvestris, Equus, 333
 Felis, 264, 265
 Felis (Catus), 256
 Felis silvestris, 14, 256, 261, 262, 264
 silvicola, Rangifer tarandus, 476
 Simenia simensis simensis, 212
 simensis, Canis, 212
 Simenia simensis, 212
 Simia (Cercopithecus) badius, 162
 pygmaeus, 164
 satyrus, 164
 troglodytes, 176
 simia-sciurus, Lemur, 140
 Simpson, G. G., 5
 simum, Ceratotherium simum, 16, 402
 simus, Hapalemur, 17, 130, 131
 Rhinoceros, 402
 Sinai-Steinbock (Ger.), 621
 sinaitica, Capra, 621
 Capra nubiana, 618, 621
 Sjölander, D., 580
 Skottsberg, C. J. F., 240, 241, 270, 314, 374, 430, 523, 636
 Sloth, Larger Hispaniolan Ground, 18
 Larger Puerto Rican Ground, 18
 Patagonian Giant Ground, 18
 Smaller Hispaniolan Ground, 18
 Smaller Puerto Rican Ground, 18
 Sloths, giant ground, 21
 ground, 21
 Sminthopsis, Long-tailed, 31
 Sminthopsis crassicaudata, 30
 longicaudata, 31
 longicaudatus, 31
 murina, 29, 31
 murina albipes, 30
 murina constricta, 31
 murina fuliginosa, 30
 murina murina, 29, 31
 Smirnov, N. A., 227
 Smith, A., 185, 404, 701, 722
 Smith, A. D., 202, 494
 Smith, C. H., 297, 330, 361
 Smith, G., 39, 41
 Smith, G. A., 295
 Smith, H., 543, 574
 Smith, H. M., 313
 Smith, H. W., 442
 Smith, W. L., 304, 563
 smithi, Lophiomys, 201, 202
 smithii, Cheirogaleus, 124
 Microcebus, 125
 Microcebus murinus, 124
 Smuts, J., 654
 Smutsia gigantea, 181
 temminckii, 181, 184
 Sody, H. J. V., 247
 soemmeringi, Gazella, 676
 soemmeringii, Acinonyx jubatus, 280
 Cynailurus, 280
 Sokolnikoff, —, 597
 Solenodon, Cuban, 21
 Solenodon cubanus, 21
 Solenodons, 21
 Solenodontidae, 21
 Somali-Wildesel (Ger.), 350
 somalicus, Oreotragus, 672
 Oreotragus oreotragus, 672
 somaliensis, Asinus taeniopus, 350
 Asinus asinus, 16, 346, 348, 350
 Diceros bicornis, 397
 Rhinoceros bicornis, 397
 sondaica, Panthera tigris, 309
 Tigris, 309
 sondaicus, Bibos sondaicus, 11, 523
 Bos, 523
 Felis tigris, 309
 Rhinoceros, 11, 13, 379, 381, 390, 393, 395, 396
 songarica, Cervus maral, 454
 songaricus, Cervus elaphus, 447, 454
 Sonnerat, P., 155
 Sorex shinanensis, 642
 Soricidae, 21, 122
 Sowerby, A. de C., 200, 216, 217, 228, 239, 240, 244, 270, 272, 299, 300, 302-304, 327, 354, 429, 431, 432, 444-446, 448, 449, 461, 467, 469, 484, 580, 638
 Sparrman, A., 252, 298, 336, 338, 417, 654
 Spatz, P., 349
 speirocerus, Bubalus, 544
 spelaeum, Plagiodontia, 18
 spelaeus, Leo, 291
 Spencer, B., 28, 31, 32, 56-59, 74, 80
 Spencer, B., and Kershaw, J. A., 72, 73
 spenserae, Tarsipes, 60
 spetsbergensis, Cervus tarandus, 479
 Ssu-pu-hsiang (Chinese), 467
 Stag, Barbary, 16, 457
 Sardinian, 459
 Yarkand, 13, 462
 Stambecco (Ital.), 614
 Stampfli, F. X., 667, 668

