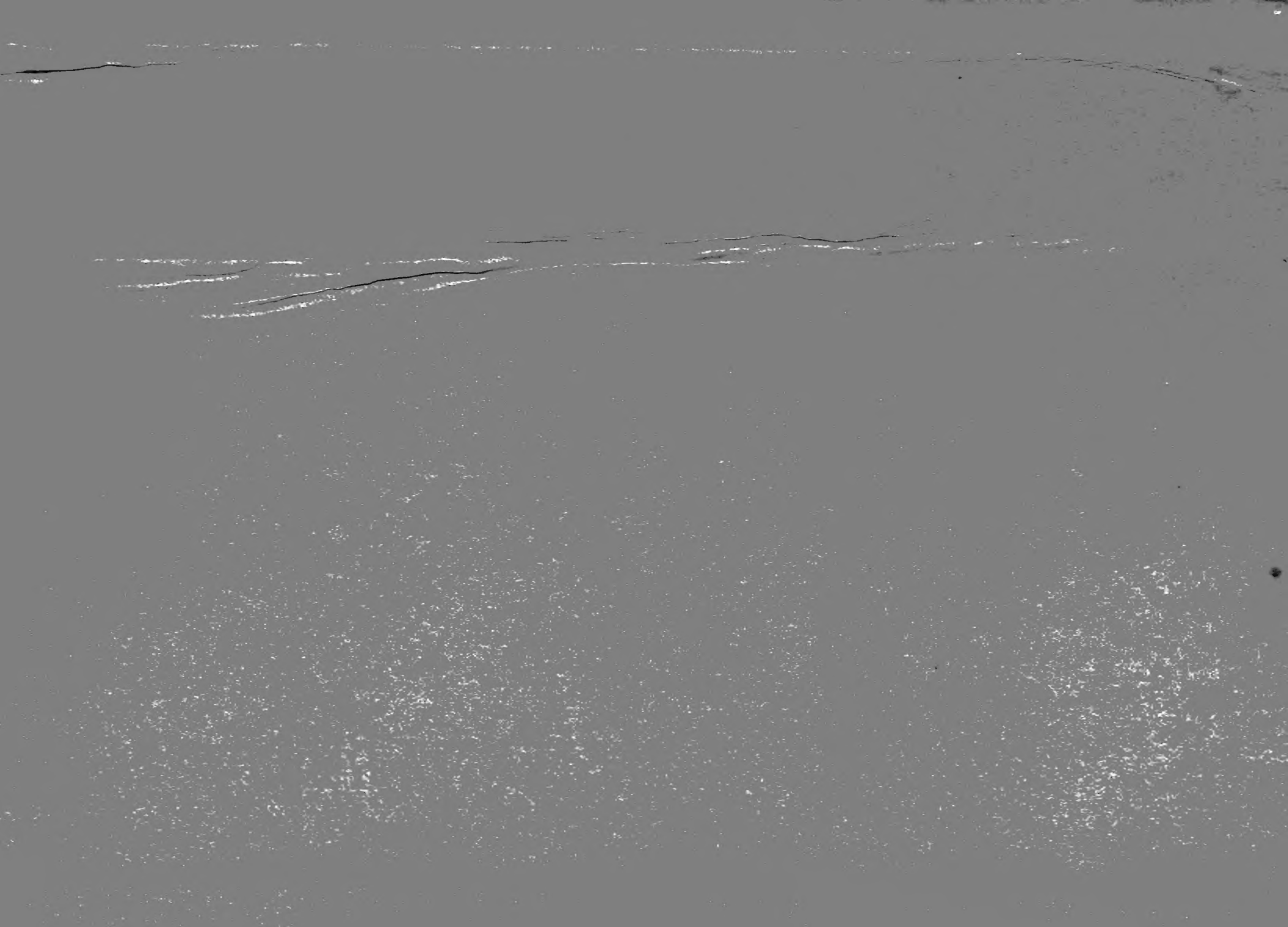


THE
GREAT AND SMALL GAME OF EUROPE WESTERN AND NORTHERN ASIA AND AMERICA

THIS EDITION CONSISTS OF TWO HUNDRED AND FIFTY COPIES, NUMBERED AND SIGNED,
OF WHICH THIS IS

No. 196

Rowland Ward

THE GREAT AND SMALL GAME OF EUROPE WESTERN & NORTHERN ASIA AND AMERICA

THEIR DISTRIBUTION, HABITS, AND STRUCTURE

BY

R. LYDEKKER

LONDON

ROWLAND WARD, LIMITED

"THE JUNGLE," 166 PICCADILLY

1901

PREFACE

The present issue completes the series of five volumes of which *Deer of All Lands; Wild Oxen, Sheep, and Goats of All Lands; Great and Small Game of Africa;* and *Great and Small Game of India, Burma, and Tibet*, have previously appeared. The two first of these are descriptions of particular groups of Ruminant Game Animals, and are thus of the same nature as the *Book of Antelopes* by Messrs. Sclater and Thomas. The other two, together with the present volume, describe the Game Mammals of particular countries, and include practically all the species likely to be encountered by Sportsmen, with the exception of a few found on the islands of the Eastern Archipelago, Siam, and Annam.

The treatment of the subject is somewhat different in the three volumes dealing with Game Animals from the point of view of Geographical Distribution, from that adopted in the two devoted to their Systematic Relationships. Moreover, certain revisions in regard to specific determinations rendered necessary by the increase in our knowledge of the subject,

together with notices of races recognised subsequently to the publication of the two earlier volumes, will be found in the two last of the series.

The whole five volumes afford to the Sportsman all the information he requires with regard to the GAME MAMMALS OF THE WORLD.

The author is again indebted to several kind friends for permission to reproduce many of the photographs of animals with which the present volume is illustrated. Foremost among them is the Duchess of Bedford, who has contributed many interesting photographs. Thanks are also due in this respect to Prince Henry of Liechtenstein for permission to reproduce photographs of Caspian red deer antlers ; to Viscount Powerscourt for those of abnormal red deer antlers ; and to Dr. von Lorenz-Liburnau and the Director of the Museum of Bosnia-Herzegovina for those of the heads of wild goats from the Ægean Archipelago. To Captain J. H. Elwes and the Council of the Linnæan Society of London the author is indebted for the figures of Asiatic wapiti antlers from the *Journal* of that Society ; as he is to the New York Zoological Society for the photograph of a group of American wapiti. Messrs. Phelps and Church have kindly afforded the opportunity of figuring some of the magnificent heads of Asiatic wapiti obtained during their recent expedition ; while Mr. F. C. Selous has permitted a magnificent reindeer head killed

by himself in Newfoundland during the past season to be added to the series of photogravures. Thanks are also due to Mr. J. Turner-Turner for the loan of photographs of abnormal heads of American deer.

Since the text was in type a number of colts of Przewalski's horse have been added to the collection at Woburn Abbey. All but one show a distinct white muzzle—a feature inconspicuous in the older specimen figured in the sequel; they all have the front surface of the legs, from the knees and hocks downwards, black; and they neigh very like a horse. They indicate that *Equus przewalskii* is a distinct species, more nearly related to the horse than to the kiang. It may be added that the tarpan is now said to be extinct, having been exterminated during the sixties.

It may be noted that in a recent issue of *Globus* (vol. lxxx. p. 188) Dr. Nehring arrives at practically the same conclusion with regard to the relationship of the Bactrian camel to the extinct Russian and Siberian species as is advanced in the sequel.

Harpenden Lodge, Herts,
November 1901.

CONTENTS AND SYSTEMATIC SYNOPSIS OF THE GAME ANIMALS OF EUROPE, WESTERN AND NORTHERN ASIA, AND AMERICA

SECTION II.—OLD WORLD TYPES

SECTION III.—AMERICAN TYPES

[1] In the text, by error, *F. dominacorum*.

LIST OF PLATES

TEXT FIGURES

[1] Incorrectly lettered Nova Scotian in text.

THE

GREAT AND SMALL GAME OF EUROPE, WESTERN AND NORTHERN ASIA, AND AMERICA

INTRODUCTION

The area of which the game animals are described in this volume comprises the whole of Europe, together with such portion of Asia north of the Himalaya as does not come within the purview of the *Great and Small Game of India, Tibet, and Burma*, and both North and South America.

The faunas of Northern Europe and Asia on the one hand, and of the more boreal portion of North America on the other hand, are so closely related to one another that there is every reason for treating of them in the same work. And in order to emphasise the closeness of this relationship between the mammals of the northern districts of the eastern and western hemispheres, and at the same time to avoid needless repetition, it has been considered advisable to treat collectively in the first section of the work of those species which, in the author's opinion, are common to the Old and the New World. Doubtless some objections may be raised against this mode of treatment. A case in point is, indeed, afforded by the extinction of the musk-ox (which is properly a circumpolar animal) in the eastern hemisphere, thus excluding this species from the first section of the work,

which is really its proper place. On the whole, however, the advantages of the plan adopted outweigh, in the author's opinion, the disadvantages. In the eastern hemisphere, as we pass from northern latitudes to the neighbourhood of the Mediterranean in Europe and the confines of Kashmir in Asia, the fauna, as might have been expected, departs more and more from the boreal type and tends to become more differentiated. That is to say, the circumpolar species tend to disappear and to be replaced by types peculiar to this hemisphere. And, as a matter of fact, this Mediterranean fauna is very closely related to that of North Africa, with which indeed it is now generally grouped by the students of the geographical distribution of animals.

The object of the present series of volumes is not, however, to treat of that branch of zoology, but to afford the sportsman information with regard to the game animals of particular continents. Consequently the animals of North Africa were described in the volume devoted to the game fauna of the African continent, while those inhabiting the opposite shore of the Mediterranean find a place in the present work.

A very similar change in the character of the fauna occurs in North America; and when the Sonoran district of Mexico is reached the same disappearance of the circumpolar forms accompanied by the appearance of types more or less peculiar to this tract is noticeable. The Sonoran region is, in fact, so far as its fauna is concerned, analogous to the Mediterranean region of the Old World. And it is not a little remarkable that what may be called representative types occur in the two areas; the southern lynx of the Mediterranean tract representing, for instance, the red lynx of the Sonoran area. To the latter area belongs, apparently, the prongbuck, although its range now extends much more to the north. And in the Old World a nearly parallel case is that of the fallow-deer, which, although typically a Mediterranean species, has now a considerable range in the more northern portions of Europe.

The Persian fallow-deer is, however, solely an inhabitant of the Mediterranean tract. Prongbuck in the western hemisphere may consequently be regarded, so far as distribution is concerned, as representing the fallow-deer of the eastern hemisphere.

When South America is reached we come to a fauna differing *in toto* from that of the northern half of the New World ; differing, in fact, more from the faunas of all the rest of the world, save Australia, than do the latter from one another. This great distinction between the fauna of South America and that of the rest of the world might, *prima facie*, be regarded as affording greater reason for devoting a special volume of this series to that country than for assigning one to Africa. But, apart from the vast numerical superiority of the African game fauna over that of South America (which is itself a sufficient justification for the course taken), there is one very strong reason for treating of the game animals of the latter country in connection with those of North America.

The real peculiarity of the fauna of South America is to be found in the presence there of such creatures as sloths, ant-eaters, armadillos, monkeys, marmosets, and a host of extinct animals, some of which were allied to the foregoing, while others were altogether peculiar. But the sportsman has nothing to do with any of these. The animals of South America by which he is alone attracted are the deer, guanaco, peccaries, tapirs, jaguars, pumas, bears, etc. And, as a matter of fact, all these animals are of a northern type, being more or less closely allied to the living fauna of North America or its forerunner, and having nothing whatever to do with the original South American indigenous fauna. For a long period South America appears to have been isolated from the northern half of the New World, and it was not till the two were completely united by the isthmus of Panama that these northern types were enabled to travel southwards.

When they reached South America most of the animals became more

or less differentiated from their North American representatives, or the latter, as in the case of the guanaco and the tapirs, died out. Nevertheless, they are essentially northern types, and as such may claim treatment next to their nearest allies, that is to say, the animals of North America—either living or extinct.

As is noticed in the sequel, some little difficulty has been experienced as to where to draw the line in regard to the animals to be included under the title of "small game." Strictly speaking, hares should be included, as is done in the *Great and Small Game of India, etc.*, where marmots are likewise mentioned. But the number of species of hares inhabiting Europe, Asia, and North America is very large indeed ; and if these were included it would be practically impossible to refuse a place for beavers, coypus, carpinchos, maras, and several other larger rodents. The space required to treat, even very briefly, of such a large number of species would be very considerable, and would make the work of greater bulk than is desirable. Consequently, it has been decided, as in the case of the *Great and Small Game of Africa*, to omit all reference to the rodent mammals.

SECTION I

TYPES COMMON TO BOTH HEMISPHERES

THE ROCKY MOUNTAIN BIGHORN SHEEP

(*Ovis canadensis*)

(Plate I. Fig. 1)

None of the species of wild sheep have anything like a circumpolar distribution, but the nearest approximation to such a wide range is made by the so-called "bighorn," of which the typical locality is the Rocky Mountains of America. Bighorns, whether (as here) regarded as local races of one variable form or as distinct species, are all very closely related indeed, and evidently modifications of one and the same type of animal. And as one modification of this type is met with in Kamchatka and the neighbouring districts of North-Eastern Asia, they are clearly entitled to occupy a place in the present section.

For the character by which the wild sheep are distinguished from their near relatives the wild goats, and likewise from other ruminants, the reader may be referred to another volume of the present series.[1] It may, however, be mentioned that since the publication of that volume it has been shown by Mr. G. Wherry[2] that the majority of the sheep may be distinguished from the goats by the circumstance that the right horn forms

[1] *Wild Oxen, Sheep, and Goats of All Lands.*

[2] *Nature*, vol. lxiii. p. 252 (1901).

a right spiral and the left horn a left spiral; the reverse of this arrangement attaining in nearly all the goats.

As the bighorns and their habits are very fully described in the work mentioned above, only their leading characters will be alluded to in this place.

They are large sheep, standing from 3 feet 2 inches to 3 feet 6 inches in height at the shoulder, and are best characterised by the minute size of the face-glands (together with the depressions in the skull in which they are situated) and the comparative smoothness of the horns. In full-grown rams these latter are strongly angulated, but show much less distinct transverse wrinkles than those of most other wild sheep. Instead of these transverse wrinkles forming the most prominent sculpture on the surface of the horns, the fine longitudinal groovings are the most conspicuous marks. The close spiral formed by the horns may include a little more than one complete circle, and is often less. Very characteristic of bighorn horns is the prominence and sharpness of the outer front angle, and the partial rounding of the inner one.

Inclusive of all their modifications, bighorns vary in colour from pure white or pale tawny to dark greyish brown; the lighter varieties (exclusive of the pure white one) showing a dark streak along the middle line of the back, and the darker-tinted phases exhibiting a light rump-patch, divided by a dark streak connecting the brown or fawn of the upper surface of the tail with that of the back. Except in the wholly white phase, the flanks and the front surface of the limbs are darker than the back, but a considerable extent of the lower surface of the body, as well as more or less of the hinder aspect and some portion of the inner sides of the legs, are white. In all the darker phases of the species the outer surface of the thigh is coloured like the thigh.

The typical Rocky Mountain race of the bighorn is best characterised by its large size, long and narrow skull, and the massive horns of the old

rams, which form a comparatively short spiral, are not distinctly keeled in front, and are generally blunted and broken at the tips. The ears, too, are broad, pointed, and deer-like, with moderately long hair externally; there is no long mane on the nape of the neck, and the light rump-patch is very large and extends well on to the loins. The general colour of the coat is some shade of greyish brown, gradually becoming darker in the neighbourhood of the dorsal streak, the brown tint being more conspicuous in winter and spring and the grey in autumn; old rams in the short summer coat may indeed become so pale-coloured as to render the rump-

Fig. 1.—Head of Rocky Mountain Bighorn Ram. From the Selkirk Range, British Columbia.

patch scarcely distinguishable. The light area on the under-parts passes gradually into the fawn above. As a rule, the general colour is very similar to that of the mule deer. A fine old ram will stand as much as 42 inches at the withers, with a girth behind the shoulder of 49 inches, and the weight may reach as much as 300 pounds. In *Wild Oxen, Sheep, and Goats*, the maximum recorded length of the horns of *O. canadensis* is given at 45 inches; but since that was written the magnificent specimen shown in the accompanying figure has been measured. It was obtained by Mr. W. F. Sheard in the Selkirk Range, British Columbia, and measures $52\frac{1}{2}$ inches along the outer curve, and $18\frac{1}{2}$ inches in basal circumference.

The spiral forms about one-third more than a complete circle, which is probably a unique feature in the species.

It is difficult at the present day to ascertain what was the original range of this race in the old days, but it embraced the mountainous districts of Western North America, from the desert tracts of Colorado and Arizona northwards into British Columbia, where it impinges on that of the black race, even if the two do not intergrade. The most massive horns appear to be those from Wyoming and Colorado. Few animals have suffered more from the advance of civilisation than the true bighorn. Owing to the persecution to which it has been subjected, it is now for the most part confined to the higher mountain peaks (where it is year by year becoming rapidly scarcer), and is one of the shyest of all game animals. This, however, was not its original habit. As we are told by Dr. G. B. Grinnell,[1] it was once found in the open country, where it frequented the higher plains and plateaus, from which it only retreated when alarmed. Neither was it the shy and suspicious creature of our own time, being, in fact, almost as heedless of the presence of man as was the bison in the days of its abundance. Now, alas ! the bighorn has disappeared from much of the country where it was once abundant, and good heads are becoming year by year more difficult to obtain. In the Yellowstone Park, where they are protected by law, bighorn are still numerous ; and in Colorado, where protection is likewise extended to them, they are said to be increasing in numbers. There are also laws prohibiting irregular destruction of bighorn in Montana and California. South Californian bighorn belong to the next race. From the Mount Shasta district of California bighorn have completely disappeared, although their bleaching bones still bear testimony to their former abundance. "In early days," writes Dr. Merriam,[2] "and as late as the seventies, many were killed here by J. H. Sisson, of Sisson Tavern.

[1] *Outing*, vol. xxxvii. p. 254 (1900).

[2] *North American Fauna*, No. 16, p. 103 (1899).

PLATE I

1. Rocky Mountain Bighorn.
2. Kamchatkan Bighorn.
3. Alaskan Bighorn.
4. North-Western Bighorn.
5. Scandinavian Reindeer.
6. Woodland Reindeer.
7. Elk.
8. American Wapiti.

TYPES COMMON TO BOTH HEMISPHERES.

Published by Rowland Ward Ltd.

Sheep Rock, at the north-east base of the mountain, was one of their favourite and latest resorts, but probably was not used during the breeding season. In 1868 G. B. Mitchell saw a band of twenty near the head of Mud Creek Canyon. In 1883 C. H. Townsend found numbers of their bones and horns scattered about everywhere on Sheep Rock, and saw the complete skeleton of a bighorn at the foot of Mud Creek Glacier, high up on Shasta."

Since a comparatively full account of the habits of the Rocky Mountain bighorn is given in *Wild Oxen, Sheep, and Goats*, it will be unnecessary to repeat it here.

The following table, furnished by Mr. E. S. Cameron, showing the progressive annual increase in the size of the horns of this sheep in specimens obtained in the Badlands of the Missouri and the Yellowstone valleys, should be of considerable interest to sportsmen :—

Sex.	Age.	Basal Circumference.	Length over Curve.
Ram	6 or 7 months	$5\frac{1}{2}$ inches	$5\frac{1}{2}$ inches
,,	1 year	$8\frac{1}{2}$,,	9 ,,
,,	2 years	9 ,,	13 ,,
,,	4 or 5 years	$10\frac{1}{2}$,,	17 ,,
,,	7 or 8 years	$12\frac{3}{4}$,,	24 ,,
,,	above 8	15 ,,	$28\frac{1}{4}$,,
,,	aged	$17\frac{3}{4}$,,	32 ,,
Ewe	1 year	2 ,,	2 ,,
,,	2 years	$2\frac{3}{4}$,,	4 ,,
,,	3 years	5 ,,	8 ,,
,,	4 years	$5\frac{3}{4}$,,	10 ,,

Bighorn skulls in the United States National Museum from the plains of Western Dakota and Eastern Montana have been regarded by Dr. Merriam[1] as indicating a race distinct from the typical bighorn of the Rocky Mountains of Montana and Alberta. For this form the name *O. canadensis auduboni* has been proposed. The chief points of distinction in

[1] *Proceedings Biological Society of Washington*, vol. xiv. p. 31 (1901).

the skull are the larger size of the cheek-teeth and the greater depth and narrowness of the lower jaw. Unless well-marked points of difference also exist in the skin, these small details seem scarcely sufficient to justify the separation of the bighorn of the district in question even as a race.

THE CALIFORNIAN BIGHORN

(*Ovis canadensis nelsoni*)

This rather small and pale-coloured desert race of the bighorn was described in 1897 by Dr. C. H. Merriam as a distinct species. From the typical Rocky Mountain race it is distinguished by its somewhat inferior dimensions, paler colour, and smaller cheek-teeth ; the light rump-patch being rather small, the tail relatively short and slender, and the general colour of the back pale dingy brown. When compared with the dark North-Western race, the paleness is, of course, still more marked, but the general plan of coloration is stated to be closer to that form than it is to the typical race. The horns, too, seem to approximate to those of the latter, and the under-parts of the body are, as in that form, darker than the back, this being, of course, exclusive of the white area, which is sharply defined. This darkening of the under-parts is doubtless connected with rendering the animal invisible in the desert. The object of the under-surface of the body being white in so many animals is to counteract the effect of the shade thrown by the body itself, and thus to render the creature as invisible as possible. But the strong light reflected by the sun from desert sands would perhaps overdo the effect, which, if really the case, would account for the darkening of the under-parts in the present race.

The typical specimen of the Californian bighorn was collected in the Grape Vine Mountains on the border between California and Nevada, a little south of 37° N. latitude. It has been thought probable, however,

that the bighorn found on some of the half-desert ranges of Northern Mexico, and the Southern United States from Texas to California, as well perhaps as those of Lower California, may belong to the same type. In Lower California Dr. Grinnell states that bighorn are still quite abundant. Most of those killed in that State are, however, attained by the unsportsmanlike practice of "potting" them as they come to drink at the water-holes.

THE MEXICAN BIGHORN

(*Ovis canadensis mexicanus*)

Quite recently the bighorn inhabiting the Chihuahua district of Central Mexico has been separated by Dr. Merriam[1] as a distinct species, under the name of *Ovis mexicanus*. It is described as of large size and intermediate in coloration between the typical and the Californian bighorn; the horns being large, massive, dark, and not strongly curved outward, and the hoofs and cheek-teeth larger than in the typical race. The most distinctive character appears to be the large size of the ears, which are stated to be double the dimensions of those of the typical bighorn. The tail is relatively long and slender.

The colour is described as drab brown, darker on the throat, legs, and tail than elsewhere, but without any trace of a dark dorsal stripe. The muzzle is decidedly paler than the rest of the face, and the whitish area on the chin broader and less sharply defined than in the typical race. The light rump-patch is also broader and more squarely truncated than in the latter; and on the hind limb the dark colour covers more of the inner side of the thigh, and less of the lower part of the leg, where the white is in consequence more developed.

[1] *Proceedings Biological Society of Washington*, vol. xiv. p. 30 (1901).

THE NORTH-WESTERN BIGHORN

(*Ovis canadensis stonei*)

(Plate I. Fig. 4)

The bighorn of the Stickeen Valley, British North-West Territory, was separated as a distinct form in 1897 by Dr. J. A. Allen, who described it

Fig. 2.—Head of North-Western Bighorn. From a specimen killed on the Stickeen River.

as being of small size and dark colour, with relatively long and slender horns, of which the front outer angle is distinctly keeled. In the following year[1] a bighorn in the British Museum, from the neighbourhood of the Liard River, near the northern end of the Rocky Mountains, was provisionally

[1] *Wild Oxen, Sheep, and Goats*, p. 215.

made the type of another race closely allied to the Stickeen animal, but apparently differing by its superior size and certain details of coloration. For this form, on the hypothesis that it was distinct, the name of *O. canadensis liardensis* was proposed. Since that description was published

Fig. 3.—North-Western Bighorn. From the Liard River specimen in the British Museum.

the present writer has seen photographs of specimens of the typical *stonei* which are apparently indistinguishable from the Liard River animal. Moreover, Dr. J. A. Allen[1] has put it on record that sheep which he unhesitatingly identifies with *stonei* occur on or near the Liard River. Hence it would seem that there is no justification for separating the British

[1] *Bulletin of the American Museum*, vol. xii. p. 2 (1899).