- Stanley, Capt., 667
 Stanley, H. M., 508
 Staples, F. H. M., 374
 Statham, J. C. B., 500
 Stead, D. G., 66, 69
 Stechow, E., 533, 536
 Steere, J. B., 548
 Steinbock (Ger.), 614
 Steinbock der Pyrenäen (Ger.), 606
 Steinhardt, H. D., 399
 Stenoderma rufum, 19
 Stephens, M., 611
 Stevenson-Hamilton, J., 417, 502, 651, 652, 657, 719
 Stirling, E. C., and Zietz, A., 45, 95
 Stockley, C. H., 296, 435, 438, 568, 569, 571, 593, 594, 626, 629, 631, 634
 Stoliczka, F., 589
 Stone, W., 190, 191
 Storck, G. H., 595
 storcki, Ovis, 595, 596
 Strabo, 192, 231, 330, 357
 Stracker, A. H., 401
 Strange, Mr., 107, 114, 116
 Streich, V., 95
 Strepsiceros buxtoni, 720
 Strohl, —, 282
 Stuhlmann, F. L., 508
 Styan, F. W., 435
 styani, Panthera tigris, 303, 304
 sumatrae, Panthera tigris, 310
 sumatraensis, Antelope, 635
 Capricornis, 637
 Capricornis sumatraensis, 11, 635
 sumatranus, Elephas, 314
 Elephas maximus, 11, 314
 sumatrensis, Dicerorhinus, 384
 Dicerorhinus sumatrensis, 11, 390
 Rhinoceros, 383-385, 387-390, 394, 396
 Sumpfotter (Ger.), 233
 Suni, Zanzibar, 672
 Zulu, 672
 Sus serofa, 14
 Sushkin, P. P., 240, 557, 560, 561, 563-568, 570, 572, 576, 577, 579, 581-583, 585, 587, 588, 590, 592, 595, 596, 598-600
 Sutton, C. S., 64
 Sverdrup, E., 482
 swarthi, Nesoryzomys, 21
 Swayne, H. G. C., 318, 401, 676
 swettenhami, Capricornis sumatraensis, 638
 Nemorhaedus, 638
 Swiecicki, A., 513
 Swinhoe, R., 445, 446
 swinhoi, Capricornis, 641
 sylvicultrix, Antelope, 663
 Cephalophus sylvicultrix, 663, 665, 666
 Syncerus caffer aequinoctialis, 554
 caffer caffer, 8, 16, 554
 nanus, 554
 syriacus, Ursus, 228, 230
 Ursus arctos, 218, 228
 Szalay, A. B., 512

 Tachard, G., 397
 Tait, A., 608
 taivanus, Cervus, 445
 Tamarao, 548
 tao, Antelope, 690
 Tapir, Malay, 372
 Tapiridae, 371
 Tapirantilope (Ger.), 666
 Tapirella, 371
 Tapirs, 371
 Tapirus, 371
 indicus, 372
 indicus brevietianus, 374
 roulinii, 371
 tapoatafa, Phascogale tapoatafa, 26
 Viverra, 26
 tarandus, Cervus, 469
 Rangifer, 14
 Rangifer tarandus, 469, 477-479
 Tarandus rangifer chukchensis, 483
 rangifer yakutskensis, 483
 Tarpan, Mongolian, 322
 Tarsipes spenserae, 60
 tartessia, Felis, 263
 Felis silvestris, 263
 tasmaniensis, Macropus, 120
 Macropus giganteus, 120
 Vombatus ursinus, 73
 tatarica, Capra, 677
 Saiga, 677
 Taurotragus derbianus, 726
 derbianus cameroonensis, 729, 730
 derbianus congolanus, 16, 729
 derbianus derbianus, 16, 725, 730
 derbianus gigas, 726
 oryx billingae, 725
 oryx livingstonii, 724
 oryx oryx, 722
 oryx pattersonianus, 725
 oryx selousi, 724
 Taylor, E. H., 249
 Taylor, J. H., 321
 Teichman, E., 326, 327
 Telfair, C., 254
 Temminck, C. J., 213-215, 237, 240, 248, 309
 temminckii, Manis, 184
 Smutsia, 181, 184
 Tennant, R., 574
 Tenreiro, A., 695
 termes, Proteles cristatus, 251
 testudo, Lophiomys, 204
 tetradactyla, Manis, 189