Museum specimen (p. 13) as the type of a race by itself. The British Museum example is in the long winter coat, and thus differs considerably from the description of the type specimen of *stonei*, which was in the short summer dress. The photographs referred to above show the typical *stonei* in the same condition as the British Museum specimen.

Owing to its dark colour, and the sharp contrast of the white rump-patch and abdomen to the back and sides, the North-Western bighorn is a very striking and handsome animal ; it is sometimes known as the black bighorn, to distinguish it from the white Alaskan race of the species.

From the Rocky Mountain bighorn the present race is distinguishable at a glance by the form of the horns of the adult rams. These are comparatively slender, with the front outer angle strongly keeled, and the tip entire, sharply pointed, and directed largely outwards. The ears also are very characteristic, being relatively small, short, and bluntly pointed. The winter coat is lengthened on the crown of the head and along the nape of the neck into a distinct mane. On the jaws and sides of the head the colour of the hair at this season is dirty white, that of the mane being greyish brown. Elsewhere on the neck the colour is a mixture of grey and brown, which passes gradually into the dark brown of the body and outer sides of the upper portion of the limbs. No distinct dark stripe is noticeable on the middle of the back until the large white rump-patch is reached, but this is divided into two by a narrow dark streak connecting the brown of the back with that of the tail. The flanks are marked by a streak of blackish brown, which is sharply defined from the white of the abdomen and the inner side and front of the thighs ; the same blackish brown colour recurs on the front of the legs, which are elsewhere pure white. The height is approximately the same as in the typical race.

The above description is taken from the specimen in the British Museum ; more recently killed examples would doubtless have the colours intensified.

In the typical locality this race of the bighorn is found on the mountains above the limits of forest. They are frequently met with singly, and it is seldom that more than five are seen in company, although a party of eleven has been observed.

The precise limits of the range of this form have yet to be determined ; a suggestion that it may occur in the heart of Alaska is referred to under the heading of the next race.

THE ALASKAN BIGHORN

(*Ovis canadensis dalli*)

(Plate I. Fig. 3)

At the time when the volume entitled *Wild Oxen, Sheep, and Goats of All Lands* was being written, the British Museum possessed only an old and battered specimen of the white sheep of Alaska, which London dirt had rendered totally unfit for exhibition. Now, however, thanks to the generosity of Mr. J. T. Studley, by whom they were presented in 1899, a pair of these handsome animals, in the long and nearly pure white winter dress, form two of the most conspicuous objects in the case devoted to the exhibition of the unrivalled series of wild sheep.

The American naturalist and explorer, Mr. E. W. Nelson, was the first to describe and name this sheep, regarding it as a variety of the ordinary bighorn. His paper was published in 1884. In 1897 Dr. J. A. Allen raised this sheep to the rank of a distinct species, but in *Wild Oxen, Sheep, and Goats* it was again relegated to the grade of a local race.

In height this sheep agrees very closely with the British Museum example of the North-Western race, by the side of which Mr. Studley's pair are exhibited. It likewise resembles that form in respect to the shape and

size of the horns and ears. The hair is white throughout at all times of the year, as has been already stated by Dr. Allen[1]; and on the head, neck, and limbs it is absolutely pure white in the British Museum examples. A close examination of the hair of the back reveals, however, a faint whitey-brown tinge on the tips of the hair, giving just the same appearance as would be produced by slightly "singing" the hair of a pure white animal. The occurrence of a somewhat similar, but perhaps more pronounced, whitey-brown stain on the fur of the back is mentioned in the original description of the type specimens, which were believed to be in the summer dress.

It appears, however, that this dark tinge is due to staining, and that generally, if not always, the true colour of the hair of this handsome sheep is really pure white.

In this connection may be appropriately quoted the following extract from Mr. Hornaday's article on the American bighorns published in the *Report of the New York Zoological Society*, 1901. The author there writes in these words :—

"Through a strange combination of circumstances, the type specimens collected in the Tanana Hills, far in the interior of Alaska, were of such a peculiar appearance that Mr. Nelson could not possibly do otherwise than describe them as being nearly uniform dirty-white. The dinginess of the white over the entire body and limbs appears to be almost entirely due to the ends of the hair being commonly tipped with a dull rusty speck. On close examination this tipping of the hair makes the fur look as though it had been slightly singed.

"In his report on his *Natural History Collections in Alaska*, p. 284, Mr. Nelson makes the following record : 'All of the skins of this animal seen by me among the Eskimo, from the Kuskoquim River to the Arctic coast, were of the uniform dingy-whitish colour characteristic of the race.'

"Unfortunately, the coat of Dall's sheep is sometimes influenced by

[1] *Bulletin of the American Museum*, vol. xii. p. 3 (1899).

its surroundings in a manner which tends to convey a very erroneous impression of its real character. During the spring and summer months the hair is frequently stained and discoloured by contact with wet soil when the animal lies down. Each hair is a thin white tube, filled solidly with a spongy, white pith, which readily takes up any liquid colouring matter by

Fig. 4.—The Home of the Alaskan Bighorn Sheep. Photographed by Mr. Dall de Weese.

capillary attraction. When the end of a hair becomes filled with rusty yellow clay-water, or water discoloured by dark grey earth, the colouring matter is held there for an indefinite period. This it is which sometimes imparts to the hair of this animal the appearance of being tipped with 'a dull rusty speck.' It is strikingly shown in some skins in the American Museum of Natural History, collected in the month of May. . . . On one of these the entire pelage had been so discoloured by what was probably

a ferruginous clay as to turn the outer surface of the pelage, and in some places the whole depth of it, the colour of iron-rust. The under-surfaces of the skin were more heavily stained, and the abdomen showed large patches of this dull reddish clay-colour.

"I have examined perhaps forty skins and heads of this animal, and excepting the type specimens, have never seen even one that was otherwise than clear milk-white, save a few which had become stained or dirty through contact with earth or dust. There is now before me a mounted head, taken in summer, the hair on which is only an inch in length, but it is perfectly white and immaculate."

The following notes on this sheep are extracted from a paper published by Mr. A. J. Stone in the *Bulletin of the American Museum of Natural History* for 1901[1]:—

"From my experience with these animals I believe they seek quite as rugged country in which to make their homes as does the Rocky Mountain goat. They have higher latitudes, and live in regions in every way more barren and forbidding.

"Although they are very wary when hunted, they are rapidly dwindling in numbers, for their white bodies in summer can be seen at a great distance by the keen eye of the native, and very few of our best natural history collections will be enriched by their beautiful forms before the last of them will have disappeared.

"The females, with their lambs, generally keep to the high table-lands, well back in the mountains, and are often much more difficult to locate than their mates. Broken jawbones, reunited, were so frequent among the females killed as to excite comment."

In his report on the mammals of the Yukon district, published in No. 19 of the *North American Fauna*, Mr. W. H. Osgood states that, although the majority of specimens of the Alaskan bighorn in collections have been

[1] Vol. xiii. pp. 31 *et seq.*

obtained in the neighbourhood of Cook Inlet, the range of the race includes nearly all the high mountains of Alaska, and extends northwards to the Arctic coast. Details are, however, wanting with regard to its limits in parts of the country ; and in the neighbourhood of Lake Bennett it is thought probable that *O. canadensis stonei* may occur close to the present race ; all the sheep in that district are, however, said to be white in winter.

THE YUKON BIGHORN

(*Ovis canadensis fannini*)

A wild sheep from the Rocky Mountains on the eastern side of the Yukon River, about seventy-five miles to the east of Dawson City, has recently been described by Mr. W. T. Hornaday,[1] in a paper on the bighorns of America generally, as a new sheep, under the name of *Ovis fannini*. The paper is illustrated with several figures, one of which is coloured. Whatever else it may be, this sheep, in the view of the present writer, is certainly not a distinct species, as it is evidently very nearly related to the white Alaskan bighorn ; it may, however, be allowed, at least provisionally, to rank as a local race of bighorn.

In general appearance this sheep seems to be very similar to the white Alaskan bighorn, from which it is distinguished by the shoulders, back, and outer side of the upper part of the legs being grey. It resembles, indeed, a white sheep covered with a grey blanket, from which feature the names of "saddle-backed" and piebald sheep have been suggested as appropriate designations. The front of the fore-legs from the knee downwards, and the whole of the corresponding surface of the hind-limb are marked by a brown streak ; and the tail is rather darker than the back, the rump-patch being white.

[1] *Report New York Zoological Society*, p. 78 (1901).

Mr. Hornaday's description of the type specimen, which is a nine-year-old ram killed in mid-winter, runs as follows :—

"Entire head and neck, breast, abdomen, inside of fore-legs, and rump-patch for four inches above insertion of tail snow-white. Entire body, except as above, brownish grey, giving the appearance of a white animal covered by a grey blanket. This colour is produced by a nearly even mixture of pure white and blackish-brown hairs. The grey colour covers the shoulders from the insertion of the neck downwards to the knee, where

Fig. 5.—Head and Skin, in the Winter Coat, of a recently-killed Ram of the Kamchatkan Bighorn. From a photograph by Prince Demidoff.

it fades out. On the outside of the thigh the grey colour grows paler as it descends, until at the hock-joint it fades out entirely. The posterior edge of the thigh is white. The lower portion of the inner surface of the thigh partakes of the grey body-colour, but is somewhat paler.

"On the front edge of the thigh and extending down to the hoof is a conspicuous band of dark brown, $1\frac{1}{2}$ inch wide, which, below the hock-joint, joins rather abruptly the pure white hair which covers the sides and rear edge of the leg. A similar brown band extends down the front of the fore-leg from knee to hoof, similarly backed up posteriorly with white.

"The tail is similar in colour to the body, but much darker, and a thin line of dark-brown hair connects it with the grey mass of the body. The white rump-patch is similar to that of *Ovis montana* [=*canadensis*], but covers a smaller area."

The thick and long coat is described as being somewhat finer than that of the Rocky Mountain bighorn. The horns are of the same amber-yellow as those of the white Alaskan bighorn. The shoulder-height of the type specimen is 34 inches.

Precise information with regard to the distributional area of this sheep is still required, although it is known to inhabit some portions of the ranges west of the Yukon between Selkirk and Forty-mile River. On the map of the distribution of the various American races of the bighorn accompanying Mr. Hornaday's paper, the habitat of the present form lies between the distributional areas of the black North-Western and the white Alaskan bighorns. So far as it goes, this is suggestive of the present form, being a hybrid between those two races; and this is confirmed by its apparently small numbers. For this reason the right of the Yukon bighorn to rank as a distinct race is here regarded as provisional.

THE KAMCHATKAN BIGHORN

(*Ovis canadensis nivicola*)

(Plate I. Fig. 2)

The relatively small dimensions of the white rump-patch differentiate the Kamchatkan bighorn from its American relatives; and this circumstance to the minds of many zoologists would doubtless justify its separation as a distinct species, even if all the American forms were included under a single specific title. The horns and ears of the Kamchatkan animal are,

however, of the same size and shape as in the North-Western and Alaskan bighorns; and the difference in the size of the caudal disk is a feature which might quite naturally be expected to occur in an animal which has been isolated from its American relatives for a longer period than the different forms of the latter have been separated from one another. And since, so far as the horns and ears are concerned, the Kamchatkan wild sheep is nearer to the Alaskan and North-Western bighorns than are the latter to the typical bighorn of the Rocky Mountains, it seems, in the writer's opinion, better to regard all the forms as phases of a single species. Not improbably the North-Western and Alaskan bighorns come closest to the original parent type, while the Rocky Mountain and the Kamchatkan bighorn represent two aberrant branches or incipient species.

As in the case of the Alaskan bighorn, the present animal was very poorly represented in the national collection at the time when *Wild Oxen, Sheep, and Goats of All Lands* was penned; the only complete specimen then fit for exhibition being an immature ram in the very long and shaggy winter coat which forms one of the distinctive characteristics of the Kamchatkan race. Mr. St. George Littledale, who made a trip to Kamchatka in 1900 with Prince Demidoff, for the purpose of shooting these wild sheep, has, however, presented the British Museum with the skin of a fine adult ram, just assuming the winter coat. Prince Demidoff has recently presented a mounted ram in the short summer coat to the St. Petersburg Museum.

In addition to the relatively small area of the white rump-patch, which does not extend on to the upper surface of the hind-quarters, the Kamchatkan bighorn is distinguished from all the American races of *Ovis canadensis* by the length and fineness of the hair of the winter coat, which somewhat approaches wool in character. There is no mane on the nape of the neck, the dark streak bisecting the white rump-patch is much wider than in any of the American races, and the white area on the hinder aspect

of the legs is smaller than the latter. The skull is characterised by its shortness and breadth, as well as by the unusual prominence of the rims of the sockets of the eyes.

The total of these characters is amply sufficient to differentiate the Kamchatkan bighorn from all its kindred. It may, however, be added that the general colour of the upper-parts, both in summer and early winter, is grizzled greyish brown, the grey tint being more noticeable on the head and neck than elsewhere. The front of the legs, the stripe down

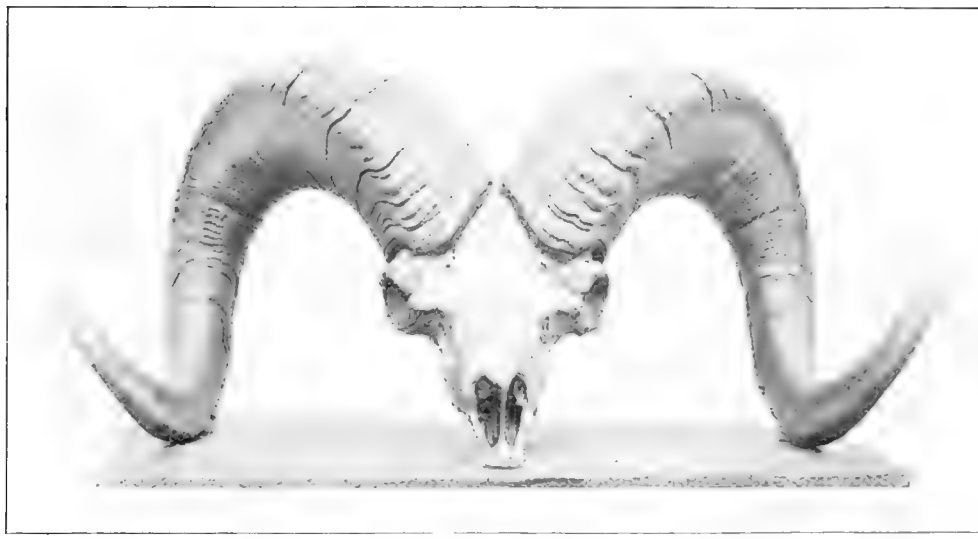


Fig. 6.—The "Record" Kamchatkan Bighorn Skull and Horns. Length of horns 39 inches. Shot by Prince Demidoff.

the back, and a patch on the forehead below the eyes are a rich dark brown. White occurs in the same areas as in the other bighorns.

It is stated in *Wild Oxen, Sheep, and Goats* that there is a pure white bighorn head from Kamchatka in the Museum at Tring Park; and certain suggestions are there made in regard to some of the Kamchatkan bighorn turning white in winter. Nothing more appears, however, to have been ascertained with regard to the occurrence of white bighorn in Kamchatka, and the subject remains at present a mystery. It is certain that, at least as a rule, the bighorn seen on the coast in early winter are brown.

Bighorn of this race are definitely known to occur in the peninsula of Kamchatka to the east and in the Stanovoi Mountains to the west of the Sea of Okhotsk, and they probably also inhabit the Chukchi country to the north. Probably they also extend a considerable distance to the eastward in Northern Siberia in the direction of the valley of the Yenisei, but how far is not yet ascertained. Moreover, there are reports to the effect that the wild sheep of the Yenisei district shows characters connecting the true Kamchatkan bighorn with the argali, so that it may not improbably prove to be a distinct race. If so, the name *borealis* is available for it.

Some interesting observations on the habits of the Kamchatkan bighorn are given by Dr. H. Guillemard in the *Cruise of the Yacht "Marchesa,"* extracts from which are quoted in *Wild Oxen, Sheep, and Goats of All Lands.*

THE SCANDINAVIAN REINDEER

(*Rangifer tarandus*)

(Plate I. Fig. 5)

Reindeer are so totally different from all other living members of the family *Cervidæ*, that there can be no difficulty in recognising them at a glance ; and since the characters by which they are distinguished from other deer, as well as the features in which the different races differ from one another, are detailed at considerable length in *Deer of All Lands*, they need only be briefly referred to on the present occasion. And first with regard to this question of races, as opposed to species. In the work just mentioned, all forms of reindeer are regarded as varieties, or local races, of a single circumpolar species. American zoologists, on the other hand, consider it advisable to rank such variations as distinct species ; Mr. O. Bangs[1]

[1] *Proceedings New England Zoological Club*, vol. i. p. 17 (1899).

remarking that it is "astonishing to American mammalogists to find Lydekker giving our woodland caribou, as distinct a species as ever existed, as a sub-species of the Old World *Rangifer tarandus*." This, of course, is simply begging the question, as no one can say absolutely that such and such an amount of variation in an animal necessarily constitutes a species. It is purely a matter of opinion, and each and every writer who knows anything about the subject is entitled to his own view. In the opinion of the present writer it is more important to grasp the fact that one peculiar type of deer has a circumpolar distribution than to emphasise the distinctness of the different local modifications of that type. And this, he maintains, is best effected by regarding the former as a single species, of which the latter are geographical races. By giving to such races distinct specific titles, the essential unity of this circumpolar type of deer stands in great danger of being lost sight of. Since the publication of the *Deer of All Lands*, three more of these geographical phases of the reindeer have been named and described by American writers.

From all other members of the deer tribe reindeer are broadly distinguished by the circumstance that antlers are normally developed in the female as well as in the male, and likewise by the early date at which these appendages make their appearance on the forehead of the fawns. Female antlers are smaller and generally less complex than those of the opposite sex. Another peculiarity of these appendages is that at least one of the brow-tines of those of the male is palmated, laterally compressed, and turned in towards the middle line. Above the brow-tines is another pair of palmated tines which have been identified with the bez-tines of the red deer. For some distance the beam of the antler then remains undivided and straight, but about the middle of its course it is suddenly bent forwards, frequently giving off a small back-tine at the "elbow," after which it expands, to terminate in a palmation of variable width and carrying a variable number of tines on its hinder border. The antlers of young reindeer

form simple spikes, sometimes straight, but in other cases inclining slightly towards the middle.

These characters are amply sufficient to distinguish reindeer from all their kindred, either near or remote ; but it may be advisable to refer to a few more of their most obvious external characters.

The muzzle of these deer is completely covered with hair, the ears and tail are both short, and the fawn-coloured hair is unspotted at all seasons and all ages, the region about the tail being white. A fringe or mane of long hair is developed on the throat, and a tuft of elongated white hairs on the inner side of the hocks marks the position of the tarsal gland, the gland on the shin-bone, or metatarsus, so commonly present in deer, being wanting in this species. The relatively large lateral hoofs and the round main hoofs are likewise characteristic features of reindeer.

The wild reindeer of Scandinavia is the typical representative of the species, as being the animal described by the great Swedish naturalist Linnæus in 1766, under the name of *Cervus tarandus*. Compared with some of the American races, it is a rather small animal, although with the usual heavy and clumsy build characteristic of all its kind. In the male both brow-tines are often palmated and not markedly unsymmetrical, and the degree of palmation of the bez-tines is comparatively slight. Above the latter the beam of the antler is unbranched for a considerable distance, although giving off a back-tine at the elbow, and the terminal expansion is not very great. Female antlers always carry much fewer points and are usually much smaller, but in a mounted specimen presented to the British Museum by Sir William Ingram they are nearly as large as in the fine male (the gift of his brother) standing alongside. As in the other races, the face, flanks, and the front of the limbs are much darker in colour than the back and sides. A feature of this race is the gradual passage of the white ring round the fetlocks into the fawn above, and the

presence of a light ring round the eye of the stag ; and it may be added that the upper surface of the very short tail is but little darker than the sides and lower surface, which are white.[1] Antlers of Scandinavian reindeer measuring 59½, 59, and 58 inches are recorded in Mr. Rowland Ward's *Records of Big Game*. From 16 to 20 stone is stated to be the usual weight of stags of two or three years of age, but Mr. Abel Chapman mentions having killed one enormous old stag which scaled 30 stone.

From Scandinavia and Lapland the typical race of the reindeer extends into Russia, but in some parts of Asia it seems to be replaced by a larger race akin to or identical with the American woodland reindeer. And even in Kazan it is stated that reindeer stags are larger than Scandinavian examples, while the hinds are frequently devoid of antlers. In the last-named district reindeer are not known south of lat. 54°, although in the Urals they descend to lat. 52°. In addition to the Spitzbergen form, reindeer are met with in Novaia Zemlia, at Cape Chelyuskin, and in Phipps and Parry Islands, between 80° and 81° N. lat.

In company with ptarmigan and lemmings, reindeer in Norway are inhabitants of the high fejlds. In summer the herds consist mainly of hinds ; the stags probably betaking themselves to the valleys, being apparently less susceptible to the attacks of mosquitoes than are their partners. Excellent accounts of the habits of wild reindeer and reindeer-stalking will be found in Captain L. Lloyd's *Field Sports of the North* (1842) and *Scandinavian Adventures* (1854), Mr. E. N. Buxton's *Short Stalks* (1892), and in *Wild Norway* by Mr. Abel Chapman.

Some speculations as to the migration in former times of the reindeer, and the relation of the Old World to the American forms, have been published by Dr. R. F. Scharff in his *History of the European Fauna* (1899). It is there stated that two types of reindeer occur fossil in Europe, one of

[1] In *Deer of All Lands* the artist has not paid sufficient attention to these details.

which, together with the existing Scandinavian animal, is regarded as practically identical with the Barren-Ground reindeer of Arctic America, while the other is considered inseparable from the woodland reindeer of North America. The former of these, it is said, is found only in the extreme west of Europe, while the latter occurs in Central and Eastern Europe and Asia. And on this evidence it is argued that the Barren-Ground reindeer entered Europe by a land connection *viâ* Greenland and Iceland ; while the woodland form made its way *viâ* Bering Strait.

At the conclusion of a long argument the author notices (p. 157) that in *Deer of All Lands* the present writer has denied the identity of the Scandinavian and the Barren-Ground reindeer, and he then proceeds to remark that "the whole subject is by no means as well known as could be wished, and a very careful comparative study of recent and fossil remains of the reindeer from various parts of the Old and New World is much needed to put our views on a firmer basis."

As a matter of fact, the Scandinavian reindeer, as all naturalists are agreed, is a perfectly distinct animal from the Barren-Ground form ; the only difference of opinion being as to whether they should be regarded as species or races. If Dr. Scharff is right in considering that there were formerly two types of reindeer in Europe, their distribution may be perfectly well explained by assuming that the Western or Scandinavian form wandered from Scandinavia by a land connection between that country and Scotland, and so on to Ireland, at a time when England was detached from Scotland and joined to the Continent. On the other hand, the second form might have spread over the whole of Central and Eastern Europe, and thus through Asia to America. There are no grounds, however, for definitely deciding whether the Old or the New World is the original home of reindeer, although it would seem more probable that the group was differentiated in the Eastern rather than in the Western Hemisphere.

THE SPITZBERGEN REINDEER

(*Rangifer tarandus spetsbergensis*)

Till recently our information with regard to the Spitzbergen reindeer, which was described in 1862 as a distinct race, was by no means so full as might be desired; but an elaborate memoir ("Ricerce in torno alle Renne delle Isole Spitzberghe") has lately been published by Signor S. Camerano in *Memorie della Reale Academia Scienze di Torino*, ser. 2, vol. li. pp. 159-240 (1901). The most characteristic feature of this race is the form of the nasal bones of the skull, which differ remarkably from those of the Scandinavian reindeer. Details are given in the memoir cited as to the difference in form of the antlers from those of the Scandinavian reindeer. In the British Museum example the antlers approximate to the Scandinavian type, but are smaller and have a shorter beam, the right brow-tine being much more expanded than the left.