- texensis, *Ursus texensis*, 20
Thalacomys lagotis, 54
 minor miselius, 56
 nigripes, 55
 sagitta, 55
Thamin, Burmese, 439
 Siamese, 441
thamin, *Rucervus*, 439
thar, *Capricornis sumatraensis*, 641
Theal, G. McC., 417
Thesiger, W., 350, 692, 715
thétis, *Halmaturus*, 106
thetis, *Thylagale*, 106
Thom, W. S., 520
Thomas, B., 694
Thomas, O., 25, 26, 28, 32, 36, 44, 48,
 50, 56, 58, 63, 68, 78, 80, 84-86,
 97, 100, 103, 105-107, 110, 112,
 114, 119, 120, 191, 204-206, 210,
 211, 214, 548, 570, 641, 667, 672,
 675, 676, 686, 708
 (See also under Sclater, P. L.)
Thomas, O., and Wroughton, R. C.,
 248
Thomas, P., 353
thomasi, *Cephalophus*, 663
 Lophiomys, 203
 Opolemur, 126
Thompson, E., 284, 293, 366, 516
thornicrofti, *Giraffa camelopardalis*,
 497
Thorold, W. G., 465
thoroldi, *Cervus*, 464, 465
Thunberg, C. P., 298
Thylacine, 40
Thylacinus cynocephalus, 40
Thylagale billardieri, 112
 eugenii, 109
 eugenii binoë, 110
 eugenii derbiana, 110
 eugenii eugenii, 110
 flindersi, 78, 108
 parma, 10, 20, 107
 thetis, 106
Tiger, Amoy, 303
 Amur, 299
 Bali, 310
 Bengal, 304, 306
 Caspian, 305
 Chinese, 303
 of Chinese Turkestan, 304
 Indian, 304, 306
 Javan, 309
 Korean, 301
 Manchurian, 299, 304
 Mongolian, 299
 North China, 301
 Persian, 305
 Siberian, 299
 Sumatran, 310
 Tasmanian, 40
 Tiger-cat, Large Spotted-tailed, 36
 Slender Spotted-tailed, 37
 tigrinum, *Helladotherium*, 506
 tigris, *Felis*, 300, 306
 Panthera tigris, 304, 306
Tigris longipilis, 299
 sondaica, 309
tippelskirchi, *Giraffa*, 495
 Giraffa camelopardalis, 495
Toolach, 116
Toolache, 116
torrei, *Boromys*, 19
Touchette, J. I., 645
Toussoum, I., 713
toxotis, *Elephas africanus*, 316
trabata, *Felis tigris*, 306
Tragelaphus angasii, 16, 716, 720
 buxtoni, 16, 720
Tragulidae, 425
Tragulus, 425, 426
Traill, T. S., 515
Transehe, N. von, 268, 474
transvaalensis, *Rangifer tarandus*, 483
transvaalensis, *Oreotragus oreotragus*,
 670
 Proteles cristatus, 251
Tratz, —, 223-226
Trevor-Battye, A., 264
Trichechus senegalensis, 16
trichota, *Cheirogaleus*, 16, 19, 128
trichura, *Crocidura fuliginosa*, 8, 10,
 20, 122, 208
tricuspis, *Manis*, 186, 188
 Phataginus, 186, 189
tridactyla, *Didelphis*, 89
tridactylus, *Potorous tridactylus*, 89
Tristram, H. B., 229, 285, 292, 349, 350,
 367, 368, 513, 622, 647, 693, 716
trogloodytes, *Pan*, 8
 Pan troglodytes, 176
 Simia, 176
Trogloodytes gorilla, 168
 schweinfurthii, 177
Trouessart, E. L., 194, 198, 221, 241,
 262, 266, 270, 338, 533, 616
trouessarti, *Equus*, 339
Troughton, E. Le G., 10, 26, 27, 32, 37,
 38, 42, 44, 45, 48, 51-61, 63-65,
 68-70, 73-76, 78, 79, 82, 84, 86,
 89, 91, 93, 96, 98, 100, 102, 104-
 106, 108, 111, 112, 115, 119, 120,
 211
 (See also under Iredale, T.)
Tsaine, Burmese, 527
tschadensis, *Hippopotamus amphibius*,
 415
 tuberculata, *Mystacina*, 731
 tuberculatus, *Vespertilio*, 731
 tularensis, *Ursus*, 20
Tunney, J. T., 102
Turner, D. P., 677