THE WOODLAND REINDEER, OR CARIBOU

(*Rangifer tarandus caribou*)

(Plate I. Fig. 6)

A magnificent mounted stag (unfortunately with the antlers in velvet), presented many years ago to the British Museum by the Hudson Bay Company, serves to show how essentially different is the woodland reindeer of North America from its Scandinavian cousin, of which the male and female referred to above stand alongside. Not only is the woodland race much the larger and heavier animal of the two, but it differs widely in the form of both its feet and its antlers, to say nothing of certain details of coloration. The comparative shortness, flatness, and massiveness of the

antlers, in which one brow-tine is excessively expanded while the other is comparatively simple, are perhaps the most distinctive features of this well-marked race. The bez is also large and much expanded, with only a short interval separating it from the comparatively large back-tine, but the points on the extremity of the antler are generally few and small, as is especially well shown in the accompanying figure. Compared with the Scandinavian reindeer the pasterns are much longer and more slender. There is no light ring round the eye, and the early winter coat is as dark a brown as that of the moose on much of the body, although as winter advances it gradually bleaches. At all seasons the colour is much darker than in the Newfoundland race, the dark area extending over the fore part of the under surface of the body. The white ring above the hoofs is very narrow, and sharply defined from the dark of the rest of the limb. The upper surface of the relatively long tail, as well as its sides, is dark fawn. In old stags the mane is not unfrequently nearly white, and in some individuals there is a considerable amount of white on the face and neck. A stag will weigh about five hundred pounds.

Fig. 7.—Skull and Antlers of Nova Scotian Woodland Reindeer. From a specimen in the British Museum.

The range of this well-marked race of reindeer covers the northern wooded districts of North America, including Labrador, Northern Canada, Nova Scotia, New Brunswick, the northern districts of Maine, and Lower Canada on both sides of the river St. Lawrence, thence passing westwards to the neighbourhood of Lake Superior, which forms the southern limit of

the range of reindeer. The woodland caribou, like the Barren-Ground race, is in the habit of making extensive seasonal migrations, so that it is somewhat difficult to define its range exactly.

Judging from a pair of antlers from Siberia in the British Museum, it would appear that a reindeer nearly allied to, if not identical with, the present race inhabits North-Eastern Asia. Specimens of reindeer from Eastern Siberia are, however, required before the affinities of the race inhabiting that region can be definitely determined.

The woodland caribou enters the United States in Maine and also in certain districts west of the Rocky Mountains. In both localities, according to Dr. Grinnell,[1] their numbers do not seem to have been much reduced by shooting. He thinks, however, that the construction of a railway across Newfoundland is likely to have a serious effect on the reindeer of that island.

An excellent account of the mode of life of the woodland reindeer will be found in Mr. Caton's *Antelope and Deer of America*, and as extracts from this are given in *Deer of All Lands*, no further reference to the subject is necessary here.

THE NEWFOUNDLAND REINDEER, OR CARIBOU

(*Rangifer tarandus terræ-novæ*)

The Newfoundland caribou, according to American naturalists, is perfectly distinct from the continental woodland form, being of a lighter colour, with more white on the muzzle and feet, and with distinct light rings round the eyes. The antlers, too, are generally shorter and more massive, and usually show a larger number of points on the hinder edge of the much-curved extremity; both the brow- and bez-tines are very long and comparatively slender.

[1] *Outing*, vol. xxxvii. p. 256 (1900).

A mounted head of this race presented to the British Museum in 1899 by Mr. W. G. P. Graves, R.N., is remarkably light-coloured, showing much white on the muzzle, forehead, ears, and round the eyes, while the neck is entirely white. The antlers are of the same general type as the pair figured by Dr. Allen, being, for reindeer antlers, unusually sym-

Fig. 8.—Skull and Antlers of Nova Scotian Reindeer.
Killed by Mr. F. C. Selous, 1901.

metrical, and having the bez-tine separated by a long interval from the brow-tine, and the back-tine remarkably small.

In his work on the *Antelope and Deer of America* Mr. Caton expressed his belief that the Newfoundland reindeer is in the habit of crossing over the ice which in winter connects its island home with the continent ; and

the statement is copied in *Deer of All Lands*. Mr. Outram Bangs[1] states, however, that this idea is entirely erroneous, and that the Newfoundland caribou never leaves its native island. "Its regular migrations," he observes, "are performed semi-annually upon its native island, which is sufficient unto it, and which it never leaves. A moment's thought shows how absurd such a theory is. No caribou is going to attempt to swim the broad, deep strait of Belle Isle, for the sake of crossing to an unknown land occupied by a different species; and in winter—when, on rare occasions, caribou might cross the ice—they are all two hundred miles away and more, in the southern and eastern parts of the island." No doubt this is perfectly correct. All the same, it is a little difficult to understand why the Newfoundland reindeer should be credited with the knowledge that its kindred of the continent belong to a type differing from itself.

THE COLUMBIAN REINDEER, OR CARIBOU

(*Rangifer tarandus montanus*)

This form was separated from its nearest ally, the woodland reindeer, by Mr. E. Seton-Thompson in the *Ottawa Naturalist* for August 1899, where it was regarded as entitled to rank as a distinct species. Compared with the woodland race, its chief characteristics are said to be its darker colour and superior size; exceeding in the latter respect even the Newfoundland race. The type specimen stood 3 feet 10½ inches at the withers. The general colour of that individual is described as deep umber-brown, very glossy, and darkening nearly to black on the lower parts of the legs. The neck is dull greyish white, as are the under surface of the tail, the buttocks, the legs, and the under-parts. The flanks show a greyish patch somewhat lighter than the surrounding brown; and the light ring above the hoof is pure white and unusually narrow. The antlers are of the same

[1] *Proceedings New England Zoological Club*, vol. i. pp. 16, 17 (1899).

form as in the woodland race, but are very much branched, no less than 72 points having been recorded in one example. They are reported to be less narrow than in the Newfoundland race.

The range of this form includes the mountains of the interior of British Columbia, thence into South-Eastern Alaska, eastward into the Rocky Mountains in Alberta, and southward into the higher ranges of Northern Idaho.

A series of four adult males collected by Mr. A. J. Stone in the Cassian Mountains has enabled Dr. A. J. Allen, in the *Bulletin of the American Museum of Natural History* for 1900,[1] to give a fuller account of this reindeer, with a number of excellent photographs of its antlers, as well as some of those of allied races. The following passages from this communication are of special interest :—

"This form of caribou differs markedly in colour from the woodland caribou, which it most resembles, in being very much darker throughout, in its larger size, longer and heavier antlers, and in the large size of the white rump-patch, which is practically obsolete in the other forms of the genus, or, at least in the lighter forms, very indistinctly defined.

"The most remote ally of *R. montanus* is *R. terræ-novæ*, not only geographically, but in coloration and structural character. *R. montanus* has the facial portion of the skull elongated and slender, in contrast with the short, thick skull of *R. terræ-novæ*. In *R. montanus* the antlers are very long, yet heavy and massive in comparison with those of *R. grœnlandicus ;* in *R. terræ-novæ* the antlers are still more massive, but much shorter than in *R. montanus*."

From the habitat of the woodland reindeer the area inhabited by the present race is said to be separated by a considerable tract in which reindeer are apparently unknown.

From a supplemental account given by Mr. W. H. Osgood in his paper on the mammals of the Yukon region, published in Part 19 of the

[1] Vol. xiii. p. 1.

North American Fauna, it appears that the present animal is abundant in the north of British Columbia about the head-waters of the Yukon, and thence northward for an undefined distance. From the coast to the southward of Cook Inlet it is unknown, although its occurrence is reported from many points behind the crest of the coast mountains. Unlike the Alaskan elk, it prefers the mountains, and is unknown at the bottom of the river valleys, for which reason it is to a considerable degree safe from attack on the part of explorers and gold-prospectors. By the Indians its flesh is, however, smoked and dried, in which condition it is the favourite article of winter diet in the district; and the hides are in large demand for sleeping-rugs, as well as for various articles of native dress.

The following notes on this reindeer, taken in the summer of 1898, were furnished by Mr. Stone to Dr. Allen, and are published in the memoir already cited :—

"These large and beautiful animals range through almost the same kind of country as that occupied by the mountain sheep. They traverse the very high valleys that separate the mountain ridges, while the sheep generally pass around them. They range in the mountains wherever the sheep do, with the exception of the most rugged paths shut in by steep rocky cliffs. They rarely visit the timber, and when they do, remain there for only a short time. During severe storms in winter they sometimes wander into the edge of timber, but do not seem to find there the food they desire. Their favourite winter feeding-ground is the top of high, bold mountain ridges, which they frequently cross by well-beaten paths through the high passes, but they seldom descend to low ground. In winter they will paw through the snow for food, but usually seek feeding-grounds from which the snow has been blown by the winds.

"The velvet is shed from the antlers in the males about the first of September, the old males shedding first, and the younger ones later, according to age and condition. The females shed the velvet about a month later

than the males, the barren females shedding first, and those with calves and the younger animals later.

"In spring and summer these animals follow the snow-line well into the mountains, and here their habits are very like those of the mountain sheep. The old males seek the more secluded retreats, where they remain in quiet, and rapidly take on flesh."

THE ALASKAN REINDEER, OR CARIBOU

(*Rangifer tarandus stonei*)

The reindeer inhabiting the Kenai peninsula of Alaska has recently been separated as a distinct species by Dr. J. A. Allen[1] under the name of *R. stonei*, but, like the other New World forms at any rate, it cannot be regarded as more than a local race, and there may be a doubt whether it is even the latter.

It is described as "a striking member of the caribou group, resembling *R. montanus* in its dark coloration, but differing in the great development of the heavy fringe of white hairs on the front of the neck, and its striking contrast in colour with the adjoining portions of the neck. Should this prove constant, it will form an easily distinguishing mark. The antlers recall in some respects those of the Barren-Ground forms of caribou (including *R. grænlandicus*), but are much heavier, with better developed and more numerous tines, a special feature being the large size and peculiar form of the anterior branch. The skull is long and slender, the facial portion especially narrow, the occipital broad, the nostrils short, and the lower jaw slender."

Reindeer are said to be nowadays very scarce in the Kenai peninsula, where they stand in imminent danger of extermination. Many are killed

[1] *Bulletin Amer. Mus. Nat. Hist.* vol. xiv. p. 143 (1901).

by sportsmen; and others by the natives, who export their heads to San Francisco.

In a recent paper on the Kenai reindeer, Dr. D. G. Elliot[1] describes and figures a mounted male, a single antler, and a head. The male has the under-parts dark, but another specimen (a female) indicates that this character is not constant. The three antlers figured also show considerable differences from the type specimen and from one another, which leads Dr. Elliot to suggest that further evidence is necessary before this form can be definitely admitted as distinct.

A reindeer reputed to inhabit the islands of the Queen Charlotte group has been described by Mr. E. Seton-Thompson as a separate species in the *Ottawa Naturalist* for February 1900 under the name of *Rangifer tarandus dawsoni*. It is said to be distinguished by its small size (which is about equal to that of the Barren-Ground reindeer) and its colour, the latter being darker than that of *R. tarandus arcticus*, but much lighter than that of *R. tarandus montanus*. The typical individual had but one antler, and was said to come from the interior of Graham Island. Mr. W. H. Osgood[2] has, however, expressed the opinion that the specimen came from the mainland, and belongs to the Barren-Ground form; the existence of any wild reindeer on Graham Island being more than doubtful.

THE GREENLAND REINDEER, OR CARIBOU

(*Rangifer tarandus grœnlandicus*)

The wild reindeer of Greenland was separated as a distinct race by Gmelin in his edition of the "*Systema Naturæ*" *of Linnæus*, published in 1788. Further information about this animal is, however, still much needed; and it would be interesting to ascertain whether there is any

[1] "Field Museum Publications"—*Zoology*, vol. iii. No. 5 (1901).
[2] *North American Fauna*, No. 21, p. 26 (1901).

difference between the reindeer respectively inhabiting Eastern and Western Greenland, or whether the same form inhabits the whole area. Antlers of the Greenland reindeer have been described and figured by Dr. J. A. Allen,[1] but the present writer has never had the opportunity of seeing a specimen.

From the form of the antlers, which are elongated, slender, and rounded, with but few points, and showing great individual variability, the Greenland reindeer would appear to be near akin to the Barren-Ground race of America. The eye is surrounded by a broad and well-defined white ring, and the white ring above the hoofs is likewise sharply marked off from the fawn-colour above and below. The antler figured by Dr. Allen shows a well-marked back-tine and a bifurcate bez-tine.

THE BARREN-GROUND REINDEER, OR CARIBOU

(*Rangifer tarandus arcticus*)

Sir John Richardson, in his great work on the fauna of North America, published in 1829, was the first naturalist to describe the reindeer of the Barren-Grounds of North America as a distinct race. In 1851 it was raised to the rank of a species by Professor Baird, and it is generally regarded as such by American naturalists of the present day. Without endorsing this view, it may be admitted that the reindeer of the Barren-Grounds is very different from the woodland animal, being much smaller in bodily size, and furnished with longer, more slender, and less flattened antlers, which can never be mistaken for those of the southern race. Moreover, although, owing to seasonal migrations, their distributional areas overlap to a certain extent, the two forms never by any chance interbreed, but always keep entirely apart.

The long, slender, and rounded antlers of the stags show but few points

[1] *Bulletin of the American Museum*, vol. viii. p. 238 (1896).

on the terminal expanded portion of the beam, which is separated by a long interval from the bez-tine. Usually, if not always, the back-tine is absent,

Fig. 9.—Skull of Barren-Ground Reindeer. From a specimen in the possession of the Hon. Walter Rothschild.

and the antlers do not exhibit the sharp "elbow" about the middle of the length of the beam seen in those forms with a well-developed back-tine. Compared with the Newfoundland reindeer, the curvature of the beam is much slighter. One of the brow-tines is usually more or less expanded

and palmated, but the bez, in some cases at any rate, is comparatively simple, and may be unbranched. In the pair of antlers figured on page 41, the left brow-antler is much expanded, but the right, which was probably much simpler, has been sawn off; both bez-antlers are remarkably simple, the left one being undivided, while that of the right side is only very slightly forked. The antlers of the hinds of this race are very small and poorly developed, showing scarcely any curvature.

A skin of this race is a desideratum in the British Museum. According to the description given by Dr. J. A. Allen,[1] the whole of the feet and legs are white, save for a stripe of tawny brown running down the front of each, and narrowing as it reaches the lateral hoofs. The eye is not surrounded by a distinct ring of white. The winter coat of this race is not of the dark brown hue characteristic of the woodland reindeer. According to information supplied to the writer, the weight of a stag is not more than about 150 lbs., or that of a good bighorn sheep.

In regard to the range of the Barren-Ground reindeer, Mr. W. H. Osgood in his account of the mammals of the Yukon district, published in Part 19 of the *North American Fauna*, observes that this animal is found over nearly the whole of the extreme northern part of North America, from North-Western Labrador to the Aleutian Islands. At the present day it is, however, rare throughout the Yukon district; and even as far back as the year 1877 it had become comparatively uncommon, although formerly abundant in the neighbourhood of Norton Sound and for some distance up the river. The precise limits of its range to the south, and also in the interior, are not yet ascertained.

The following notes on a series of skins of this form appeared in the *Proceedings of the Philadelphia Academy* for 1900 (p. 34):—

"A series of twenty-four of these animals was secured: three skeletons, eight skins with skulls, and thirteen additional skulls.

[1] *Bulletin of the American Museum*, vol. viii. p. 234 (1896).

"Some of the horns are in the velvet, which is dark blackish brown, with scattered white hairs near the basal portion.

"The youngest examples have straight or slightly incurved 'spike' horns eight to eleven inches long. The next has the horns incurved, thirteen inches long (chord measurement) with a forward tine six inches long near the base. Other horns of the same size are slightly forked at the tip with the forward tine also sometimes forked; while one specimen has the tip of one horn somewhat flattened. Another specimen, slightly larger, has a well-developed fork to the main horns, while the adults vary very much.

Fig. 10.—Antlers of Barren-Ground Reindeer. From a specimen in the British Museum.

"A comparison of this series with a number of skulls from Greenland fails to show any tangible difference either in the characters of the cranium or the antlers. No doubt there are satisfactory differences in the coloration, but lack of skins of the Greenland animal prevents me from making comparisons.

"In colour the adult skins do not vary to any great extent. A female killed in March 1897 is nearly white on the neck and head, the ears and portions of the face and top of head are brownish grey, the middle of the back from shoulders to rump is brownish grey, while the legs, sides, underparts, tail, and buttocks are white, and a well-defined dark, narrow lateral band runs about three inches from the dark dorsal area. Feet white, the brown colour running down the middle of each toe to within an inch of

the hoof, but much paler than elsewhere on the legs. Another female, March 1897, is in much fuller coat, with hair much longer and everywhere lighter, owing to a 'frosting' of white hairs. The lateral stripes are not so well defined, and the feet are pure white. The horns of this specimen are in the velvet."

THE EUROPEAN ELK

(*Alces machlis*)

(Plate I. Fig. 7.)

By the ancient Greeks, to whom in all probability it was chiefly if not entirely known by repute, the great stag we now call the elk was regarded as the personification of strength, and was accordingly named *Alce*, from ἄλκη, strength. From this comes the Latin *alces*, the German *elend*, the French *élan*, and the English *elk*. The Boers of the Cape Colony applied, however, the equivalent term in Dutch, *eland*, to the largest antelope of South Africa, while by Americans the English name elk is invariably applied to the wapiti instead of the animal to which it properly belongs, which is as invariably designated by its native title moose. There may have been some justification for the Boers in calling the largest antelope of Africa by the title of the largest of the deer of their fatherland, especially as deer are unknown in that part of Africa, but there was none whatever for the transference of the name elk to the American wapiti, seeing that the elk itself is an inhabitant of the same country. The transmutation of names is, however, too firmly rooted among Americans of the present day to be righted, and the confusion which not unfrequently arises therefrom must accordingly be accepted as inevitable.

Although agreeing with the great majority of the deer tribe in possessing antlers only in the male sex, the elk is as distinct from all its relations as the reindeer, and as easy of recognition. Therefore little need be said here in the way of description. Among the most distinctive features of the elk are the shape and setting-on of the antlers. Instead of rising obliquely from the forehead, these appendages in the males diverge at right angles to the middle line of the face, the basal portion being cylindrical and unbranched. After continuing for a short distance, this beam expands suddenly into a huge concave plate of bone, the margins of which are broken up into a number of finger-like snags. Even in fully adult stags the lower portion of this expansion, or palmation, is separated by a slit deeper than any of those between the other snags; and in younger animals this lower portion is seen to consist of two tines, and to be perfectly distinct from the much larger upper portion.[1] Essentially, therefore, elk antlers are of a forked type, with the hinder prong much larger and more expanded than the lower one. As age advances this forked type tends to become more and more obliterated owing to the increasing palmation of the two branches and the partial filling up of the space between them.

Apart from the antlers, there are many other striking peculiarities in the form and structure of the elk. Especially noticeable is the long, broad, and overhanging muzzle, which is entirely covered with hair save for a small triangular patch between the nostrils. Even more remarkable is the pear-shaped, hairy appendage, commonly known as the "bell," hanging from the throat of the stags, the precise function of which does not yet appear to have been ascertained. From an æsthetic point of view the elk is one of the most inelegant and ungainly of all warm-blooded quadrupeds, and horse and cattle breeders might be disposed to say that it has no shape or make in it. Nevertheless, for the exigencies of its mode of

[1] Compare the figures on pp. 50 and 53 of *Deer of All Lands*.

life—especially wading shoulder-deep in lakes for the sake of browsing on water-plants—its long limbs, high fore-quarters, short neck, and broad, flexible muzzle are admirably adapted. The tail is remarkably short, even for a deer. The main hoofs are long, narrow, and pointed; and the lateral pair of hoofs, probably in order to aid in supporting the weight of the body on soft and yielding ground, are relatively large. The hair is coarse and rather long, and even in the fawn never shows distinct spotting. Much exaggeration has occurred with regard to the size ordinarily attained by the elk, but a height of 6½ feet has been definitely recorded in the case of a Canadian example; and Alaskan elk, as stated below, are said to be very much taller.

Elk are darker in winter than in summer, and their general colour varies from yellowish grey to deep blackish brown, the lower portions of the limbs being whitish, the forehead dark chestnut, and the face nearly black below the eyes but reddish grey about the muzzle.

The elk of Scandinavia is the typical representative of the species, being the animal to which the Swedish naturalist gave the name *Cervus alces*. Purists in nomenclature prefer to designate the creature *Alces alces* instead of by the title given above, but this is a matter of individual taste. Generally speaking, the Scandinavian elk is characterised by the greyish tone of its coloration; and the fawns are absolutely free from any trace of spotting.

From the forest-clad and marshy districts of Sweden and Norway the range of the elk extends into Eastern Prussia, Livonia, Northern Russia, and thence eastward through Siberia, northwards of about latitude 50°, into Northern Manchuria and Amurland. And so far as our present information goes there are no means of distinguishing the elk of North-Eastern Asia from the typical Scandinavian form. It must, however, be admitted that Asiatic specimens of the elk are extremely rare in English Museums. A female skull from Manchuria, presented to the British Museum by the

Duke of Bedford, appears indistinguishable from Scandinavian examples. Should the Eastern form of the elk prove distinguishable, it should not be forgotten that separate specific names were assigned many years ago by Fisher-de-Waldheim[1] to elk-remains from Russia which are certainly referable to *A. machlis*.

It is generally stated that Eastern Prussia marks the southern limits of the elk in Europe within historic times. At an earlier date there is, however, evidence of its occurrence on the Save River, on the northern frontier of Bosnia, in about latitude 45° N., two fine specimens of detached antlers from this locality having recently been figured and described by Herr J. Grimmer.[2]

The largest pair of European elk antlers recorded by Mr. Rowland Ward measure $37\frac{3}{4}$ inches to the tip of the longest tine, and have a basal girth of 8 inches, with a tip-to-tip interval of $35\frac{3}{8}$ inches. The weight of a large pair of elk-antlers is not unfrequently as much as 60 lbs., while an entire animal will scale from 900 to 1400 lbs.

So much has been written with regard to the habits of the elk, both in Europe and in America, that little need be said. A summary of the general features will be found in *Deer of All Lands*, while for fuller and more detailed information the reader may consult the two works by Capt. L. Lloyd quoted under the heading of the reindeer, as well as Mr. E. N. Buxton's *Short Stalks*, and Mr. Abel Chapman's *Wild Norway*. An essential feature in the habits of the elk is that it is a forest-dwelling animal, fond of wading into swamps and lakes in order to browse on aquatic plants, and that in the main it is not gregarious, although family parties may collect for the winter season. Like most deer, male elk become exceedingly ferocious during the pairing time, when both sexes utter the characteristic call of the species, which in the case of the female

[1] When writing *Deer of All Lands* the author was unaware of the existence of these names, and they are consequently omitted from the list of synonyms.

[2] *Wissenschaftliche Mittheilungen aus Bosnien und der Hersegovina*, vol. vi. pp. 844-846 (1899).

has been likened to the roar of a bear when enraged. There is, however, some evidence to show that the European elk is much less prone to utter the call than is its American representative.

THE AMERICAN ELK, OR MOOSE

(*Alces machlis americanus*)

In *Deer of All Lands* no distinction was made between the American and the European elk, but by force of circumstances the writer, almost in spite of himself, has been compelled to recognise such distinction, although the two animals are practically alike in all respects save for certain slight differences in coloration, and it may be in the shape of the antlers. The main reason for this change of view is that the Alaskan elk has been described as distinct by American naturalists, and if, as may be quite probable, its right to distinction is recognised, it follows as a matter of course that the elk of other parts of America must likewise be distinguished from its brother of the Old World. But while quite willing to concede thus much to American opinion, the present writer utterly refuses to regard the American and the Alaskan elk as distinct species, the highest rank, in his opinion, to which they can possibly be entitled being merely that of local races, or sub-species.

Apparently the chief claim of the American elk to be distinguished from its European representative is its darker colour, the general hue of the hair tending to blackish brown rather than to yellowish grey or greyish brown. It is stated, however, that American elk-fawns show faint traces of dappling ; and, as already mentioned, there is some evidence that it is more noisy in the pairing-season than the elk of Sweden and Norway. At best, however, the distinction between the two is of the slightest. It is true, indeed, that American antlers run larger than European specimens, but it is just possible that this may be due to the incessant persecution to

which the latter animal has been long subjected in its best-known haunts. And it is not improbable that Asiatic elk antlers may be as large as American examples.