- Tweedie, J. L. F., 728
 Tweedie, M. W. F., 208
typica, *Ovis ammon*, 576
typicus, *Cheirogaleus*, 127
 Equus hemionus, 355
 Macromerus, 146
- Uchida, S., 216, 240, 642
 Udad, 600
uellensis, *Gorilla*, 174
 Ulmer, F. A., Jr., 247, 375, 391
 Ungulates, even-toed, 414
 odd-toed, 322
unicornis, *Rhinoceros*, 375, 381, 384
 Ur (Ger.), 511
 Urbain, A., 510, 511
 Urial, Afghan, 569
 Astor, 567
 Bokharan, 571
 Ladak, 567
 Panja, 571
 Punjab, 568
 Transcaspian, 572
urmiana, *Ovis gmelinii*, 563
 Ovis ophion, 563
Uromanis longicaudatus, 189
 Ursidae, 21, 217
ursina, *Didelphis*, 38, 72
ursinus, *Vombatus ursinus*, 72
Ursinus harrisii, 38
Ursus apache, 21
 arctos, 14, 217, 229
 arctos arctos, 218
 arctos beringianus, 218, 228
 arctos caucasicus, 217
 arctos collaris, 217, 218
 arctos isabellinus, 218
 arctos lasiotus, 218, 228
 arctos meridionalis, 218
 arctos pruinus, 218
 arctos pyrenaicus, 217, 218, 221
 arctos syriacus, 218, 228
 arctos yesoensis, 228
 californicus, 19
 colosus, 19
 crowtheri, 15, 19, 230
 faidherbianus, 231
 henshawi, 21
 horriaeus, 19
 horribilis horribilis, 19
 kennerleyi, 19
 klamathensis, 20
 lasiotus, 228
 magister, 20
 mendocinensis, 19
 perturbans, 20
 pervagor, 20
 rogersi bisonophagus, 20
 schmitzi, 229
 syriacus, 228, 230
- Ursus syriacus schmitzi*, 230
 texensis navaho, 19
 texensis texensis, 20
 tularensis, 20
ussuriensis, *Nyctereutes procyonoides*, 217
- Valenciennes*, A., 574
valentinae, *Rangifer tarandus*, 483
vallesius, *Rattus culmorum*, 206
 van Dam, D. C., 158
 Van den Brink, F. H., 258
 Van der Byl, A., 654
 Van der Byl, P. B., 530, 537, 567
 Van Dyck, W., 229
varenavi, *Ovis vignei*, 572
 Vari, 142
 Varian, H. F., 665, 707-711
variani, *Hippotragus*, 16, 707
 Hippotragus niger, 707
variegatus, *Indris*, 155
 Lemur, 142
 Lemur macaco, 142
varius, Lemur, 142
 Vaughan-Kirby, F., 406. (See also Kirby, F. V.)
velox, *Acinonyx jubatus*, 278, 279
venatica, *Felis*, 283
venaticus, *Acinonyx jubatus*, 12, 283
 Verhulst, —, 666
 Vernay, A. S., 294-296, 378, 384, 396, 438, 711
verreauxi, *Propithecus*, 147, 149, 154
 Propithecus verreauxi, 149
verus, *Pan satyrus*, 177
 Pan troglodytes, 177
Vespertilio tuberculatus, 731
Vetulani, T., 331, 332
vetus, *Phyllops*, 18
 Vickers, C., 434
victor, *Phascalartos cinereus*, 64, 65, 70
victoriae, *Capra pyrenaica*, 608, 610, 612
victus, *Oryzomys*, 19
 Vicugna, 421
 Vielfrass (Ger.), 241
 Vigne, G. T., 567
vignei, *Ovis*, 564, 567, 590
 Ovis vignei, 567, 568, 571
 Villa, E. M. de, 385
Villaviciosa de Asturias, Marquis de, 221
 Vinson, A., 155
virgata, *Felis*, 305
 Panthera tigris, 305
 Virgil, 231
 Vison (Fr.), 233
vistulanus, *Castor fiber*, 191, 198
 Vitry, P., 311, 385, 442, 511, 520, 527, 546, 640

- Vittoz, R., 511
 Viverra binturong, 244
 cristata, 250
 fossa, 249
 maculata, 36
 tapoatafa, 26
 Viverridae, 244
 viverrina, *Didelphis*, 32
 viverrinus, *Canis*, 215
 Dasyurus, 32, 34
 Nyctereutes procyonoides, 215
 vivverinus [sic], *Dasyurus*, 210
 Vizios, Capt., 458
 Voeltzkow, A., 158
 Vombatidae, 72
Vombatus hirsutus hirsutus, 73
 hirsutus niger, 73
 ursinus tasmaniensis, 73
 ursinus ursinus, 72
 voratus, *Brotomys*, 18
Vulpes macrotis macrotis, 20
- wachei, *Cervus*, 451
 Wadsworth, J., 220, 471
 Wagner, J. A., 338
 Wagner, M., 49, 231, 273
 Wählberg, D., 471
 Waite, E. R., and Jones, F. W., 34, 75, 81
 Waldbock (Ger.), 663
 Wali, 623
 walie, *Capra*, 16, 623
Wallabia elegans, 114
 greyi, 10, 20, 116
 irma, 119
 rufogrisea rufogrisea, 116
 Wallabies, 77
 Wallaby, Banded, 96
 Black-gloved, 119
 Bridled Nail-tailed, 98
 Crescent Nail-tailed, 100
 Flinders Island, 108
 Dama, 109
 Gray-face, 114
 Grey's, 116
 Pademelon, 106
 Parma, 10, 20, 107
 Parry's, 114
 Pretty-face, 114
 Rufous-bellied, 112
 Scrub, 109
 Tasmanian, 112
 Toolach, 10, 20
 Western Brush, 119
 Whiptail, 114
 White-throated, 107
 Wallace, A. R., 10, 165
 Wallace, H. F., 446, 450, 452, 454
 Walter, A., 358
 (See also under Radde, G.)
- Wapiti, 12
 Ala-shan, 449
 Altai, 451
 Arizona, 21
 Bactrian, 463
 Eastern, 19
 Kansu, 450
 Manchurian, 447
 Tian Shan, 454
 Ward, R., 317, 382, 397, 408, 436, 439, 441, 447, 451, 462, 463, 465, 467, 499, 514, 517, 523, 528, 545, 547, 548, 555, 560, 566-568, 570, 572, 585, 589, 593, 618, 625, 626, 632, 633, 637, 643, 653, 656-658, 660, 663, 666, 668, 674, 675, 678, 683, 687, 691, 696, 701, 705, 711, 717, 720, 725, 729, 730
 wardi, *Cervus canadensis*, 460, 461
 Giraffa camelopardalis, 501
 Warren, E., 252, 649
 Waterhouse, G. R., 29, 30, 36, 44, 59, 80, 82-84, 90, 97, 106, 107, 116
 Watson, W. C. H., 432. (See also Haines-Watson, W. C.)
 Watters, Mr., 288
 Weasels, 21, 232
 Weber, M., 550, 551
 Weigold, H., 303
 Weisslippenhirsch (Ger.), 464
 Welwitsch, F., 709
 Werth, E., 348, 349, 353
 West, Prof., 229
 Wetmore, A., 7
 Wettstein, O., 225, 259
 Whetham, P. W., 659
 "Whistler," 94
 Whitaker, J. S., 685, 688, 712
 white, *Hypsiprymnus*, 78
 White, J. J., 492
 Whitehead, J., 548
 whitei, *Arctitis binturong*, 249
 Arctitis [sic], 249
 Wildcat, British, 260
 Corsican, 264
 Cretan, 263
 European, 14, 256
 Peloponnesian, 262
 Sardinian, 264
 Spanish, 263
 Wildcats, insular (Cretan, Sardinian, Corsican, British), 14
 Wildebeest, zwart (Cape Dutch), 659
 Wildepaard (Boer), 341
 Wildesel, indischer (Ger.), 363
 nubischer (Ger.), 345
 Wildkatze (Ger.), 256
 Wilhelm, J. H., 403, 499
 Wilkins, G. H., 76
 Willshire, W., 690
 Wilson, A. G., 62