The two largest pairs of antlers of American elk entered in Mr. Rowland Ward's *Records of Big Game* respectively measure $44\frac{1}{2}$ and 44 inches in length to the extremity of the longest tine, the former of them having a basal girth of $10\frac{1}{2}$, a tip-to-tip interval of $49\frac{1}{2}$, and a maximum width of 66 inches.

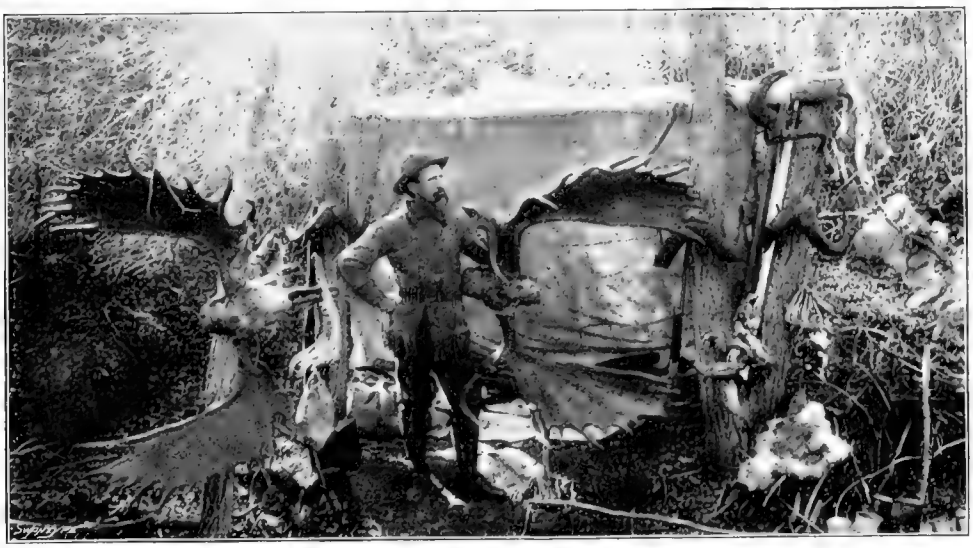


Fig. 11.—A Scene in Mr. Dall de Weese's Camp, showing Alaskan Elk, Bear, and Bighorn Sheep killed on Kussilloffin River, Alaska, in 1897.

Inclusive of the Alaskan race, the elk in America formerly inhabited the west coast region from the shores of the Arctic Ocean nearly as far south as the Columbia River; while further east its northern limit was formed approximately by 65° N. lat., whence it extended through Canada into Maine, New Hampshire, Vermont, and the northern forest-clad districts of New York State.

Constant persecution, accompanied by inadequate or no protection, has however done its usual fatal work, and this extensive range became sadly reduced during the last quarter of the nineteenth century. In the

beautiful Adirondack Mountains, to the eastward of New York, the last elk was killed in or about the year 1861. During the middle seventies elk became exceedingly scarce in Maine, but fortunately protective laws were enacted before it had become too late; and now, according to Dr. Grinnell,[1] elk are once more common in the forests of that State.

In addition to Maine, the elk is found in the United States in the Rocky Mountain region, where it extends as far south as the Yellowstone Park, in Wyoming. Dr. Grinnell states that the most southern locality known to him for elk is Fort Fetterman, in Wyoming, where a specimen was killed some ten years ago.

An excellent account of the habits and mode of life of the American elk (moose) will be found in Dr. Merriam's *Mammals of the Adirondack Region*, while for a more sporting description the reader may refer to Colonel Rooseveldt's well-known work on American big game. The fact that at certain times of the year elk feed largely on bark is probably familiar to many, but the manner in which these animals strip trees is doubtless much less commonly known. Writing in *Shooting and Fishing* for 24th Jan. 1901, Mr. W. P. Barnes has the following observations on the subject :—

"The way in which a bull moose will rip the bark of the young beech trees when it gets into an open piece of hardwood is astonishing. Trees seven and eight feet high were stripped of their bark. At other places where there was an opening they would play, and the way they would tread the leaves into the ground and hook the hair out of each other would lead one to believe there had been a terrible battle fought."

[1] *Outing*, vol. xxxxii. p. 256 (1900).

THE ALASKAN ELK, OR MOOSE

(*Alces machlis gigas*)

The Alaskan elk, or moose, was described as a distinct species in 1899 by Mr. G. S. Miller,[1] under the name of *Alces gigas;* but, as mentioned above, seems better regarded as an unusually large local race of the ordinary elk.

The specimens on whose evidence the present animal was described were obtained from the Kenai Peninsula, in South Alaska, and included four males and two females. The large pair of antlers, belonging to the Duke of Westminster, figured on page 53 of the *Deer of All Lands*, are referable to the present race.

Mr. Miller describes the Alaskan elk as larger and more richly coloured than the elk of the Eastern United States and Canada; while it is said to be further distinguished by the narrower occipital region of the skull, the wider palate, and the heavier lower jaw, the whole skull being larger and more massive. The general colour is described as a grizzled mixture of black and wood-brown, becoming darker along the back, and changing suddenly to pure black on the chest, buttocks, and lower part of the flanks; the middle line of the under surface of the body is hair-brown, as are the legs, which have, however, a darker shading. The head is coloured like the back, but is more finely grizzled; the ears being hair-brown on the outer surface, and yellowish white internally. In height this magnificent animal stands considerably over six feet at the withers; and the above-mentioned pair of antlers in the possession of the Duke of Westminster have a span of 72 inches. This dimension is, however, exceeded by a pair from the Yukon in the possession of Mr. F. W. Sheerd,

[1] *Proceedings Biological Society of Washington*, vol. xiii. p. 57 (1899).

of which the span is 78½ inches. In the latter the length is 49 inches, but in a pair belonging to Mr. W. Hart the length is 55½ inches.

According to an account given by Mr. W. H. Osgood in No. 19 of the *North American Fauna*, it appears that the range of this variety of the elk extends along the Yukon from Lakes Atlin and Tagish at least as far as the mouth of the Tanana, and probably some distance farther. Occasionally it appears to leave the shelter of the forests to wander to the shores of the Arctic Ocean. Although still abundant everywhere, it is more common in the tributary valleys than in the Yukon itself, where it suffered severely during the rush to the Klondike goldfields. During winter, indeed, elk-meat forms the staple diet of both the white and red population of these dreary districts, and as its price at the mining camps has been as high as from one to two dollars per pound, there is naturally a keen incentive to the pursuit of an animal which yields a large amount of such a valuable commodity. The hides, too, are valued both by Indians and whites. Mr. Cowan informed the writer that in places this elk is still very numerous and easy to kill.

In the case of Mr. Hart's specimen above mentioned, the height of the animal at the shoulder is stated to have been 8½ feet, while that of another individual is given at 7 feet 8 inches. The estimated weight of the former animal was set at 2600 lbs. These dimensions and weights must, however, for the present be received with caution.

THE ROCKY MOUNTAIN WAPITI

(*Cervus canadensis*)

(Plate I. Fig. 8)

In spite of all that has been written to show its complete distinctness, it is still not uncommon in sporting literature to see the wapiti (persistently miscalled elk in America) spoken of as a mere variety of the red deer of Europe and Western Asia. In one sense indeed, the two animals are very closely allied, both belonging to the typical group of the genus *Cervus*, in which, as a rule, the antlers of the stags have a more or less rounded beam, with brow-, bez-, and trez-tines, above which are a variable number of points collectively known as the sur-royals. The two also agree in many characters, such as the presence of a light-coloured patch surrounding and including the short tail, and of a light-coloured tuft of hair, marking the position of a gland, high up on the outer side of the hind cannon-bone, the relatively large size of the naked area on the muzzle, and the dappled coat of the fawn. But there are essential differences between the two, which, if once fully realised, will never permit the one animal to be confounded with the other. Most important of all are the distinctive characters afforded by the antlers of the stags. In the first place, as a general rule, wapiti-antlers are not cupped at the crown, after the manner so common in the red deer of Western Europe. Not that cups are never seen in the antlers of the wapiti, for there are many examples in which distinct cupping occurs, and there may even be a common characteristic in certain localities ; but, as a general thing, cupping is conspicuous by its absence. And when such cupping does occur, there is no difficulty in distinguishing a wapiti-antler at a glance from that of any red deer. In fully adult antlers (such as the pair represented in the figure on

Plate I.) perhaps the most conspicuous feature is the lateral compression, or flattening, of the upper portion of the beam, and the enormous length and thickness of the fourth tine, which is likewise much flattened. Nothing like this is ever seen in red-deer antlers. Equally, and in some degree even more, important (for it is a feature as marked in immature as in adult wapiti) is the circumstance that all the tines above the fourth are situated in practically the same plane as the latter, so that in a front view of the antler the great fourth tine tends more or less completely to hide all those above and behind it. Consequently, the two or more forks formed by the fourth tine and those above it are placed approximately parallel to the long axis of the animal's head, and are thus to a great degree invisible when each antler is viewed from directly in front in the vertical plane of the fourth tine. These characteristics are excellently well displayed in the two pairs of Asiatic wapiti antlers shown in the upper half of the illustration on page 61 ; and, as already said, may be always relied upon to distinguish the antlers of this species from those of red deer.

But it is not only by means of its antlers that the wapiti may be readily distinguished from the red deer ; as there are many features connected with its form and colouring which show how distinct it really is, and since these are, for the most part, available at all seasons and all ages, they are in some respects of even more value as a means of recognition than are the cranial appendages of the stags, which are shown in their full glory only during a comparatively short period of the year.

As regards form and colour, the wapiti is specially distinguished by the extreme shortness of the tail, and the relatively large size of the light rump-patch, which is straw-coloured. The build is heavy, and the neck of the old stags carries in winter a heavy fringe of long dark-coloured hair. The coat, which is seldom distinctly red, is some shade of light tawny brown over the greater part of the body, but on the withers, neck, head, under-parts, and legs is dark brown, varying in tint according to position, age, sex,

season, and race, from chestnut-brown to almost black. In late winter it becomes dirty white on the back. The young are fully spotted, but no trace of dappling persists in the adult.

There is one more very important attribute of the wapiti by which it

Fig. 12.—Wapiti in the New York Zoological Park. From the *News Bulletin of the New York Zoological Society* for May 1900.

is distinguished from its cousin the red deer. This is the cry of the stags in the breeding season, which, instead of being a roar, is a long and prolonged squeal, gradually ending off in a more guttural tone.

The true or typical wapiti, long supposed to be the only representative of its kind, is the animal inhabiting the flanks of the Rocky Mountains and the regions eastward. It is a heavily-built creature, attaining to a height

of about 5 feet 4 inches at the withers, and with the antlers (although of huge dimensions) not excessively large in proportion to the size of the body.

The coloration of this magnificent deer has been (with the assistance derived from Mr. Caton's well-known work on North American deer) so fully described in the *Deer of All Lands* that a much briefer notice will suffice on the present occasion.

In the summer, when both sexes are almost alike in colour, the short and fine coat is dirty yellowish white on the body, and chestnut-brown on the head, neck, under-parts and legs; the tints gradually bleaching as the season advances. In the winter coat, on the other hand, the dark areas in the old stags are brownish black, with the border on the sides of the rump-patch black, whereas in the hinds these parts are chestnut-brown, with the exception of the middle line of the under-surface of the body, which is nearly black. By exposure to the elements, the winter coat fades to even a greater extent than is the case with the summer dress.

The two largest pairs of antlers belonging to the present race (both from Wyoming) recorded by Mr. Rowland Ward respectively measure 66 and 65 inches in length along the outside curve; the one having six and the other seven points on each side. Of the larger example the basal girth is not given, but in the smaller this is $7\frac{5}{8}$ inches between the bez- and trez-tine. The maximum recorded girth ($9\frac{1}{16}$ inches) occurs in a Wyoming specimen of which the length is 58 inches.

The distributional area of the true wapiti originally embraced the greater part of North America eastward of the central range of the Rocky Mountains, between 40° and 57° N. latitude. On the eastern side, the range extended from Labrador in the north to Pennsylvania and Virginia in the south; and in the west, from some distance north of the Saskatchewan River in Canada to Colorado and Nabraska. The Athabasca, or Elk River, flowing in a northerly direction from the Saskatchewan, doubtless takes its

second title from the present species, of whose range it probably marks the northern limits.

But this extensive distributional area has been vastly curtailed during the last half-century. In the Adirondack mountains of New York State wapiti are stated to have been abundant about the year 1836, but when Dr. Merriam wrote his history of the mammals of this tract in the early eighties, the only evidence of the former presence of this deer was afforded by its buried bones and antlers, even tradition of its former existence having died out. In Pennsylvania the last wapiti is stated to have been killed in the year 1853. "In 1870," writes Dr. G. B. Grinnell,[1] "there were some in Michigan, but they were few. West of the Missouri River, however, they were still abundant, and in 1873 I saw several hundred less than one hundred and fifty miles west of Omaha." Within the territory of the United States the region where true wapiti are most abundant is the neighbourhood of the Yellowstone Park in Wyoming, but there are also some in the northern parts of the Rocky Mountains, as well as in the wilds of Colorado. Even in many parts of Wyoming the range of this deer has been greatly circumscribed, its former abundance in the Bighorn range, according to Mr. F. C. Selous,[2] being attested only by the number of bleached antlers which mark the line of the great spring migration, when the wapiti were returning to the mountains from their winter feeding-grounds on the plains. At the present day these noble deer are unknown on the low-grounds of the Bighorn basin, and the few survivors have to make shift as best they can during the dreary winter months in the mountains, from among the pine forests of which they emerge as seldom as possible.

This great reduction in the range and numbers of the true wapiti has undoubtedly affected the size of the survivors, and old stags with really fine antlers are now few and far between, and are year by year becoming still

[1] *Outing*, vol. xxxvii. p. 257 (1900).

[2] *Sport and Travel*, p. 157 (1900).

fewer. "Not many years ago," writes Mr. Selous,[1] "the American wapiti was indisputably the finest deer in the world both in size and weight of antlers, as well as in size and weight of body. He is undoubtedly still the heaviest deer in the world on the average, though the finest Hungarian and Caucasian red deer are possibly heavier than some full-grown wapiti of to-day; but I think it is doubtful whether the finest wapiti horns now obtainable in the Rocky Mountains are equal in weight to those of the finest red deer now living in Eastern Europe and Western Asia, or to the finest specimens of those of their nearer allies the great deer of Central and Eastern Asia.'

Originally the wapiti was an inhabitant of the open prairie, and it was only as the result of persecution that it took to a forest life in the mountains. Dr. Grinnell, in the passage cited, states that in the early days of American sport it was quite a common thing to see wapiti, after having grazed on the prairie, lying out on the open hillside like bison or domesticated cattle. At other times, however, they would seek shelter in the willows bordering the streams. The disappearance of the wapiti from the plains and its retirement to the uplands and mountains dates from about the year 1880.

The reason of the disappearance of this splendid deer from the eastern portion of its range, where it was formerly even more abundant than the white-tailed deer, which still flourishes there, is not easy to find.

THE WEST AMERICAN WAPITI

(*Cervus canadensis occidentalis*)

When the western representative of the wapiti was described in 1897 by Dr. C. H. Merriam as a new species, under the name of *Cervus roosevelti*, it was believed to be distinguishable from the eastern or typical

[1] *Sport and Travel*, p. 247 (1900).

wapiti by the characters of the antlers, which were supposed to exhibit an abortion of the part above the great fourth tine. The examination of a larger series of specimens has, however, permitted Dr. D. G. Elliot to state in vol. i. of the zoological section of the publications of the Field Columbian Museum (1899) that, taken as a whole, the antlers of this local race of wapiti cannot be distinguished from those of its Rocky

Fig. 13.—Antlers of West American Wapiti. From Dr. D. G. Elliot, *Bulletin of the Field Columbian Museum.*

Mountain representative. From this typical form there is, however, a great tendency to vary, both as regards size, shape, the number of tines, and the presence of palmation or cupping; consequently, specimens of an extremely unusual and bizarre type are relatively numerous. Although palmation is met with among Rocky Mountain wapiti antlers, in none is this feature developed to such an extent as in a pair described by Dr. Elliot.

As regards colour, the same gentleman states that, except in winter, this is very similar in the western wapiti to that of the typical race. In

winter, however, it appears that the western wapiti has the head, neck, and limbs more or less completely black, although the intensity of this displays considerable individual variation, and it is often mingled with brown. "This peculiar coloration," writes Dr. Elliot, "I have never seen in the eastern wapiti ; and when in this pelage the Olympic animal could be always readily recognisable. It is to be expected that all the animals inheriting a country subjected to such an annual rainfall as is North-West Washington would be very dark in appearance, and this is almost universally the case, all colours being intensified, and it is not surprising that the wapiti should be no exception to the rule, but assume at certain seasons a partly black pelage. This colouring is practically the only character there is by which the wapiti of the Olympics and Rocky Mountains can be separated, and when it is absent the animals are indistinguishable from each other."

If this account may be taken as an authentic statement of the case, it will be evident that the differences between the eastern and western races of the wapiti are much less than would be inferred from reading Dr. Merriam's original description of *Cervus roosevelti*, which formed the basis of the notice in *Deer of All Lands*. Indeed, it may be a question whether, from the present writer's point of view, such a slight distinction can be regarded as sufficient to justify even a sub-specific separation of the two animals. Since, however, the distinction between them is recognised by all modern American naturalists, their claim to rank as separate races is provisionally recognised here.

The range of the western wapiti includes a portion of British Columbia, Vancouver Island, Washington, Oregon, and, it is said, Northern California. In certain parts of the Olympic Mountains wapiti, according to information furnished by Mr. Cowan, are still very numerous ; and on account of the quantity of fallen timber it is very difficult to bring out their heads.

In the British Museum this race is represented by a very massive pair of antlers presented by Captain H. J. Elwes, which show the abortion of the portion above the fourth tine referred to in Dr. Merriam's description of *Cervus roosevelti*. A pair of antlers from the Olympic Mountains, Washington, belonging to Mr. W. F. Sheard, measure 70 inches in length along the outside curve, with a circumference of $14\frac{1}{2}$ inches round the base, and are thus the largest American wapiti antlers on record.

THE THIAN SHAN WAPITI

(*Cervus canadensis songaricus*)

It is not a little remarkable that, although this magnificent representative of the wapiti has been kept in large numbers from time immemorial in a state of semi-domestication by the farmers of the southern Altai, for the sake of the revenue yielded by its antlers, yet its very existence was unknown in Europe till the year 1873, when it was described by the Russian naturalist Severtzoff as a variety of the so-called "maral," which was itself regarded as a local race of the American wapiti. Subsequently antlers from the Thian Shan were brought home from Kashgar by the Second Yarkand Mission, under the late Sir Douglas Forsyth, which were described in 1875 by Mr. W. T. Blanford under the name of *Cervus eustephanus*, but were regarded by him in 1893 as indicating merely a local race of the wapiti. The subsequent acquisition of living specimens of this deer by the Duke of Bedford served to confirm the correctness of the latter view. Of late years our knowledge of this deer has grown apace. In 1899 Captain H. J. Elwes,[1] on his return from a journey in the Altai, gave a description of a number of antlers he brought

[1] *Journal Linnæan Society of London*, vol. xxvii. p. 29 (1899).

home, as well as notes on the animal itself; and further information with regard to the domesticated herds kept in the Altai has been furnished by Prince Demidoff in his work entitled *After Wild Sheep in the Altai and Mongolia*, published in 1900. Still more recently, Messrs J. V. Phelps and P. Church have brought home eleven magnificent pairs of antlers of this wapiti, of which the five finest are shown in the accompanying photogravures. Unfortunately the skins obtained at the same time were so damaged in transit that an entire specimen of the animal could not be set up. Many fine examples of this deer have, however, been kept in captivity in the Duke of Bedford's park at Woburn Abbey, so that its appearance in the living state is now well known.

Since a great deal of confusion has arisen with regard to what is the proper name for this deer, a few words are advisable on the subject. Severtzoff, who considered the name *C. maral* as a synonym of *C. wapiti*, which is itself equivalent to *C. canadensis*, appears at first to have been disposed to call the Asiatic animal *C. canadensis*, var. *asiatica*. But, abandoning this title, he finally wrote as follows,[1] viz.—

Cervus maral (*C. wapiti*).

A. Var. *americana.*	*B.* Var. *asiatica.*
a. canadensis.	*a. sibirica.*
b. californica.	*b. songarica.*

"Var. *songarica.* These are the Thian Shan stags, which are larger than the Siberian ones, and darker-coloured in winter, being brownish grey, and not of a whitish colour; and, finally, the stems and branches of the horns of Thian Shan specimens are larger and thicker."

According to modern rules of nomenclature, it is quite clear that the name *sibirica*, which apparently applies to the stags of the Northern Altai,

[1] See *Ann. Mag. Nat. Hist.* series 4, vol. xviii. p. 386 (1876).

Fig. 14.—Skulls and Antlers of Thian Shan Wapiti. Obtained by Mr. J. V. Phelps.

is a synonym of *asiatica*; and for these stags the proper title will consequently be *Cervus asiaticus*, if they are regarded as a distinct species, or *C. canadensis asiaticus*, if they are considered merely as a local race of the wapiti.

On the other hand, *Cervus songaricus* (taking its name from Dzungaria, the district of the southern Altai lying between Kuldja in the south and Tarbagatai in the north) is the earliest title for the Thian Shan wapiti—the *C. eustephanus* of Mr. Blanford. Hence, assuming the deer to be distinct from Severtzoff's *asiaticus* of the northern Altai and Siberia, and if it be regarded as a local race rather than a species, its proper title will be *C. canadensis songaricus*. It may be added that there can be no doubt as to the identity of the deer obtained by Messrs. Church and Phelps at Tarbagatai in the northern Altai with the typical *songaricus*, or *eustephanus*, of the Thian Shan.[1]

So far as comparisons from living animals can be made, it appears that the Thian Shan wapiti is a somewhat smaller and shorter-legged deer than either form of its American relatives, with relatively larger antlers. In *Deer of All Lands* the antlers are stated to be absolutely longer; but that is not borne out by subsequent experience, the longest antlers recorded by Mr. Rowland Ward measuring 55 inches along the curve, while the length of the pair shown on page 63, which are the finest obtained by Mr. Church, is 54 inches. On the other hand, it must be borne in mind, that of American wapiti heads in this country only a comparatively small number exceed these dimensions, and as it is improbable that the Asiatic specimens hitherto brought to England are the largest of their kind, it is not unlikely that dimensions closely rivalling the largest American may occasionally be obtained.

Be this as it may, it is certain that the Thian Shan wapiti is remarkable for the proportionately large size of its antlers, and is thus one of the very finest of all living deer.

[1] See Blanford, *Proc. Zool. Soc. London*, 1900, p. 775.

Fig. 15.—Skull and Antlers of Thian Shan Wapiti. Shot by Mr. P. Church at Tarbagatai.

As regards form, it appears exceedingly difficult to point out any distinctive peculiarities by which the antlers of this race can be definitely distinguished from American specimens. In full-grown examples, like the pair shown on page 63, the great relative size and marked flattening of the fourth tine, so characteristic of wapiti in general, are very conspicuous, and possibly these features may be more exaggerated than in either of the American races, but it is very difficult to be sure. The following are the dimensions of the specimen just referred to (in which there are seven tines on the right and six on the left side), viz.—length, 54 ; girth between bez- and trez-tines, $7\frac{1}{4}$; tip-to-tip interval, 49 ; and widest outside span $50\frac{1}{2}$ inches.

Of the four specimens in the possession of Mr. J. V. Phelps, shown on page 61, the two upper ones are quite normal and regularly tined, but the two lower pairs show a tendency towards palmation near their summits, at least on the one side. Moreover, the left antler in one of the specimens has an additional small line between the bez and the trez.

As regards the coloration of the present race, the author must confess that he has never had the opportunity of comparing a skin side by side with that of the typical American wapiti, which is the only means by which minute points of difference can be detected. But a comparison of living examples shows that, in the winter coat at any rate, the general type of coloration is essentially the same in both. The specimen shown in plate vi. of *Deer of All Lands* appears to have been figured when in the early winter coat, before the hair had grown to its full length, and when the throat-fringe had only just begun to make its appearance. According to information furnished by Mr. P. W. Church, the winter coat of the stags bleaches very rapidly, and the body soon becomes almost white.

That certain differences do exist as regards coloration between the American and Asiatic animals may almost be taken for granted ; but, considering the immense time during which they have been isolated, the marvel is that they should be so much alike as they are. And the writer

has no hesitation in regarding them as local races of one and the same species.

As regards the cry uttered by the old stags of the Thian Shan wapiti in the pairing season, this was stated in *Deer of All Lands* to be in some respects intermediate between that of its American representative and the

Fig. 16.—Skull and Antlers of Thian Shan Wapiti. From the Kuldja District. (Elwes, *Journ. Linn. Soc.*, 1899.)

red deer. Subsequent observations made from the specimens at Woburn Abbey, as well as others recorded by Captain Elwes, have, however, shown that the call is essentially of the same type as in the American wapiti, thus confirming the intimate affinity between the two forms. On this subject Captain Elwes writes as follows :—

"Another point which should be taken into consideration in deciding the specific relations of these deer is the peculiar call of the stags in the

rutting time. The red deer in all its forms, both in Europe and Asia, utters at this season a deep hoarse roar, ending in three or four loud grunts, which may be imitated by the human voice with the aid of a conch-shell or glass bottle. On the other hand, the wapiti in all its races (Asiatic and American) has a very different cry, which is described by hunters as a whistle. Although I have never listened to this cry myself, I have heard hunters in the Altai imitate it with the hollow stem of a plant, whilst in America a tin whistle is used for the same purpose. Radde, who, in his well-known and valuable work on the natural history of Amurland, regards the stag of the East Sagansk Mountains and Dahuria as a race of *Cervus claphus*, mentions this peculiar cry and reduces it to musical notation."

In a footnote the author adds the following :—

"Mr. J. E. Harting informs me that the notes indicated by Radde accurately express the call of the wapiti as heard by him repeatedly in the Regent's Park Zoological Gardens, and are quite unlike the call of the European red deer."

These observations are fully confirmed by Mr. P. W. Church, who describes the call of the Altai wapiti as essentially similar to that of its American representive.

Our information with regard to this deer in a wild state is extremely scant and unsatisfactory. Captain Elwes writes that it "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 realise as much as 100 roubles [£10] a pair at the rate of 10 roubles a pound. The killing of these deer has now been prohibited 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 Tehuja

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 to it, is much more numerous."

This account is confirmed in all essential details by Prince Demidoff, who states, however, that the price per pound obtained for the antlers is 15 roubles, and also that a single pair will sometimes realise as much as 120 roubles (£12), while in one instance as much as 180 roubles (£18) was obtained. This latter instance suggests, by the way, the occasional occurrence of antlers of much larger dimensions than any of those hitherto brought to this country.

Throughout Central Asia wapiti, in common with other deer, are known by the name of *maral;* the enclosures in which they are kept in the Altai being termed *maralnik.* In one of such enclosures, or parks, Prince Demidoff saw a herd of about 150 deer of both sexes and all ages, some of which were so tame that they would take bread from the hand of their owner. The hinds were tamer than the stags; the latter being stated to show signs of wildness as the season approached for cutting their antlers while in the velvet, an operation which generally takes place in June. In the Eastern Altai these "maralniks" are especially numerous; and about the time of the visit of Prince Demidoff the total number of wapiti kept in captivity throughout the Altai was estimated at about six thousand.

THE SIBERIAN WAPITI

(*Cervus canadensis asiaticus*)

In the *Deer of All Lands* the name *asiaticus* was taken to include all the wapiti-like deer of East Central and Northern Asia. But, as mentioned on page 60, Severtzoff distinguishes those of the Southern Altai and Thian

Shan from the form inhabiting the Northern Altai and Siberia. Captain Elwes[1] also finds a difference between the antlers of the two forms, remarking that those of the deer from the Yenisei and Abakan valleys (which he calls *Cervus asiaticus*, var. *sibirica*) have a distinct cup or crown of six or

Fig. 17.—Skull and Antlers of Siberian Wapiti. Bought at Barnaoul. (Elwes, *Journ. Linn. Soc. Lond.*, 1899.)

seven tines branching from the same point on the beam, as in large old specimens of the red deer, quite unlike the antlers of the Thian Shan form, in which there is no tendency to form a cup. Mr. Hagenbeck likewise states that antlers from the Northern Altai have more tines than those of the Thian Shan wapiti. Under these circumstances the author feels that

[1] *Journ. Linn. Soc. London*—"Zool." vol. xxvii. p. 31 (1899).

he is no longer justified in identifying Severtzoff's *songaricus* with *asiaticus* (*sibiricus*).

In a pair of antlers of the present form bought by Captain Elwes at Barnaoul, the figure of which is here reproduced, the trez-tine is absent, and the same is the case with a pair brought from the Gulf of Obi,

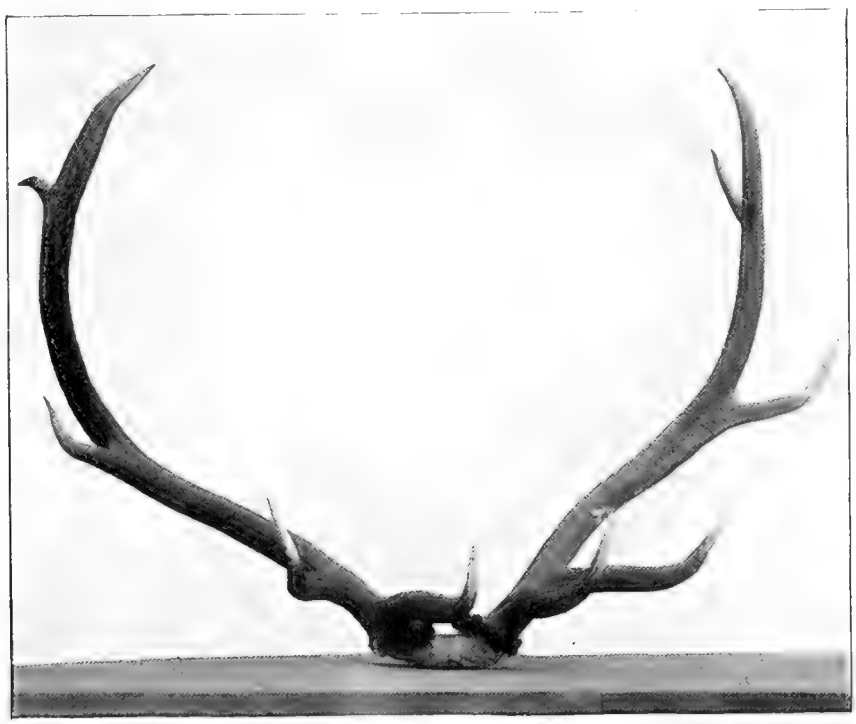


Fig. 18.—A Pair of Antlers from the Northern (?) Altai. Provisionally assigned to the Siberian Wapiti. (Elwes, *op. cit.*)

Siberia, mentioned on page 987 of the *Proceedings of the Zoological Society of London* for 1899.

This form inhabits the Northern Altai, and probably the Yenisei valley and Transbaikalia. Exact information as to its range and characteristics is, however, much wanted. It should be added that if the Thian Shan form is not really separable, then the name *asiaticus* should stand instead of *songaricus*, as in *Deer of All Lands*.

THE MANCHURIAN WAPITI, OR DUKE OF BEDFORD'S DEER

(*Cervus canadensis xanthopygus*)

This handsome deer has, it must be confessed, been somewhat hardly treated by naturalists, on account of the number of names it has received, and the conflicting views that have been entertained with regard to its affinities. It was originally named *Cervus xanthopygus* by the late Professor Milne-Edwards, on the evidence of a young stag (probably in its fourth year) obtained in Manchuria by the traveller Monsieur Fontanier, and transmitted by him to the Paris Museum, where it is still preserved. In a coloured figure of the type specimen subsequently published by its describer (*Recherches Mammifères*, plate xxi.), the tail is unfortunately made much too long, which gives an erroneous idea of the affinities of the animal. Moreover, when referring to this specimen in the *Deer of All Lands* (page 81), the writer fell into the error of regarding it as an old animal with retrograding antlers. In the year 1880, Dr. Bolau, of Hamburg, described a wapiti-like deer from Northern or Eastern Manchuria as a new species under the name of *Cervus luedorfi;* and in 1889 the same deer was very unnecessarily renamed *Cervus isubra* by Dr. Noack, *isubra* being its vernacular title in the land of its birth.

In the year 1896 the present writer described a stag then living in the Duke of Bedford's park at Woburn Abbey under the name of *Cervus bedfordianus;* the shortness of its tail being one of the reasons for separating it from *C. xanthopygus*, as figured by Milne-Edwards.

In the *Deer of All Lands* this so-called *C. bedfordianus* was, however, identified with *C. xanthopygus*, which was regarded as entitled to rank as a species by itself. And it was then proposed that, in the absence of any other English name, it should be known as the Duke of Bedford's deer.

On the other hand, *C. luedorfi* was considered to be nothing more than a local race of the wapiti, under the name of *C. canadensis luedorfi*. A hind at Woburn figured under the latter name was, however, soon after ascertained to be inseparable from *C. xanthopygus*.

And in 1898, the same year in which the *Deer of All Lands* was published, Monsieur E. de Pousargues,[1] of the Paris Museum, arrived at the

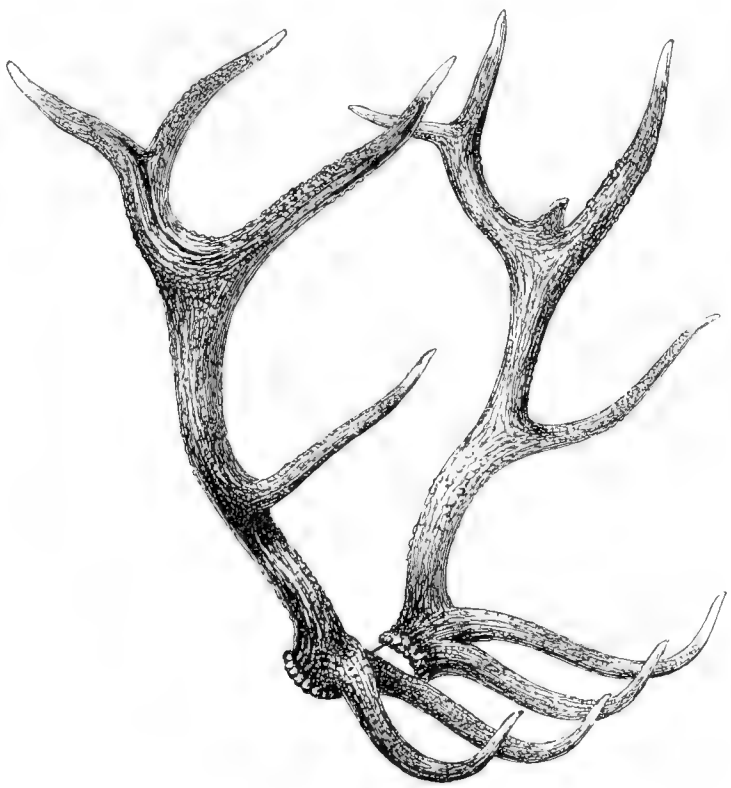


Fig. 19.—Adult Antlers of the Manchurian Wapiti. (After Bolau.)

conclusion that *C. xanthopygus* and *C. luedorfi* were one and the same animal, for which the former title, as the earlier, must be employed. Monsieur Pousargues was further of opinion that the Altai wapiti is only a local race of *C. xanthopygus*. The present animal was accordingly named *C. xanthopygus typicus* by M. de Pousargues, and the Thian Shan wapiti *C. xanthopygus eustephanus*; Severtzoff's *C. maral*, var. *asiatica*, or *sibirica*, being

[1] *Mem. Soc. Zool. Paris*, vol. xi. p. 209 (1898).

identified with the former, and his *C. maral*, var. (*asiatica*) *songarica*, with the latter.

The next year Captain H. J. Elwes,[1] while omitting all reference to *C. xanthopygus*, recognised three races of "*Cervus asiaticus*" (or *C. canadensis asiaticus*), which he proposed to call (*a*) var. *songarica*, from the Thian Shan and South Altai; (*b*) var. *sibirica*, from the Altai; and (*c*) var. *luedorfi*, from North and East Manchuria.

Finally, in 1901, the present writer (*Great and Small Game of India, etc.*, p. 206), from the examination of living specimens at Woburn Abbey and of antlers from Manchuria, fully accepted the identity of *C. luedorfi* with *C. xanthopygus*, mentioning that this animal was in certain respects intermediate between a wapiti and a red deer, and, pending further investigations, alluding to it by the latter name.

If the view here entertained that the Thian Shan and Siberian wapitis form local races of the true wapiti of America, and if the migration of deer between the Old and New Worlds took place by way of Bering Strait, it is practically imperative to regard *C. xanthopygus* (which occupies the intermediate area between the habitats of the Thian Shan, Siberian, and West American wapitis) as another local race of the same species, in spite of the fact that its summer coloration departs somewhat widely from the true wapiti type, and that its antlers differ to a certain extent from those of the Thian Shan, Siberian, and American forms. Nevertheless, the antlers of *xanthopygus* are essentially of the wapiti, as distinguished from the red deer type, and the variation in the colour of the summer dress from that type may be attributed either to a retention of affinity with the red deer (if that be the earlier form—and the length of its tail suggests that this may be the case) or to specialisation in the same direction as that taken by the red deer.

In regard to its antlers, the present animal, as already mentioned, con-

[1] *Journ. Linn. Soc. London*—"Zool." vol. xxvii. p. 36.

forms essentially to the wapiti type, the fourth tine being much enlarged and situated in the same vertical plane as the fifth and succeeding tines (when any of the latter are developed) ; such plane being parallel, or nearly so, to the middle line of the head. The antlers appear, however, in general to be decidedly smaller (shorter) in proportion to the size of the animal than is the case in either the American, the Thian Shan, or the Siberian wapiti ; and in immature specimens, at any rate, the fourth tine does not

Fig. 20.—Manchurian Wapiti Hind. From a photograph by the Duchess of Bedford.

appear to be so long and stout in proportion to those below it as in the former. In fully adult specimens (Fig. 19), however, the relatively large size of this tine becomes more conspicuous, although even then it is less marked than in the other forms. Again, as shown in Fig. 21, the portion of the antler above the fourth tine, even in more fully mature specimens, is much smaller than in the other races of the wapiti. A similar feature was, indeed, at one time said to be distinctive of the West American wapiti, and this statement is referred to in *Deer of All Lands;* but

although the feature occurs in a pair of antlers of that race presented to the British Museum by Captain Elwes, it is not, according to Dr. D. G. Elliot, a constant feature. A tendency to bifurcation in the fourth tine (as shown in the accompanying figure) may be a peculiarity of this species. In the five-tined antlers of sub-adult stags the fourth and fifth tines curve towards one another at their extremities so as to present a

Fig. 21.—Antlers of Manchurian Wapiti. Collected by Herr Dörries in the Sutschan Valley, Manchuria. (Elwes, *Journ. Linn. Soc.*, 1899.)

curious similarity to crabs' claws ; this feature being less noticeable in those of the Altai and American wapitis.

In its extremely short tail this deer resembles other forms of the wapiti and differs from the red deer. It is likewise extremely wapiti-like when in the winter dress, the stags then developing a long blackish mane, and the under-parts being much darker than the back, which varies in colour from whitish to brownish grey, with a very large straw-coloured or orange rump-patch. In the summer, however, this mane completely disappears, and the general colour, at least in animals of from three to five

years of age, becomes bright foxy red. By Dr. Bolau the colour at this season is described as light brown. As a rule, the light-coloured rump-patch is as conspicuous in the summer as in the winter dress, but it was completely absent in the type specimen of *Cervus bedfordianus* when in the early summer garb. This is shown in plate iii. of *Deer of All Lands*. The same individual has also been figured by the present writer, in the *Proceedings of the Zoological Society* for 1896, in both the summer and

Fig. 22.—Another Pair of Antlers of the Manchurian Wapiti. From the same locality as the preceding. (Elwes, *op cit.*)

the winter dress; and a reference to the plates in question will show the remarkable difference in the coloration of this deer at the two seasons. Monsieur de Pousargues is of opinion that the Manchurian wapiti is a much smaller animal than the Altai wapiti, but this is scarcely borne out by the herd now living at Woburn Abbey; and the hind shown in the photograph on page 73 was a very large deer.

The strongly marked rufous coloration of this deer when in the summer dress might be considered an objection against regarding it as a

local variety of the wapiti. But the wapiti-like features of the animal in other respects seem to override this. And there is, moreover, the possibility that an intergradation between this deer and the Altai wapiti may eventually be discovered, which would render it essential to regard the two as nothing more than local races of a single species.

Typically an inhabitant of Northern and Eastern Manchuria, where it was met with by Herr Dörries in considerable numbers in the Sutschan Valley, the isubra deer, as it is locally called, is probably also found throughout Amurland ; its favourite haunts being the dense forests stretching from the Amur to the Lower Ussuri. Being essentially a forest-dwelling animal, its northern limits are probably formed by the Stanavoi Mountains ; while the Gobi desert doubtless constitutes an impassable barrier to the southward. Information is much wanted as to the western limits of this species.

According to Herr Dörries, this deer is an extremely shy and wary animal, spending the greater part of its time in the secluded recesses of the forest, and not even venturing out to graze till the day is far advanced. The end of September or the early part of the following month is the pairing-season. And during the fortnight or so this season lasts the old stags are to be heard calling constantly from early morning till late in the evening.

As to the nature of the call, whether it is essentially the scream of the true wapiti, or whether it in any respects partakes of the roar of the red deer, information is still required.

THE EUROPEAN LYNX

(*Felis* [*Lynx*] *lynx*)

(Plate II. Fig. 1)

Apart from the very distinct caracal (described in *Game of India, etc.*), lynxes are represented by a northern and a southern species in both the Old and the New World. In Europe and North Asia the northern form is the true, or common, lynx, and the southern the Spanish or pardine lynx; while in America the Canadian lynx and two allied races represent the northern type, and the red lynx (with its numerous local phases) the southern type. The red lynx (described in the sequel) differs from the northern lynxes in certain structural details of the skull; and, if sufficient specimens were available, it would probably be found that somewhat similar features distinguish that of the Spanish lynx.

While admitting that the two are intimately connected, American naturalists regard the Canadian lynx as specifically distinct from the European animal; and they likewise assign the same rank to the two other American representatives of the northern type. All these forms are, however, so closely allied that it seems preferable to regard them as local phases of a single circumpolar species.

With the more typical representatives of the genus *Felis* the true lynxes are connected by means of the Old World caracal and jungle-cat. Were it not for this connection, imperfect as it is, they would undoubtedly be regarded as entitled to form a genus by themselves; and that they are so, in spite of the connection in question, is the opinion of many eminent zoologists at the present day. Personally, however, the author inclines to the view that they are not more than subgenerically distinct from the true cats; and if this view be adopted the full title of the common lynx will be *Felis* (*Lynx*) *lynx*.

All lynxes are specially characterised by the possession of a tuft or pencil of long, stiff black hairs surmounting each ear, as well as by certain details in the form of the skull and teeth. The true lynxes (that is to say, the species other than the aberrant caracal) are further characterised by the extreme shortness of the tail, the relative length of the limbs, and the abundant ruff of long hair fringing the throat and communicating to them one of the most distinctive features of their appearance. The pads of the foot of a lynx are always more or less coated with hair; and the coat shows solid black spots at least during some portion of the year, although the number and intensity varies considerably in the different species and races.

It is to Mr. Outram Bangs[1] that naturalists are indebted for precise information as to the structural details by which the common lynx is specially distinguished from the red lynx. In the former the feet are relatively large, with the pads on their surface proportionately small; the tail is extremely short; the fur is long and loose; and the pencil of hair surmounting the ear is much elongated, this being noticeable even in the very young kitten. Very important are certain details with regard to the form and structure of the skull. This is relatively wide, with a broad muzzle. It has a distinctive conformation of the bones in the neighbourhood of the hinder extremity of the bony palate; while the inflated bullæ on its under-surface, which are connected with the organ of hearing, are very small and flat. Another important feature of the skull is that the upper jaw-bone, or maxilla, of each side is almost or completely separated from the nasal bones by the meeting (or close approximation) of the frontal bone with the premaxilla, or anterior bone of the upper jaw. The tusks, or canines, are relatively slender, and the lower molar tooth is of proportionately large size.

To enter into a lengthened and detailed description of such a com-

[1] *Proceedings of Biological Society of Washington*, vol. xi. p. 48 (1897).

paratively familiar animal as the lynx of Northern Europe and Asia would, on the present occasion, be quite superfluous. Apart from the very pale-coloured Tibetan race of the species, to which reference is made in *Great and Small Game of India, Burma, and Tibet*, the ground-colour of the beautifully soft and thick fur of the upper-parts and limbs is rufous fawn, with a tinge of grey, but in some European examples a decidedly ferruginous tint is noticeable, this being particularly the case with one skin in the British Museum. The under-parts are white, and generally devoid of spots. The comparatively short summer coat of the upper-parts and limbs is, however, always marked with a number of solid black spots of medium size and somewhat irregular shape; these being apparently more strongly developed in immature than in fully adult individuals. Except on the flanks and limbs, and sometimes there also, the longer and thicker winter dress, which is usually of a greyer tinge, is devoid of spots in many cases, but in some instances (possibly immature individuals) it may be almost if not quite as fully spotted as the summer dress. In Asiatic specimens, according to Mr. Blanford, the winter dress is invariably without spots; and if this be so, there may be a distinct Asiatic race of the species in addition to the one inhabiting Tibet. Further information is, however, required with regard to the seasonal and local variations displayed by the spotting of the lynx of Northern Europe and Asia. The tip of the tail is black, as are the tufts and backs of the ears, with the exception of a triangular greyish area on the latter; and there may be some black hairs mingled with the light ones of the throat-ruff. Occasionally, too, lynxes are met with in which there is a dark band across the throat. In size the European lynx is a comparatively large animal, the length of the head and body being about 33 inches, and that of the tail $7\frac{1}{2}$ inches.

The distributional area of the European lynx (assuming the Asiatic form to be identical) includes Northern Scandinavia, Russia, Northern Asia, and some of the mountainous districts of Central and Eastern Europe, as well as

Asia Minor. Stray specimens have been killed in France, Würtemberg, and other districts where the species is practically unknown. In the Caucasus, according to Prince Demidoff, lynxes are comparatively numerous, as they are also reported to be in the forest of Bielowitzka, in Lithuania. The lynx in the Caucasus, in common with the leopard, is known as the borse.

THE CANADIAN LYNX

(*Felis lynx canadensis*)

In the absence of a large series of skins for comparison, it is by no means easy to state definitely the distinction between the Canadian and European lynx, and the writer has never come across any detailed notice of the differences by American zoologists. It is commonly stated that the American animal is much inferior in size to its European relative, the length of the head and body not exceeding 30 inches, and that of the tail $5\frac{1}{2}$ inches. And a very remarkable disparity of size is presented by the American and European representatives of the species now exhibited in the British Museum; the former being small and uniformly coloured, while the latter (a Norwegian specimen) is large and fully spotted. As regards the absence or presence of spots, the difference between these two specimens is doubtless due to the one being in the winter and the other in the summer dress; American examples in the latter coat being fully spotted. With regard to size, although there are statements of specimens of a yard in length being killed, it is not improbable that the American form is really smaller than the European.

Although now verging on extermination in the Eastern United States, the Canadian lynx was originally an inhabitant of the greater portion of boreal North America, its distributional area extending from Maine and New York to the confines of Alaska, where it is replaced by a

PLATE II

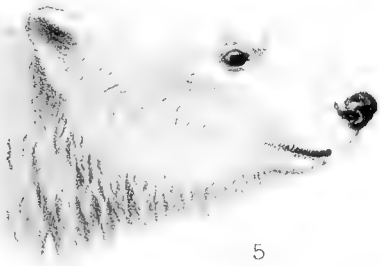
1. Common Lynx.
2. American Wolf.
3. Alaskan Brown Bear.
4. Kamchatkan Brown Bear.
5. Polar Bear.
6. Wolverine.
7. Chamois.
8. Saiga.
9. Przewalski's Gazelle.
10. Mongolian Gazelle.
11. Arabian Gazelle.
12. Beatrix Oryx.