- Wilson, E. H., 271, 303, 432, 461, 465, 594
 Wilson, G. F., 559
 Winge, H., 196, 223, 258, 267
 Wisent (Ger.), 531
 kaukasischer (Ger.), 536
 Witrenoster (Boer), 402
 Wolf, Abyssinian, 212
 Abyssinian Red, 212
 Arctic, 19
 European, 14
 Florida, 20
 Japanese, 12, 20, 213
 Newfoundland, 20
 Tasmanian, 40
 Yezo, 214
 Wolf, J., 271
 Wollibaek, A., 476, 479, 481, 482
 Wolverine, 241
 Wolves, 21, 211
 Wombat, Central Queensland Hairy-nosed, 76
 Flinders Island, 72
 Hairy-nosed, 74
 Island, 72
 Southern Queensland Hairy-nosed, 75
 Wombats, 72
 Wood, R. C., 278, 399, 706, 719
 Worcester, D. C., 548
 Wrangel, C. G., 324, 325
 wrangeli, *Lynx lynx*, 270
 Wroughton, R. C. (See under Thomas, O.)
 wurmbi, *Pongo*, 164
 Wylde, A. B., 251, 619
 Wyman, J. (See under Savage, T. S.)

xanthomystax, *Prosimia*, 137
xanthopus, *Petrogale*, 104-106
 Petrogale xanthopus, 104
xanthopygus, *Cervus*, 447
 Cervus elaphus, 447
xanthourus, *Rattus*, 206

Xenophon, 369, 537
Xerxes, 291, 364

 Yak, Domestic, 531
 Wild, 528
yakutskensis, *Tarandus rangifer*, 483
yarkandensis, *Cervus*, 13, 462
 Cervus cashmirianus, 462, 463
yeniseensis, *Martes zibellina*, 236, 238
 Yerkes, R. M., 181
 Yerkes, R. M., and Yerkes, A. W., 165, 172, 176-178
yesoensis, *Ursus arctos*, 228
 Younghusband, F. E., 324, 355, 423
youngi, *Rattus culmorum*, 206
 Yule, A. F., 275, 422

zamicrus, *Nesophontes*, 18
 Zammarrano, V. T., 251, 280, 282, 348, 603, 604, 688
 Zappey, W. R., 431, 594
 Zarudny, N. A., 286
zebra, Burchell's, 8, 15, 20, 339
 Hartmann's Mountain, 341
 Mountain, 8, 15, 341
zebra, *Equus*, 8, 341, 342
 Equus zebra, 341
 Hippotigris zebra, 15
Zebras, 21, 322
zibellina, *Martes*, 235
 Martes zibellina, 236, 238
Zibethyäne (Ger.), 250
 Zietz, A. (See under Stirling, E. C.)
 Zobel (Ger.), 235
 Zondag, J. L. P., 393
 Zubkov, A. I., 476
 Zubr (Russian), 531, 536
 Zukowsky, L., 185, 403
zukowskyi, *Loxodonta africana*, 316
zuluensis, *Nesotragus livingstonianus*, 672
Zwart-wit-pens (Boer), 705
Zyzomys, 205
 argurus argurus, 10, 20, 211
 argurus indutus, 211

FORESTA INSTITUTE
FOR
OCEAN



MOUNTAIN
STUDIES

6205 FRANKTOWN ROAD
CARSON CITY, NEVADA 89701