1

3

2

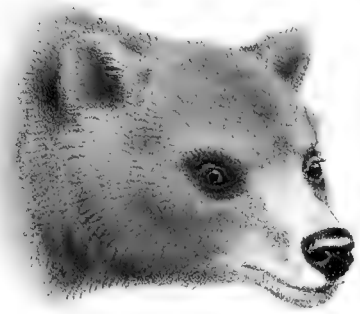
11



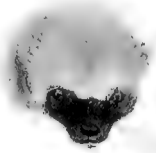
5

12

9



4



6

10

8

7

CIRCUMPOLAR AND OLD WORLD TYPES

Published by Rowland Ward Ltd.

form considered to be distinct. In the Adirondack Mountains it was already rare when Dr. Merriam was writing the zoological history of that district about 1880, since which date it has doubtless grown still scarcer.

In most parts of its range the prey of the lynx consists of the ruffed grouse, the spruce partridge, and various kinds of hares and such other small mammals as it can capture and slay. But it is not above making a meal off the remains of the carcase of some larger mammal left by the puma ; and it will also devour young fawns, as well as domesticated lambs and pigs. As a rule, however, it keeps far from human habitations, its favourite haunts being the sequestered depths of the mountain forests, where the female produces two cubs at a time, usually in the shelter afforded by some hollow tree-trunk or rocky cave. Like many other members of the cat tribe, the lynx will take readily to the water and swim strongly, an instance being recorded where one of these animals actually swam the whole way across Lake Leman, a distance of about a mile.

Although Mr. Selous was successful in bagging a pair in the Rockies, the lynx, as a rule, is hunted by trappers more than by sportsmen ; the former valuing it on account of its soft and warm fur, which is in great demand. The animal is either hunted by its scent with dogs or tracked through the snow till the tree in which it has taken refuge is reached, when it is shot. Such a successful result frequently, however, involves a long and weary tramp which may occupy the whole of one day, and even a considerable portion of a second.

THE NEWFOUNDLAND LYNX

(*Felis lynx subsolana*)

This insular race is chiefly distinguished, according to its describer Mr. O. Bangs,[1] from the ordinary Canadian representative of the species by its much darker and richer coloration. On the flanks the colour of the under-fur is cinnamon-rufous throughout, but on the back the hairs are black at the base and hazel at the tip. Of the longer hairs some are wholly black, others entirely hazel, and yet others banded with hazel, yellowish grey, and black. The prevailing tint of the upper-parts is a mixture of black and hazel ; the face is dull yellowish grey ; the outer surface of the ear black with the usual triangular patch of dark grey ; the legs are dull yellowish hazel faintly spotted with a darker hue ; the tail is dull hazel above, white beneath, and black at the tip ; and the under-parts are wood-brown irregularly blotched with black, the longer hairs being dirty white.

THE ALASKAN LYNX

(*Felis lynx mollipilosa*)

A male lynx from Point Barrow, Alaska, described in 1900 by Mr. W. A. Stone[2] as *Lynx canadensis mollipilosus*, is regarded as probably representing a distinct race. It is described as browner and less grey than the ordinary Canadian lynx, with a very dense, soft, and woolly coat. The skull is said to be narrower, higher, and more arched than in the Canadian race, and is also more constricted across the forehead and between the sockets of the eyes.

[1] *Proceedings Biological Society of Washington*, vol. xi. p. 49 (1897).
[2] *Proceedings of the Academy of Philadelphia*, 1900, p. 48.

Mr. Osgood, in his report on the mammals of the Yukon district, published in No. 19 of the *North American Fauna* (1900), says that lynxes are by no means so common in the interior of Alaska as might have been expected. He himself saw no signs of these animals, and could obtain but little evidence of their presence.

THE COMMON WOLF

(*Canis lupus*)

The wolf being one of the animals mentioned in *Great and Small Game of India, etc.*, may be passed over, so far as its typical European representative is concerned, in the present volume with a brief notice. It is the largest representative of the *Canidæ* found in northern latitudes, the skull generally exceeding $7\frac{1}{2}$ inches in length, and the length of the head and body varying between 3 and $3\frac{1}{2}$ feet. The limbs are elongated, under-fur is present, and there is a black mark down the front of each fore-leg. The number of teeth is the same as in the dog.

The typical representative of the species is the wolf of Scandinavia, since the name *Canis lupus* of Linnæus applies primarily to the form found in his own country. In the wolves of this area and the neighbouring countries of North-Western Europe the general colour of the upper parts of the body and head and of the outer surface of the limbs is some shade of rufous or tawny grey, with a considerable mixture of black in some specimens; the under-parts and the inner side of the limbs being whitish. Old individuals tend to become greyer. On the back the colour of the under-fur is light brown or pale slaty grey, with an admixture of coarser whitish hairs; the longer hairs are usually brown with black tips, although they may be white at the extremities. The tail, which, inclusive of the

hair, is considerably less than half the length of the head and body, is frequently tipped with black. The black stripe mentioned above as occurring on the front of the fore-legs extends upwards from the wrists, and there is sometimes a chevron-shaped black mark on the shoulders. The thighs and outer surfaces of the legs are usually of a more reddish yellow tinge than the back and head, which tend to blackish. In height, a wolf generally stands about 2 feet 4 inches at the shoulder.

The above is approximately the typical coloration of the European wolf, but there are several colour-phases, which appear to be partly local, and not improbably indicate geographical races of the species. Many wolves, for instance, from the Pyrenees, are of a much brighter tint than ordinary ; while the majority of Spanish specimens exhibit a considerably greater admixture of black, this feature being in some cases carried to such an extent as to produce an almost completely black pelage ; and a black specimen has been killed in Belgium. On the other hand, the farther north we proceed in Europe, the lighter, as a rule, do the wolves become in colour ; the fur being also longer and more abundant, and the general tint greyish instead of rufous ; and in a series of wolf-skins from Siberia that have recently come under the writer's notice there is a broad stripe of black down the middle of the back, almost after the fashion of the black-backed jackal of Africa, the remainder of the fur being very light-coloured. It may be mentioned that the name *Canis lycaon* has been applied to the black wolf of Europe, which, however, is not a local race, but merely an example of melanism—a feature which may appear in any individual.

Although, as already mentioned, it is quite probable that it may hereafter be found possible to divide the wolves of Europe and Western and Northern Asia into several local races, until this is done they must be regarded as one form, the range of which includes the greater part of Europe and Asia north of the Himalaya. Although extinct in Britain, the wolf is still found from France and Spain to Amurland, likewise occurring in

Persia, Afghanistan, Baluchistan, Gilgit, Western Sind, and the Punjab; the Tibetan form, as mentioned in *Great and Small Game of India, etc.*, constituting a local race by itself.

Nothing, on this occasion, need be said with regard to wolf-hunting and the habits of wolves, subjects which have been fully discussed in many other works easily accessible to the sportsman.

THE JAPANESE WOLF

(*Canis lupus hodophylax*)

Although the wolf of Japan, which was named by Messrs. Temminck and Schlegel in 1847, is regarded by Dr. P. L. Sclater as entitled to specific rank, the late Professor Mivart,[1] following a suggestion of the late Professor Huxley, saw no reason for regarding it as more than a local race of the common wolf. It was originally described as being very like the latter, but of smaller dimensions, with relatively shorter limbs. A later writer, Professor D. Brauns, states that the tail is also proportionately shorter and the muzzle longer. European wolves are, however, found with the limbs nearly as short in proportion; and the abbreviation of the tail seems to be less marked than has been stated to be the case. The skull, which shows a certain amount of individual variation, apparently presents no well-marked specific characters by which it can be distinguished from that of the ordinary wolf. Probably, like many other mammals from the same country, the wolf of Japan has been dwarfed by the small area of its habitat. Various colour-phases of the Japanese wolf have been recorded, the colour of the fur being described in some specimens as yellowish, in others brownish, and in others whitish grey.

In general habits this variety, as might be expected, is very similar to

[1] *Monograph of the Canidæ.*

the typical form of the species, and it is as much dreaded by the Japanese as is the latter by the peasants of many parts of Europe. Indeed, so deep-rooted is the fear instilled by this wolf, that even its flesh is reported to possess poisonous properties. It frequents the more thickly wooded and mountainous districts of the country, where it associates in small bands.

THE AMERICAN WOLF

(*Canis lupus occidentalis*)

(Plate II. Fig. 2)

In his *Mammals of the Adirondack Region*, published in 1884, Dr. C. H. Merriam regarded all the American true wolves as inseparable from the European species; and the same view was subsequently taken by the late Professor Mivart in his *Monograph of the Canidæ*. Of late years, however, American naturalists have come to the conclusion that (apart from the coyote) the wolves of their own country are all specifically distinct from those of the Old World. To the present writer, however, they appear to be nothing more than local phases of *Canis lupus*. And in regard to the present form, Dr. D. G. Elliot, in his recently published *Synopsis of the Mammals of North America*, remarks that it is only "doubtfully distinct from *Canis lupus* of the Old World." This admission on the part of an American naturalist suggests that the American wolf has not even the right to be regarded as a race apart from its Old World representative. By some writers the grey wolf, *Canis griseus*, of Richardson's *Fauna Borealis Americanæ*, which inhabits the Arctic and Hudsonian zones of America, is regarded as a distinct species. And a similar view is often taken with regard to the so-called red wolf of Texas, the *Canis occidentalis*, var. *rufus*, of Audubon, and Bachman's *North American Quadrupeds*. Both are, however,

regarded by Dr. Elliot, in the work already cited, as inseparable from the present form.

In size the western wolf appears inseparable from the Old World animal. In colour, according to Dr. Elliot, it varies from uniform white through various shades of grey to black; the great majority of individuals being grey and white more or less tinged with brown.

The distributional area of this wolf includes Western North America as far as Idaho and Nebraska, extending southwards to Mexico and northwards to Greenland. In the United States this animal is rarely met with to the eastward of the Mississippi valley. As the habits of the American wolf appear to be essentially the same as those of its Old World representative, nothing need be said with regard to these on the present occasion.

THE TIMBER WOLF

(*Canis lupus nubilus*)

The "timber-wolf," as this race is commonly called in America, was described as long ago as 1823 by Say, in Long's *Expedition to the Rocky Mountains*, so that its title antedates that of the preceding form. The type specimen was killed on the prairie near Council Bluffs, Iowa; and the distributional area of the race includes that portion of North America situated westward of the longitude of Idaho, from the Great Slave Lake in the north probably as far south as California.

The distinctive feature of the animal appears to be its sooty or leaden-brown colour; Say's description of the type specimen being as follows:—

"Dusky colour, the hair cinereous at the base, then brownish black, then grey, then black; the grey of the hairs combining with the black tip to produce a mottled appearance; the grey predominating on the sides.

Ears short, deep brownish black, with a patch of grey hair within. The under-parts dusky ferruginous, greyish with long hairs between the thighs, and with a large white spot on the breast, the ferruginous colour very much narrowed on the neck, but dilated on the lower part of the cheeks ; legs brownish black with a slight admixture of grey hairs, excepting on the anterior edge of the thighs, and the lower edgings of the toes, where the grey predominated. The tail was short, fusiform, a little tinged with ferruginous, black above near the base and at the tip. . . . The longer hairs of the back, particularly over the shoulders, revealed a short, sparse mane."

This somewhat technical description may enable sportsmen to determine to which of the two forms any American wolf-skin they may possess should be referred. The relative shortness of the tail appears to be a distinctive feature of the timber-wolf.

THE EUROPEAN BROWN BEAR

(*Ursus arctus*)

The question whether *Ursus arctus*, as typified by the brown bear of Scandinavia, is a circumpolar species, and also whether (apart from the polar bear) there is more than a single species of bear inhabiting North America, is one which has given rise to a considerable amount of discussion and difference of opinion among naturalists. The answer depends in no inconsiderable degree on the views held by individual zoologists as to the amount of difference between allied animals necessary to constitute species. And in this connection it should be mentioned as an important element in the discussion, that a similar diversity of view obtains with regard to the relationships of the brown bears of Europe and Western and Northern Asia ; many naturalists regarding the brown bear

of Kashmir, and likewise the Syrian brown bear, as specifically distinct from the typical brown bear of Scandinavia. Others, on the contrary, consider the two former as nothing more than local phases, or races, of the latter; this view being adopted in the *Great and Small Game of India*, *etc.*

In regard to the question in its widest aspect, the Russian naturalist Middendorff,[1] so long ago as the year 1851, came to the conclusion that all the brown and grey bears of the northern half of both hemispheres were nothing more than local varieties of a single widely spread species. The late Dr. Gray, of the British Museum, took, on the other hand, precisely the opposite view, considering that not only were all the brown and grey bears of North America specifically distinct from those of the Old World, but also that there were several different species of the latter.

Many other writers might be quoted, but it will suffice on the present occasion to refer to a few of comparatively recent date. In the first of these an American writer, Mr. A. E. Brown,[2] came to the conclusion that the black, grizzly, cinnamon, and in fact all the dark North American bears should be regarded as varieties of the European brown bear; the black bear being, however, more distinct than any of the others. This paper was published in 1894. Two years later the great American zoologist, Dr. C. H. Merriam,[3] contributed another memoir to the controversy. His conclusion is that the black bears of North America (of which several species are recognised) are perfectly distinct from the brown and grey bears of the same region, and likewise that there are several distinct specific representatives of the latter; the different types of Old World brown bears being also regarded as entitled to rank as so many distinct species. In 1897 a third contribution to the subject

[1] *Sibirische Reise* (1851). [2] *Proceedings Philadelphia Academy*, 1894, p. 119.
[3] *Proceedings Biological Society of Washington*, vol. x. p. 65 (1896).

was made by the present writer.[1] So far as regards the perfect distinctness of the black bears of North America from their brown and grey compatriots, the views of Dr. Merriam were followed in this contribution, although only a single specific type of the former was admitted. On the other hand, all the American bears classed by Dr. Merriam in the same subgeneric group as the European brown bear were considered to be nothing more than local phases of that species. From this view the writer has seen no reason to depart, and it is accordingly adhered to in the present volume. It may be added, that in some of the North American brown bears the claws on the fore-feet are longer and straighter than in their Old World relatives, but since this character is not common to all the former it cannot be taken as a feature by means of which they can be collectively separated as a species from the latter. Of course, all the American brown bears are isolated from their representatives in the eastern hemisphere, but such isolation, in the opinion of the present writer, does not by any means necessarily imply specific distinction.

In a work of the present nature it would be entirely superfluous to give the characteristics of bears in general, especially as there are no animals in the area here treated of with which they could possibly be confounded. It may, however, be as well to mention that in all the bears here described the full number of teeth is normally forty-two. The three anterior pairs of cheek-teeth, that is to say, those situated behind the tusks, or canines, in both jaws, are, however, small and almost or completely functionless. Consequently several of them are usually shed before the attainment of maturity, so that the number of teeth in an adult skull is generally only from thirty-six to thirty-eight, or even less.

It may be added that in all European, North Asiatic, and North American bears save the white polar species, the cheek-teeth are large

[1] *Proceedings Zoological Society of London*, 1897, p. 412.

and powerful, the upper carnassial (the third tooth from behind) having a well-developed tubercle on the inner side, while the last upper molar has a very large posterior heel.

As regards the characters by which the brown bear and its varieties are distinguished from the American black bear, the most important of these are connected with the skull, since, so far as colour is concerned, there is an almost complete transition from the one type to the other. Among these dental characters, perhaps the most important are those afforded by the last premolar tooth of the lower jaw, that is to say, the fourth tooth from the hinder end of the series. This tooth, which is relatively large in the brown bear, always carries two distinct tubercles on its inner side. The tooth immediately behind the one just mentioned, that is to say, the lower carnassial, also affords important points of distinction, being larger and of more complicated structure in the brown than in the black American species.

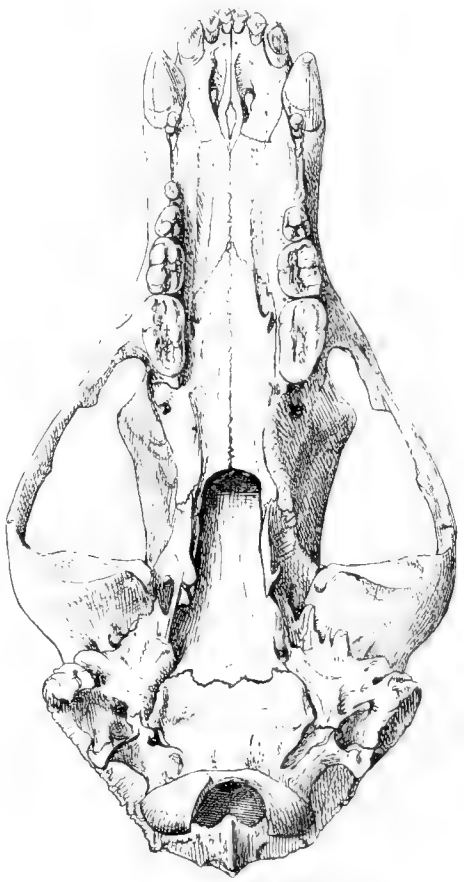


Fig. 23.—Palatal View of the Skull of the Yezo Brown Bear, to show the Characters of the Dentition. (From *Proc. Zool. Soc.*, 1897.)

Externally the brown bear, of which some of the races attain an enormous size, is characterised by the shagginess and length of the coat, the relatively long front claws, and the large size of the hind feet. In Europe and Asia the colour of the fur shows very great local and individual variation, some skins being very dark brown, with or without a white gorget on the chest; in the Kashmir or Himalayan variety the tint is pale

fawn, except in old individuals, while in the Syrian race a silvery grey tone is predominant. Similar variations in colour obtain in the North American races of the species, many Alaskan skins being much browner than those of the true Rocky Mountain grizzly, in which grey is the prevailing tone. Such colour variations are indicated by names like "silver-tip" and "cinnamon" bear, which are applied by American hunters. These variations, in many cases at any rate, appear, however, to be individual rather than racial, Dr. W. S. Rainsford mentioning an instance of a female grizzly bear with three cubs of which the first was nearly yellow, the second almost black, and the third grey.

To describe the typical brown bear of Europe in detail would be a waste of time, since it is an animal familiar to all, and several of the leading features in which it differs from the numerous other local races of the species are alluded to in the descriptions of the latter. Under the typical race may be provisionally included all the bears (save the polar species) found from the Pyrenees at least as far east as the Caucasus and the Urals. Although variable to some extent in this respect, the typical brown bear is not an excessively large animal. Normally the colour of the fur is dark brown; and the skull shows a comparatively low profile and a relatively wide palate, while the front claws are short and much curved. It has been stated by the late Professor Busk that the last premolar tooth in the lower jaw is characterised by its relatively small size and the absence of the posterior inner tubercle; but in a young skeleton from Russia in the British Museum the latter tubercle is very well developed, while there are slight traces of it in a Norwegian skull in the same collection.

Although long since exterminated in Britain, and also killed out at a later date in Switzerland, the brown bear is still fairly numerous in many parts of Scandinavia, while 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.

Whether local races in the area mentioned above are capable of being defined must await the acquisition of a larger series of specimens than our Museums at present possess; but that very great individual variation in colour and size obtains among European brown bears has been long known. The late Professor Nilsson, for instance, notices the occurrence of six different colour varieties in Sweden alone; these he classes as black, dark-brown, brown washed with white (silver), red-brown, brown with a white gorget, and variegated or albino. But it does not appear that any of these colour phases have a definite geographical distribution, while it is quite likely that some of them are only seasonal. Again, the bear of the Pyrenees is stated, at least in the case of immature examples, to be characterised by its yellowish fur and black feet; the hairs of the body being brown with yellow tips, but those on the head deep yellowish. If this prove a distinct race, the name *pyrenaicus* is available.

In the Caucasus bears are found throughout the wooded area, as they also are in Transcaucasia. The ordinary brown form, according to Prince Demidoff,[1] is found at all elevations, and varies in the colour of its fur according to the season of the year, being at one time light brown with a reddish tinge, from which it changes to brown of so dark a shade as to approach black. About eighteen stone is a good weight for a fine specimen.

On the higher grounds of the same area occurs a smaller and greyer form, which Prince Demidoff calls the mountain grey bear. It is stated to have a longer snout than the typical brown bear, while its chest is generally marked with a white gorget or collar. It lives among the high rocks, from which it seldom descends to lower elevations, and is stated to be fiercer in disposition than its larger brown relative.

[1] *Hunting Trips in the Caucasus*, p. 13 (1898).

This grey bear of the higher regions of the Caucasus would appear identical with the one from Transcaucasia described by Middendorff as *Ursus arctus meridionalis*. Bears of a light, or sometimes dark, yellowish white colour, according to Dr. K. Satunin,[1] are found in the neighbourhood of the Black Sea and Talysch, and seem to form a connecting link between the typical brown bear and the Syrian brown bear, to be next mentioned. Very probably this is the correct view ; but it is still an open question whether the bear of Transcaucasia ought to be regarded as representing a race by itself or classed with the Syrian form, as is done by Dr. Satunin.

THE SYRIAN BROWN BEAR

(*Ursus arctus syriacus*)

The Syrian race of the brown bear seems to be connected on the one hand with the silvery grey bears from the Caucasus and neighbouring districts referred to above, and on the other with the Kashmir brown bear, of which mention is made in the *Great and Small Game of India, etc.* The skull is very like that of the Kashmir race, but in the single specimen that has come under the writer's notice the profile lacks the deep concavity characteristic of that of the latter ; and other differences between the skulls of the two forms have been pointed out by Dr. Gray. The last premolar tooth in the lower jaw of the aforesaid skull shows a slight trace of the posterior inner tubercle. By Dr. Gray the colour of the fur is described as dirty yellowish, but silvery grey is the prevalent tinge in a specimen now living in the London Zoological Gardens. Doubtless, however, there are individual variations ; but it does not seem that the fur is

[1] "Die Säugethierfauna der Kaukasusländer," *Zoologischen Jahrbüchern*, vol. ix. p. 292 (1896).

ever of the creamy tint characteristic of immature examples of the Kashmir race.

The typical habitat of this bear is Syria and Palestine, but, as mentioned above, it seems very doubtful whether the silver-grey bears of Transcaucasia and the higher levels of the Caucasus can be satisfactorily distinguished from the Syrian form. In any case, there is probably a complete gradation between the two.

THE KAMCHATKAN BROWN BEAR

(*Ursus arctus collaris*)

(Plate II. Fig. 4)

With the Kamchatkan brown bear we come to the first of several races of the species inhabiting North-Eastern Asia and North-Western America which are characterised, among other features, by their huge bodily size. It is these bears, moreover, which serve to connect the typical European race of *Ursus arctus* with the so-called grizzlies of North America. Compared with the brown bear of Scandinavia, the present race (of which a mounted example, presented by Mr. St. George Littledale, is exhibited in the British Museum), in addition to its superior size and certain peculiarities in the form of its skull, differs by its shorter, more rounded, and thickly-haired ears, the great thickness and massiveness of the body, and the length of the fur, which is very long and tangled, forming a kind of ruff on the throat. The colour of the fur varies, according to season and age, from yellowish brown to blackish brown; the chest and shoulders being in some instances marked with a white collar or gorget, and the legs being always much darker than the back. The front claws are long, highly curved, and of a dark horn-colour. Dr. Guillemard possesses an

enormous skin of this bear, and it is probable that old individuals attain a length of at least 9 feet. Mr. Littledale's specimen, which is apparently immature, is, however, much smaller, its length being only about 6 feet 2 inches, and its height at the shoulder 38 inches.

In this specimen the general colour of the shaggy fur is very pale brown, flecked with whitey-brown, the muzzle being whitey-brown; below each ear, which is very short and thickly fringed with hair, is a patch of fur of a wood-brown colour, and there is a brown patch round each eye; except where they are overhung on the outer side by the long light hair of the back, the limbs are of a full wood-brown, passing into blackish-brown on the feet. There is no white collar. Older animals become much darker, often blackish-brown with a tinge of grey, the limbs being nearly black.

The *Ursus collaris* of Frederic Cuvier (*Mammifères*, pl. xliii.) was named on the evidence of an apparently immature bear from Siberia whose coat is much the same in colour as in Mr. Littledale's specimen. There is, however, a broad white collar extending right across the shoulders and neck, and apparently denoting a tendency to albinism in this particular specimen, which was described in 1824. In 1851, Middendorff, in his *Sibirische Reise*, described a bear from Siberia as *U. arctus*, var. *beringiana*, which is doubtless the same. But Professor I. Geoffroy St. Hilaire, in the *Zoology of the Voyage of the "Venus,"* figured a bear from Kamchatka, to which in 1855 Monsieur Pucheran (*Revue Zoologie*, p. 392) gave the name of *Ursus piscator;* and in 1867 Mr. P. L. Sclater[1] identified with that species an individual from Kamchatka then living in the London Zoological Gardens. The latter bear, which was renamed by Dr. Gray in 1867 *U. lasiotus*, seems to be undoubtedly the adult of the same species as the one to which Mr. Littledale's mounted specimen belongs; and as shown above, the latter appears inseparable from F. Cuvier's *U. collaris*, which is the earliest name

[1] *Proc. Zool. Soc. London*, 1867, 817, Fig.

of all. Dr. Gray described his so-called *U. lasiotus* in the following words: "Black; nose brownish. Ears covered externally with soft and internally with long hairs, forming a projecting tuft. Fur elongate, forming a large tuft on the throat."

Dark rings round the eyes are noticeable in Mr. Sclater's figure.

The range of this bear apparently extends from North Siberia to Amurland and Kamchatka. An excellent account of the habits of the Kamchatkan bear will be found in Dr. F. H. H. Guillemard's *Cruise of the Yacht "Marchesa."* It is there stated that when, at certain seasons of the year, the rivers of Kamchatka become almost choked by the swarms of the northern salmon that ascend them, the bears come down to the banks to prey upon the fish, which they scoop out of the water with their fore-paws.

THE KADIAK BROWN BEAR

(*Ursus arctus middendorffi*)

The brown bear inhabiting Kadiak Island, Alaska, was named in 1896 by Dr. C. H. Merriam in the paper cited above (where it is regarded as a distinct species), and appears to be the largest living representative of its tribe. It approaches very closely to the Kamchatkan brown bear, but is of even larger dimensions. It is further distinguished by the much greater elevation of the frontal region of the skull, which is highly arched and relatively narrow, as well as by the proportionately greater width across the (zygomatic) arches formed by the cheek-bones, and the shortness of that portion of the skull situated behind the posterior roots of those arches. There appears to be no concavity at the root of the nasal bones of the skull; and the great elevation of the skull seems to be most developed in sub-adult examples. It is stated that in the adult female the skull is relatively more elongated and the frontal region less elevated than in the male.

The front claws are long and considerably curved. No mention is made of the external features of this bear by its describer; but a flat skin in the possession of Mr. J. C. Tolman measures no less than 13½ feet from the nose to the tip of the tail, while the animal to which it belonged weighed 1656 lbs.

THE YEZO BROWN BEAR

(*Ursus arctus yesoensis*)

Certain bear-skulls in the British Museum from Yezo, the northern island of Japan, show characters which have led the present writer to regard

Fig. 24.—Profile View of Sub-adult Skull of Yezo Brown Bear. (From *Proceedings of the Zoological Society*, 1897.)

them as representing a distinct race of the brown bear. One of these skulls is shown in the annexed figure, and from the palatal aspect in the figure on page 91. Compared with skulls of approximately the same age of the Kamchatkan brown bear, which they approach in size, two immature specimens differ by the regular convex arch formed by the profile. The difference is also equally noticeable in the one fully adult specimen, in which there is no trace of the concavity at the root of the nasal bones so conspicuous in the Kamchatkan bear. The palate, too, is also remark-

able on account of its extreme elongation and narrowness ; and there are likewise other structural peculiarities in the skull, which are mentioned in the writer's notes on the races of the brown bear published in the *Proceedings of the Zoological Society of London* for 1897. The last premolar tooth in the lower jaw is characterised by its extreme shortness, and the almost complete obliteration of its inner tubercles, the hinder one of which is well developed in the Kamchatkan race.

Compared with Dr. Merriam's figure of the sub-adult skull of the Kadiak bear, the corresponding British Museum specimen appears larger, with a smaller degree of expansion across the cheek-arches, and the arching of the profile not so high or so sudden, but more regular.

The writer has never had an opportunity of seeing a skin of this bear. It is, however, doubtless the animal from the north island of Japan described by Temminck in his *Fauna Japonica*, and identified with the grizzly bear of North America, under the name of *Ursus ferox*.

THE SOUTH ALASKAN BROWN BEAR

(*Ursus arctus dalli*)

(Plate II. Fig. 3)

This huge bear, which is one of those named in 1896 by Dr. Merriam, is typically from Yakutat Bay, South-Eastern Alaska. It is represented by a mounted example in the British Museum, from which the head shown in the plate has been drawn. From the Kadiak Island bear it differs by its slightly inferior size, and by the slight elevation of the frontal region of the skull, which is almost flat. The front claws of the specimen in the British Museum are long and much curved ; the hair being dark brown in colour, without a white gorget on the chest.

This bear is confined to the southern districts of Alaska, its place in the Yukon Valley being taken by the grizzly.

A bear from Sitka Island, in the Alexander Archipelago, which is situated south of Yakutat Bay, has been separated by Dr. Merriam in the memoir cited above, under the name of *Ursus sitkensis*. In his description Dr. Merriam observes that "the Sitka bear resembles the Yakutat bear in general appearance, but is decidedly smaller, and differs widely in dental characters. It lacks the excessive development of the last upper premolar which characterises *Ursus dalli*, and the front lower molar [carnassial] is unique among the large bears, lacking the tubercles that are present in all the others between the anterior and posterior parts of the tooth. In this respect the tooth approaches, though it does not really resemble, that of the black bear."

Bearing in mind the comparatively small distance between Sitka Island and Yakutat Bay, and likewise that the bear from the former locality was described on the evidence of a single specimen, it appears desirable to await the acquisition of additional examples before admitting its right to distinctness. The peculiarities in the dentition of the type specimen may be merely individual. In any case, this bear cannot be regarded as more than a local race.

THE GRIZZLY, OR ROCKY MOUNTAIN BROWN BEAR.

(*Ursus arctus horribilis*)

The true "grizzly" of the Rocky Mountains was originally described from Montana by Ord, in that rare book the second American edition of *Guthrie's Geography*, published in 1815. The typical form ranges as far south as Utah and a long distance into British Columbia. The grizzly of the Yukon Valley and Norton Sound, Alaska, differs, however, to a

certain extent from this typical form, and has been separated as a distinct race under the name of *U. horribilis alascensis*[1]; and the same is the case with the one inhabiting the Sonoran district of Mexico and the adjacent territories, which has been called *U. horribilis horriæus*.

Here, however, a difficulty presents itself. The grizzly and the South Alaskan bears are regarded by American zoologists as distinct species; and on this view they may be divided into local races distinguishable by the addition of a third name. When, however, the two former are regarded merely as local races of the brown bear, a subdivision of the grizzlies, if uniformity is to be maintained, can only be made by using four names, as, for example, *Ursus arctus horribilis alascensis*. Such complicated nomenclature is, however, not yet admitted in zoology, and the three modifications of the grizzly type are consequently here regarded as belonging to a single somewhat variable race.

In this sense the range of the grizzly bear extends from Norton Sound, Alaska, through the Rocky Mountains into Arizona, California, and Northern Mexico. Except in the Hudson Bay district, brown bears are unknown to the eastward of the Rockies. This may probably be taken to indicate that all of them were originally emigrants from Asia by way of what is now Bering Strait and Alaska. The wapiti, the elk, and the bison doubtless entered America by the same route, but have succeeded in penetrating farther eastward, possibly on account of having reached the Western Hemisphere at an earlier epoch.

The true grizzly is a smaller animal than either of the preceding American races, with the front claws longer, straighter, and lighter-coloured. On the shoulders the hair is so elongated as to give almost the appearance of a hump, whence these bears are frequently termed "roach-backs." The skull is relatively long, with the temporal impressions in the

[1] Merriam, *Proceedings Biological Society, Washington*, vol. x. p. 74 (1896); and Osgood, *N. American Fauna*, No. 19, p. 41 (1900).

adult not turning in abruptly from the post-orbital processes of the frontals, and the whole frontal region between them elevated and usually convex. Compared with the typical brown bear of Europe, the cheek-arches are less expanded, forming an ellipse rather than almost a circle, and the palate is flatter.

The grizzly of Norton Sound and the Yukon, which appears to be by no means abundant, is a somewhat larger animal, with the frontal region of the skull narrowed between the sockets of the eyes, the palate longer, and the ascending branch of the lower jaw higher. Certain minute points of difference are likewise said to be observable between its cheek-teeth and those of the bear from the Central Rockies.

The Sonoran grizzly, on the other hand, which ranges from the Southern Rocky Mountains into Northern Mexico and California, has the frontal region of the skull flattened and concave between the post-orbital processes.

In general coloration the grizzly, as its name implies, is some shade of greyish, although there are many individual variations. In this respect it approximates to the Syrian race of the species, of which it may perhaps be regarded as the American representative.

The largest grizzlies were those formerly found in the Sierra Nevada in Northern California, of which Mount Shasta forms the northern termination. These, however, have been almost or completely exterminated by the shepherds in the greater part of that chain of mountains, on account of the damage they inflicted on the flocks. Dr. Merriam[1] states that although grizzlies were formerly very abundant in the Mount Shasta district, they are now exceedingly rare. A few years ago a huge grizzly, well known to the settlers under the name of "Old Clubfoot," which had been repeatedly shot at, was killed near Goose Nest Mountain, just north of Shasta, and was probably one of the last of his race. Skins pegged out

[1] *North American Fauna*, No. 16, p. 107 (1899).

but not unduly stretched are known which measure from 9 feet 3 inches to 10 feet in length. Dr. Rainsford estimates the weight of a full-grown Sierra grizzly at from 900 to 1000 lbs., but there seems little doubt individuals weighing from 1200 to 1400 lbs. were occasionally killed in the old days. The reports of still greater weights must, however, be received with extreme caution.

Grizzlies, like the other American representatives of the brown bear, are, writes Dr. Grinnell,[1] much less tolerant of the approach of civilisation than is the black bear, and are likely to quit any region where they are much disturbed. "On the other hand, where bears come to feel a confidence in their human neighbours, they are extraordinarily bold. It is but a year or two since there was a bear living at Heart Butts, Montana, which made a practice of coming into an Indian camp to find what he could to eat. The Indians had no arms, and did not discuss his rights in the premises, but promptly vacated the camp on his appearance."

THE BARREN-GROUND BROWN BEAR

(*Ursus arctus richardsoni*)

This, the last and smallest American representative of the species, was named in 1838 by Swainson, after the American naturalist Sir J. Richardson. Its range includes the Barren Grounds between Hudson Bay and the Mackenzie, and may perhaps extend some distance westward of that river. Contrasted with that of the grizzly, the skull is shorter and wider, with the muzzle abruptly truncated, so as to give a kind of "pug-nosed" appearance. This shortening, according to Dr. Merriam, is especially noticeable in the region of the brain-case, the posterior roots

[1] *Outing*, vol. xxxvii. p. 257 (1900).

of the cheek-arches being approximated to the occiput. In young individuals the top of the skull is flattened, but in full-grown animals it rises abruptly at the sockets of the eyes, to become convex above the brain-case. The last lower premolar tooth lacks the anterior inner cusp. Dr. Merriam regards this bear as most nearly related to the Alaskan form of the grizzly, from which, however, it is markedly distinct.

THE POLAR BEAR

(*Ursus maritimus*)

(Plate II. Fig. 5)

That the white bear of the north polar regions is an animal that has exchanged the dark livery of its fellows for a dress to accord with the eternal snow and ice of its northern home may be regarded as an indisputable fact. It would, however, be quite erroneous to suppose that this animal is merely a brown or a black bear, or a near relative of one or the other, that has adapted itself to the exigencies of an Arctic existence. On the contrary, the white bear differs so remarkably in the form and proportions of its skull and cheek-teeth that it must undoubtedly have branched off from the common ursine stock at a comparatively distant epoch. So different indeed is the animal in these respects that by many naturalists it is regarded as entitled to represent a distinct generic type by itself, under the name of *Thalarctus*, or more correctly *Thalassarctus*. Such a wide separation from its kindred does not, however, appear necessary, and it seems preferable to use the last-named title in a subgeneric rather than a generic sense. On this view the full title of the animal will be *Ursus* (*Thalassarctus*) *maritimus*. It may be added that a suggestion was made in 1899 that the proper specific title of the white bear is *marinus*

rather than *maritimus*, but this proposed change has not met with a favourable reception among naturalists.

Whatever differences of opinion may obtain among zoologists as to the propriety of regarding *Ursus arctus* as a circumpolar species, there is perfect unanimity on this point in the case of the polar or white bear, which has hitherto not even been divided into local races. Its range thus includes the Arctic shores of the continents of both the eastern and western hemispheres, as well as most, or all, of the islands of the Polar Ocean. Bears are, however, stated to be more numerous on the islands where the ice remains unmelted throughout the year than in those where it disappears in summer, as is the case on the south-western coasts of Novaia Zemlya and Spitzbergen. And in many districts where they were formerly abundant their numbers have been so reduced that they are now comparatively rare. This is the case in Labrador, from the southern part of which the white bear appears to have been totally exterminated. There is some reason to believe that in the fifteenth century the species inhabited Newfoundland ; and it has even been suggested that its southern range extended as far as Maine, where bones from the old shell-mounds have been assigned to this species. How far south the range of this animal extends along the Scandinavian coasts is very difficult to ascertain.

Of course the creamy white coat from which this species derives one of its popular titles serves at once to distinguish it broadly from all its kindred, but a brief reference to some of its other peculiarities seems advisable. In many books on natural history it is stated that the present species differs from all other bears by the relatively small size of its head. A more exact description would state that the skull is distinguished by the low elevation of the portion containing the brain and the consequent straightness of its profile. That it is incorrect to describe the skull as small is manifest from the measurements of bears' skulls given in the third edition of Mr. Rowland Ward's *Records of Great Game*, where the present

species stands third on the list; one of the two specimens above it being the skull of a Kamchatkan brown bear, and the other that of the great extinct cave-bear of Europe. In the Kamchatkan brown bear skull the extreme length is 18 inches, and the maximum width across the arches formed by the cheek-bones 11 inches. Of the three largest white bear skulls in the list one measures $16\frac{1}{2}$ and the other two 16 inches in length; the width of one of the two latter being $9\frac{5}{8}$ and of the other $9\frac{7}{8}$ inches. A fourth specimen, measuring $15\frac{7}{8}$ inches in length, has, however, a width of $10\frac{1}{2}$ inches. The comparative narrowness of the skull is to a great extent confined to the brain-case, and is less apparent when the cheek-arches are taken into consideration.

Another characteristic feature of the white bear is to be found in the relatively small size of its hinder cheek-teeth, which are also narrower than in most other species, and have a simpler structure on the crown. A third peculiarity is the covering of hair on the soles of the feet, whereby the animal is enabled to obtain firm foothold where an ordinary bear would slip and slide about in a ludicrously helpless manner. As minor peculiarities of the species may be noticed the unusual length of the neck and the comparatively small size of the ears, which are densely covered with fur. Although in all examples that have come under the present writer's notice the long and thick fur is of a beautiful creamy white, it has been stated by Mr. F. E. Beddard, in an article on white bears published some years ago in *Knowledge*, that a brownish tinge is occasionally perceptible.

As regards the maximum dimensions attained by the white bear, there is the dearth of exact information so usual in the case of nearly all large animals. It is commonly stated that white bears not unfrequently attain a length of close upon 9 feet. Mr. Arnold Pike, in the "Badminton Library" volumes on *Big Game Shooting*, states that a full-grown male will commonly measure from 8 to $8\frac{1}{2}$ inches from snout to tail, and weigh

about 1500 lbs. He mentions, however, a skin measuring 9 feet 10 inches from the snout to the root of the tail; but the measurement appears to have been taken after its removal from the animal, and is thus probably exaggerated. A length of 9 feet 5 inches, and a height at the shoulder of $4\frac{1}{2}$ feet, are given by Mr. Rowland Ward as the dimensions of a specimen from Baffin Bay; 1600 lbs. being the weight of another specimen recorded in the same list.

Although the older writers give terrible accounts of the ferocity of the white bear, these are not borne out by the testimony of later travellers and sportsmen; but it must be borne in mind that this discrepancy may be largely due to the deadly character of modern firearms as compared with the weapons of an earlier age. Mr. Arnold Pike even goes so far as to despise the white bear from a sporting point of view, saying that its pursuit is far less exciting than walrus-hunting. And no doubt there is a considerable degree of foundation for this idea, seeing that this bear can in most cases be detected at a long distance by the hunter, stalked without difficulty, and finally dispatched with a well-directed bullet. Consequently, hand-to-hand encounters with white bears are now of rare occurrence. Not so in the old days of Arctic hunting, when the *coup de grâce* was often delivered with a spear or the butt-end of a gun. For many years the present writer possessed the skull of a white bear which in its death-struggle bit off one of the fingers of a Captain Jack, who commanded a vessel engaged in the whaling trade during the early part of last century.

From the relatively small size and simple structure of its molar teeth the white bear might be inferred to be much more carnivorous in its tastes than are the majority of its kindred; and, as a matter of fact, this is really the case, its food consisting chiefly of seal, walrus, and porpoise flesh, varied by fish and an occasional gorge on the carcase of a stranded whale. Although an expert swimmer and diver, the white bear can only attack and kill the unwieldy walrus when on land; but seals it often

kills by swimming along the edges of the ice-flow or pack-ice and striking them as they lie asleep with their head close to, or even hanging over, the water. So stealthy, too, are its movements when on the ice, that it is reported to kill with ease the seals as they lie basking alongside their breathing-holes, although this is a task which often baffles the European hunter armed with a rifle. It is not, however, to be assumed that the white bear altogether disdains vegetable food, for at least one has been observed grazing as busily as a brown bear; while a specimen in captivity was fed for years on bread alone.

At the commencement of winter, that is to say, about the end of September in the Hudson Bay territory, the pregnant females retire to a hiding-place beneath the snow in some inland spot, where they remain till the spring, bringing forth their offspring (generally two in number) meanwhile. The male bears, it is said, generally or always accompany their partners to their hiding-places, in which they see them safely ensconced; after which they return to the coast, where, in some districts at any rate, they are active throughout the winter. In the more northern portions of their range bears of both sexes disappear during winter, and it has consequently been suggested that both hibernate. But this disappearance may well be caused by the migration of the males to more southern regions, where, as noted above, they remain active at all times; and there does not appear to be any authenticated instance of a male bear having been found in a dormant condition. In this connection the testimony of Mr. A. Pike may be quoted :—

"No beast on the earth lives a harder life than the polar bear. Relying solely on the chase, it roams continually amongst the ice. Even during the winter it does not retire from the battle of life, like its less hardy congeners, but wanders on through the storm and lasting darkness, for this species does not as a rule hibernate. It is alleged elsewhere that the female differs in this respect from the male, hibernating while he

remains out, and the fact that all the bears (between sixty and seventy) killed in the winter months during the Austrian expedition under MM. Weyprecht and Payer, were males, supports this statement; but, on the other hand, the only bears, two in number, which we killed in midwinter (on 11th and 19th December 1888), while wintering on Dane's Island (north coast of Spitzbergen), were both females, accompanied on each occasion by a cub. I think it possible, therefore, that it is only the females which are about to cast their young in the spring that lie dormant during the winter."

A very similar opinion was given many years previously by Sir John Richardson, who, in his *North American Zoology*, wrote as follows :—

"The polar bear being able to procure its food in the depth of even an Arctic winter, there is not the same necessity for its hibernating that exists in the case of the black bear, which feeds chiefly on vegetable matter; and it is probable that, although they may all retire occasionally to caverns in the snow, the pregnant females alone seclude themselves for the entire winter."

If the Eskimo account is to be relied upon, namely, that it is only the females which develop a great store of fat at the approach of autumn, it would seem probable that the opinion expressed in the two foregoing quotations is correct.

Like most, or all, of their kind, white bears are generally met with either singly or in small family parties of from three to five individuals. When, however, the carcase of a whale or walrus is stranded, especially if it be in a more or less odoriferous condition, all the bears within smelling distance flock together to join in the banquet.

From the length and beauty of the fur, white bear skins are much in demand, and command a high price in the market; their value ranging between ten and thirty pounds each, if in good condition and retaining the claws. The best skins are stated to be those from Greenland, where

the animals are killed during winter, when the fur is at its best. In these skins the fur does not turn yellow from being stained by oil; and this immunity is said to be produced by dragging the skins in the snow as soon as they are removed from the bodies of the animals.

THE WOLVERINE

(*Gulo luscus*)

(Plate II. Fig. 6)

Owing to considerations of space, the smaller quadrupeds which have any claim to be regarded as game animals are for the most part excluded from the purview of the present volume. But an exception is made in the case of the wolverine, or glutton, as it is often called, on account of its being one of the comparatively few that undoubtedly have a circumpolar distribution. The wolverine is one of the few animals that Linnæus described twice over, first as *Mustela gulo*, and secondly as *Ursus luscus*; the former title applying to the Scandinavian form of the animal. When these two were found to be identical, and it was also manifest that the creature belonged neither to the genus *Mustela* (marten) nor to *Ursus* (bear), it was made the type of a new genus under the title *Gulo luscus*—a name which has been very generally adopted ever since. Since, however, the typical Scandinavian form is the one to which the specific title *gulo* was originally applied, purists in nomenclature would probably prefer to call the animal *Gulo gulo*.

Originally the wolverine and the musk-ox appear to have had a very similar geographical distribution, the range of both in prehistoric times including a large portion of Western and Central Europe as well as the northern parts of both hemispheres. Whereas, however, the musk-ox has long since disappeared entirely from the Old World, the wolverine still

survives throughout Northern Europe and Asia, although the extent of its range to the southward has been much curtailed in the former continent. In America both coexist, although the wolverine, by adapting itself to a life in the mountains, extends much farther south on the western side of the continent than does its larger compatriot.

As regards its zoological affinities, the wolverine is a relative of the martens, with which it agrees in the number (38) and general character of its teeth. In common with the former, it differs from the bears by the smaller number of true molar teeth, of which there is one pair in the upper and two pairs in the lower jaw. In the bears, on the other hand, there are two pairs of upper and three of lower molar teeth.

Unlike the martens and weasles, however, the wolverine resembles the bears in walking on the greater part of the soles of the feet, instead of on the toes alone. But this is a feature of but little importance from the point of view of relationship, seeing that it is one inherited from the primitive type of the Carnivora, and its retention depends probably more on the habits of the animals in which it occurs than on their zoological affinities.

Were it not for its moderately long and bushy tail, which is about as long as the body, the wolverine would present a certain resemblance to a very small and long-haired bear. In the highly-arched back its form recalls, however, to a certain extent the striped hyæna; and its habits are also in some degree hyæna-like. With the exception of the bare callous pads, the whole of the soles of the feet are thickly coated with hair. In length a wolverine will measure about $2\frac{1}{2}$ feet to the root of the bushy tail; the tail itself being about a foot long. The general build is heavy, and the limbs are comparatively short. Although there seems to be a considerable amount of individual, or perhaps local, variation in this respect, the colour of the long and soft fur is mostly blackish brown; but a light-coloured ellipse of a greyish or yellowish tint across the shoulders

and along the flank generally demarcates a large saddle-like area on the back which is darkest of all. A light band also extends across the jaw between the short ears and the eyes; and the upper part of the head and neck is greyish. In the paler coloured individuals the light ellipse round the dorsal saddle is nearly white and the saddle itself brown; but in the darker varieties the central area is nearly black and the surrounding ring dark brown.

Mr. H. Poland, who has handled a large number of wolverine skins in the course of his business, states that specimens from British Columbia are dark brown, rather coarse-haired, and large-sized; thus approximating in the latter respect to the very large, coarse-furred, and light-coloured Kamchatkan form. Siberian and Russian skins, on the other hand, run smaller and darker, and have fur of a much finer and softer texture. These remarks seem to indicate that it may be possible to define local races of the species. It may be added that almost black examples, especially in Siberia, are by no means uncommon. Albinos, on the other hand, are of extreme rarity. 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.

Formerly, that is to say, in prehistoric times, the wolverine was found in England, and indeed ranged as far south as the Pyrenees. Now, however, it is restricted in Europe to Northern Scandinavia and Russia, whence it extends eastwards through Siberia to Amurland and Kamchatka. Indications of its presence have been found as far north as Melville Island; and it ranges over all the northern districts of America, extending southwards on the Atlantic seaboard about as far as lat. 42° N. On the Pacific side, along the mountain ranges, its southern limits descend lower, the species occurring in the Sierra Nevada of California, as it does farther north in the Cascade range of Oregon. Dr. C. H. Merriam[1]

[1] *North American Fauna*, No. 16, p. 105 (1899).

states that it is uncertain whether wolverines occur on Mount Shasta (to the north of the Sierra Nevada), but it is probable that they do, a specimen having been killed about 1893 between Mounts Shasta and Lassen. From most parts of the United States wolverines have been more or less completely exterminated; but they are still common enough in Canada and Alaska. Concerning their occurrence in the Yukon Valley, Mr. W. H. Osgood[1] writes as follows :—

"Wolverines seem to be quite common in the Yukon district. They were often reported, and I saw a number of skins among the natives on the lower river. One was said to have been trapped at Tagish in the winter of 1898, and others were seen in the vicinity. They are seen frequently about Lake Lebarge in winter, and trappers from the Macmillan River say they are abundant in that region."

Save where it lives beyond the limits of trees, the wolverine is essentially a forest-dwelling animal. It is also commonly stated to be almost completely nocturnal in its habits. Mr. C. L. Herrick, in his work on the *Mammals of Minnesota*, says, however, that in districts where it is common the wolverine may be encountered at any time of the day or night, as it certainly may at all seasons of the year, for it is one of those animals that disdain to hibernate. As regards its food, it is exclusively carnivorous, preying chiefly upon small mammals, but occasionally attacking a young reindeer or mule deer, and never refusing a meal of carrion when hungry. War to the death is waged by the trapper against the wolverine, on account of its habit of visiting his line of traps and removing the bait from each in succession without being injured itself. From four to five cubs are produced at a birth; the nursery being generally a cave or hollow log, and the season of the year June or July.

[1] *North American Fauna*, No. 19, p. 44 (1900).

Drawn by H. Goodchild

FIG. 25.—Young Male Argali recently living in the Menagerie of the Zoological Society in the Regent's Park. A distinct throat-ruff, usually regarded as distinctive of the Tibetan race, is noticeable (see page 123).

SECTION II

OLD WORLD TYPES

THE EUROPEAN BISON

(*Bos* [*Bison*] *bonasus*)

(Plate III. Fig. 1)

Few names in zoology have been more misused than that of bison, which properly belongs exclusively to the species whose habitat is now restricted to the Caucasus and a certain district in Lithuania, although it is only in the former area that the animal is met with in a truly wild condition. Formerly, however, the bison, or wisent as it was called in certain districts, appears to have been distributed over the greater part of Europe, where it was a contemporary of the wild ox, or aurochs (*Bos taurus primigenius*). When that species became extinct as a wild animal, the name aurochs seems to have become transferred to the bison, so that the latter title has fallen to a great extent into disuse, so far as the species to which it properly belongs is concerned. It is, however, still commonly, and correctly, applied to the American representative of the group in popular English literature, although in America itself that animal is almost invariably miscalled buffalo. There is, however, no justification for calling the Indian gaur a bison, although this term is commonly used for the

latter animal by sportsmen. In Russia the name zubr is the native title of the bison.

It will be evident from the foregoing remarks that there is no justification for ever using the terms aurochs in connection with the present animal, whose proper title is bison, *par excellence*. In order, however, to distinguish it from its American relative it is frequently convenient to speak of it as the European bison.

The nearest existing relative of the two living species of bison appears to be the yak of Tibet,[1] which, among other features, is readily distinguishable, at least in the wild condition, by the sable hue of its coat and the great amount of long hair clothing the tail and the whole of the flanks.

In the true bison, on the other hand, the colour is some shade of brown, the long hair on the tail is only of moderate amount and may be restricted to its extremity, and the long hair on the body is developed only on the fore-quarters, and in the European species chiefly on the forehead, chin, throat, and chest. The hair all over the body is, however, of considerable length in the winter coat, and in the European species frequently displays a more or less marked tendency to curl. But a more important feature of the true bisons is to be found in the great relative height of the withers, and the presence of fourteen pairs of ribs in the skeleton. The horns, too, which are cylindrical in form, are peculiar in growing from a ridge situated below the extreme vertex of the skull, so that in a front view of the latter the summit of the crest of the true occiput is visible. The sockets of the eyes, which are placed comparatively close to the horns, are likewise remarkable for their tubular form; and the nasal bones are noticeable for their relative shortness. Again, the frontal region of the skull of a bison is characterised by its great width and shortness. In all the foregoing respects a bison's skull differs very markedly from that

[1] See *Great and Small Game of India, etc.*, and *Wild Oxen, Sheep, and Goats of all Lands.*

PLATE III

1. European Bison.
2. Siberian Argali.
3. Littledale's Sheep.
4. European Muflon.
5. Armenian Muflon.
6. East Caucasian Tur.
7. West Caucasian Tur.
8. Spanish Tur.
9. Alpine Ibex.
10. Persian Wild Goat.
11. Arabian Tahr.

3

2

9

1

11

6

7

5

10

8

4

EUROPEAN AND ASIATIC TYPES.

Published by Rowland Ward Ltd.

of either a domesticated ox or a gaur, and, of course, still more from that of a buffalo.

A figure of the European bison, taken mainly from a mounted Caucasian bull in the British Museum, is given in plate v. of *Wild Oxen, Sheep, and Goats*, but the artist has not succeeded in making a good likeness of the animal, the fore-legs being too short, and the contour of the head and neck by no means satisfactory. The colour also is of too bright a brown, but this can scarcely be laid to the fault of the artist, as the hair

Fig. 26.—Bull and Cow European Bison from Lithuania at Woburn Abbey. From a photograph by the Duchess of Bedford.

of all the specimens in the Museum has turned a foxy hue. The accompanying photogravure of a living bull and cow from Lithuania at Woburn Abbey gives the correct form of the animal; but the bull, either owing to immaturity or the season of the year at which the photograph was taken, does not show the full development of the mane on the fore-quarters, which is better displayed in the figure on page 119.

Reaching to a height of 6 feet 1 or 2 inches at the shoulder, the bull European bison stands fairly high on the legs, and has well-developed hind-quarters which do not fall away in the manner so characteristic of its American cousin. The withers, too, do not form the enormous hump

which is so noticeable in the latter, and the long hair on this part of the body never makes such a heavy mass as in that species. The pasterns are long; and the tail, which may be long-haired throughout, as in the accompanying photographs, or only at the tip, as in the dead Caucasian specimen photographed in Prince Demidoff's book on hunting in the Caucasus, reaches at least as low as the hocks. When the photograph on page 117 of the Woburn bull was taken the long hair of the head and fore-quarters was chiefly developed on the crown of the head, forehead, middle of the face, and the middle line of the under surface from the chin to between the fore-legs; there being little mane on the neck, although the ears are fringed with long hair. A similar throat-fringe and forelock are noticeable in the bull from the Caucasus in the British Museum; the tail in this specimen being tufted only at the end. On the other hand, in a Caucasian bull figured by Prince Demidoff[1] there is a well-marked upright mane on the neck. In an old bull from Lithuania presented to the British Museum by the Tsar about 1845 the mantle of longish curly hair investing the whole of the fore-quarters is very well developed; the hair being much longer on the head, throat, and the middle line of the chest than elsewhere. Although the colour of the hair in all the specimens now exhibited in the British Museum is bright chestnut-brown, this seems to be due to fading, the colour of the bull and cow now (March 1901) living in the park at Woburn Abbey being in the main puce-brown with a tinge of greyish purple. The head, especially in the bull, is, however, nearly black, and the mantle of long hair on the withers tends to tawny, especially when about to be shed.

None of the differences indicated above seem to be more than individual or seasonal, and do not support the idea of a racial distinction between the Lithuanian and Caucasian animals, which are stated, however, to differ somewhat in size and colour.

[1] The figure is reproduced in *Wild Oxen, etc.*, p. 76.

The skull of the European bison is specially characterised by the flatness of the forehead and the marked prominence of the sockets of the eyes, which form short tubes ; as well as by the extreme shortness and width of the nasal bones.

The longest bison horns recorded by Mr. Rowland Ward are those of the bull from Lithuania presented to the British Museum by the Tsar of Russia. These measure $8\frac{1}{4}$ inches along the outside curve, and have a

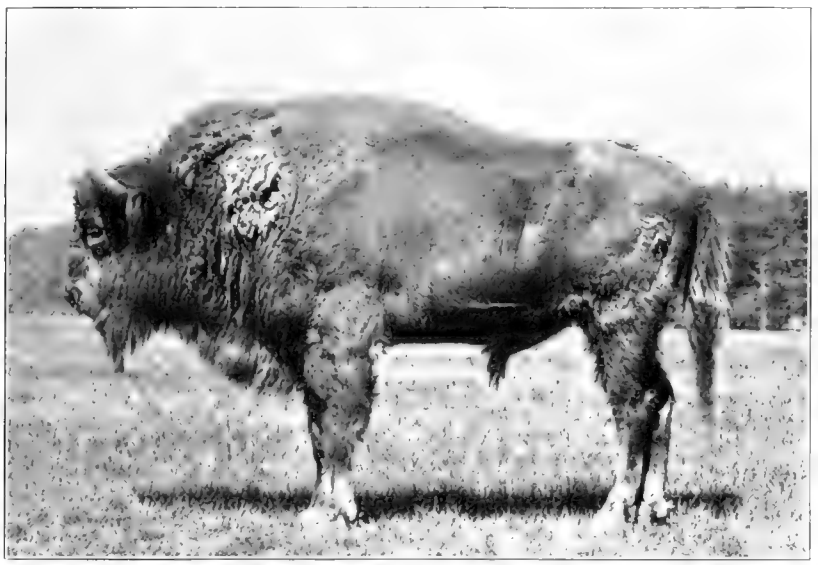


Fig. 27.—Another View of the Bull European Bison at Woburn Abbey. Photographed by the Duchess of Bedford.

basal girth of $12\frac{1}{8}$, and a tip-to-tip interval of $13\frac{3}{4}$ inches. A bull killed by Mr. St. George Littledale, which stood 5 feet 11 inches in height at the withers, measured 10 feet 1 inch from the nose to the root of the tail.

The two remaining resorts of the bison are the forest of Bielowitza (or Bielovege), in the district formerly known as Lithuania, but now officially designated the government of Grodno, and certain parts of the Caucasus. In the latter area alone does the animal exist in a perfectly wild condition. It is there confined to the forest districts in the neighbourhood of the sources of the Leba and Bjellaja rivers on the north side of the range,

its eastern limits being approximately indicated by the sources of the Zellentchuk. Throughout its habitat in this part of the Caucasus it appears, however, to be comparatively rare, and is generally found only in twos or threes, although occasionally as many as five may be seen in company.

Since full details of the habits of this noble animal, as well as the numbers of the herd in the Bielowitza forest, are given in *Wild Oxen, Sheep, and Goats of All Lands*, they need not be repeated on the present occasion. Since that account was written, Mr. E. N. Buxton[1] has, however, published some notes on the bison made during a visit to the Bielowitza forest in 1898 which are of much interest. After stating that, in company with the chief forester, Mr. Neverli, he drove for many miles through the forest, he writes as follows of the bison :—

"It occupies a country which is almost dead flat, but is intersected by a few sluggish streams. With the exception of the meadows which border the latter, and a few clearances for cultivation round small villages, there are no open spaces: consequently, although the timber, which consists mainly of oak, elm, birch, spruce, and fir, is very fine, the forest is tame and wanting in variety. This monotony is enhanced by the unfortunate practice of removing all windfalls, a most short-sighted policy, as I think, because nothing so assists the warmth, shelter, and sense of security of a forest, for wild animals, as fallen timber, through the branches of which a tangle of wild growth quickly penetrates and forms a natural screen. The artificial effect is further increased by an immense extent of grass rides, which are cut in perfectly straight lines, at right angles to one another, dividing the forest into squares of four kilometres for the convenience of driving the game. There are nearly four hundred lineal kilometres of these rides.

"Mr. Neverli estimates the herd of bisons at the present time at about seven hundred, and he puts the elk, which frequent the wettest parts, at

[1] *Proceedings Zool. Soc. London*, 1899, p. 64.

the same number. The wild boars, judging by their frequent rootings, must be very numerous. Red deer were not formerly found in the forest, but have been introduced. I could not find out that there was any satisfactory basis for Mr. Neverli's calculation of the numbers of the herd of bisons. Judging by the number of tracks which I saw, I am inclined to be sceptical of it. Every naturalist will be anxious to know whether the herd is diminishing or not. Mr. Neverli is of opinion that the herd was formerly more numerous, but such estimates may be based on some calculation even less authoritative than those of the present time. The privilege of hunting in this forest was confined for centuries to the Kings of Poland exclusively."

At the last official count which was taken of the herd in the forest, namely, in 1892, the number was given as 375, in addition to which there were 101 head in the adjacent forest of Swisslotch, and 15 in the Zoological Gardens at Bielowitza.

For accounts of bison-stalking in the Caucasus the reader may be referred to Prince Demidoff's *Hunting Trips in the Caucasus*, and also to Mr. St. George Littledale's article in the volumes on *Big Game Shooting* in the "Badminton Library."

The European bison is one of the animals that has not been exhibited to the public in the menagerie of the London Zoological Society for many years; the last example being one purchased in the autumn of 1868, which had been bred three years previously in the garden of the Zoological Society of Amsterdam. Recently, however, the Duke of Bedford obtained a bull and two cows from the Lithuanian herd, all three of which were living in an enclosure in the park at Woburn Abbey at the end of 1900. One of the cows unfortunately died at the commencement of the following year; its skin is now mounted in the Museum at Edinburgh.

THE YAK

(*Bos* [*Bison*] *grunniens*)

Although this animal inhabits portions of Central Asia coming within the area treated of in the present work, it has been so fully described in the companion volume, *Great and Small Game of India, Tibet, and Burma*, that it requires no further notice here. We accordingly pass on to the wild sheep, the first of which to be mentioned is

THE SIBERIAN ARGALI

(*Ovis ammon*)

(Plate III. Fig. 2)

According to the view adopted in *Wild Oxen, Sheep, and Goats of All Lands*, the great wild sheep of Siberia and the Altai is the typical representative of a species divisible into at least three local races, and as one of these, the Tibetan argali (*O. ammon hodgsoni*), is described in *Great and Small Game of India, etc.*, where the characters of the species itself are also given, the notice in this volume need only be very short indeed. A good portrait of the ram in the summer dress forms the frontispiece to Prince Demidoff's *After Wild Sheep in the Altai and Mongolia*, but the colour is made decidedly darker than in the mounted specimen presented to the British Museum by Mr. St. George Littledale.

The distinctive characteristics of the typical Siberian, or Altai, race of the argali appear to be the following:—The horns of the old rams are very long and massive and much inclined outwards at the tips, which are generally but little broken, so that their spiral forms more than one complete circle. There is no long white ruff on the throat of the rams in the summer coat, and little or no trace of the same in an old male from

Siberia in the British Museum showing the winter dress. In a young ram from the Altai (Fig. 25) recently living in the Zoological Gardens there is, however, a distinct throat-ruff, although it does not seem that this would ever become so long or so white as in the Tibetan argali. In the winter dress of the old rams the general colour of the hair on the upper-

Fig. 28.—Skull and Horns of Siberian Argali. From an Altai specimen shot by Mr. St. George Littledale.

parts is light brown tinged with grey ; the lower part of the face, the abdomen, a patch on the rump, including the tail, and the inner surfaces of the limbs and their front surfaces below the knees and hocks being white or whitish. In the very short summer coat the colour of the old rams is very much lighter, the general tint above being uniform speckled light brown and white, becoming lighter on the face, throat, chest, the under surface of the body, and the limbs, while the white rump-patch is

so little lighter in colour than the back as to be almost unnoticeable. Females in the winter coat show a tuft of dark hair longer than elsewhere on the nape of the neck.

Very different in appearance to the old rams in the summer coat as described above was the young ram in the Zoological Gardens already mentioned. According to a figure published by Mr. P. L. Sclater in the *Proceedings of the Zoological Society* for 1899,[1] this animal, at a time when its horns were still small, upright, and goat-like, was of a generally brownish grey colour, the face, chest, and a line on the flanks being much darker, while the inner surface of the ears, muzzle, the under surface of the body, and the rump-patch and tail, as well as the hinder surface of the fore-legs, were pure white. The whole of the fore-legs with the exception of the front surface, as well as the inner side and the outer surface of the lower part of the hind-limbs, were likewise very much lighter than the back and sides of the body. There was a whitish gorget on the throat. Starting from this very dark juvenile stage, the coat of the males in summer appears to become gradually lighter and lighter, till in very old rams it reaches the extreme lightness referred to above.

A remarkable feature about the young ram just mentioned was the extreme rapidity of its growth. In the summer of 1899 it was in the condition shown in Mr. Sclater's figure, but by September 1900 its horns were quite large and had assumed the form characteristic of adult rams, while the hair on the throat had developed into a fairly conspicuous ruff (Fig. 26).

In *Wild Oxen, Sheep, and Goats of All Lands* the maximum length of *Ovis ammon* horns, measured along the front curve, was given at 56½ inches; this dimension being taken from a pair obtained by Major C. S. Cumberland in the Altai, which then formed the "record" in this country. This and the other dimensions have, however, been largely exceeded in the case of

[1] Plate vii.

four specimens, three of which were obtained by Mr. Littledale and the fourth by Captain H. J. Elwes. The measurements of these four magnificent examples are as follows :—

Length along Front Curve.	Basal Circumference.	Tip to Tip.
$62\frac{1}{4}$	$19\frac{3}{4}$	$38\frac{1}{4}$
62	19	$38\frac{3}{4}$
$61\frac{1}{2}$	$19\frac{1}{4}$	$39\frac{1}{4}$
$59\frac{1}{8}$	$19\frac{1}{8}$	$38\frac{1}{4}$

The argali in Siberia is one of the many animals whose range has been greatly curtailed within modern times by incessant persecution on the part of man, and 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. Probably the range of this sheep once extended continually from the mountains in the neighbourhood of Lake Baikal, in the south of Eastern Siberia, through the north of Mongolia to the Semipalatinsk Altai, where it is still fairly abundant, and is met with on a plateau varying in elevation from about 6000 to 10,000 feet above sea-level. In Northern Mongolia, where, as in Siberia, it frequents lower levels, it is likewise locally abundant.

So many accounts of the habits of this argali have been published, that but little need be said on the present occasion. Of travellers who have recently visited its haunts, Captain J. H. Elwes, in his narrative of a journey in the Altai published in the *Journal of the Linnæan Society* for 1899, says scarcely anything about this sheep. Prince Demidoff, on the other hand, in his work entitled *After Wild Sheep to the Altai and Mongolia*, has much interesting information to impart on this subject.

In that volume will be found an account of the stalking by Mr. Littledale of a flock of ten old rams, the horns of one of which, as measured on the spot, were stated to be 60 inches in length along the curve. The pair in question is doubtless one of those mentioned in the table above, after more accurate dimensions had been taken. Far more

interesting must have been the sight of a flock of old rams crossing a stream which Prince Demidoff records.

"We had not been an hour watching them," he writes, "when, to my joy, they all got up one after the other and crossed the stream in our direction. Taba had foretold this, saying that the grazing was better on our side. For some time we lay low, till the whole herd passed and disappeared below us; then we rushed down, hiding behind every rock, and presently found ourselves within 250 yards of the animals, whom we now saw feeding on the slopes under us. I was just on the point of starting towards a small pinnacle, within easy rifle range of the herd, when I noticed that they all of a sudden had become suspicious. A whiff of wind had probably reached them, and in an instant they were off, making back to the opposite side."

It was shortly after that the whole flock dashed across the stream at full gallop—a truly magnificent sight.

THE MONGOLIAN ARGALI

(*Ovis ammon jubata*)

In regard to this race of the argali there is nothing to add to the brief notice given in *Wild Oxen, Sheep, and Goats of All Lands*, the purport of which is as follows. It appears allied to the Tibetan argali (fully described in the work cited), having horns of a similar type, and a large ruff on the throat, which, like the lower portion of the face, is yellowish white. The rump-patch is of large size, including the whole of the tail, and pure white in colour, as is the hinder surface of the legs. The habitat of this race of the argali is Eastern Mongolia, to the northward of Pekin.

A couple of years ago the writer saw at the establishment of Rowland Ward, Ltd., some argali heads apparently referable to this form, but had no opportunity of making a detailed examination of them.

LITTLEDALE'S SHEEP

(*Ovis sairensis*)

(Plate III. Fig. 3)

This species was named by the present writer in *Wild Oxen, Sheep, and Goats of All Lands* on the evidence of several specimens in the summer dress

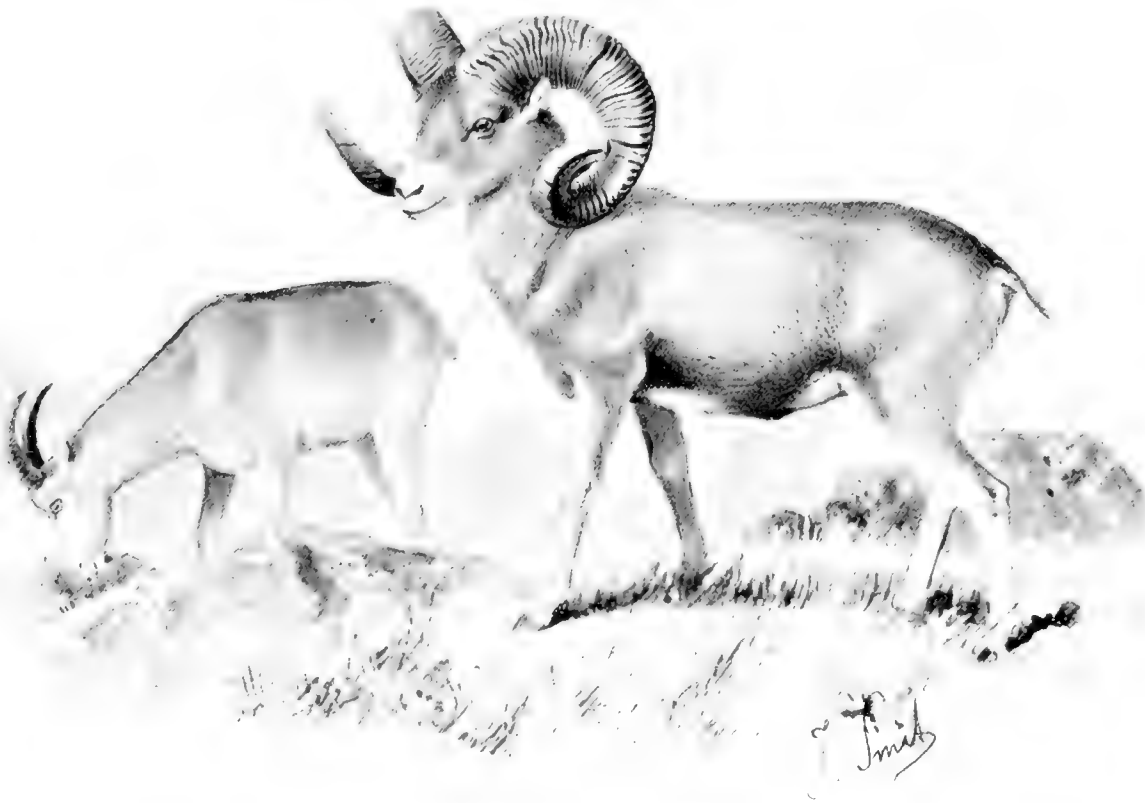


Fig. 29.—Male and Female of Littledale's Sheep in the Summer Coat.

killed by Mr. St. George Littledale in the Sair Mountains, situated in the Great Altai in lat. 86° E. and long. 47° N., and at Semitau, in lat. 84° E. and long. 46° N.

This sheep is a smaller animal than either the argali or Marco Polo's sheep ; the horns of the old rams, which form a close spiral of rather more than one circle, being in some respects intermediate between those of the two species mentioned. Although very considerably smaller, the

horns are very like those of the Siberian argali, having the front angles rounded off; in the latter respect they come closer to Marco Polo's sheep, but are much more massive than in that species. In immature animals the front angles of the horns are much more distinct. The typical specimens, which, as already said, are in the summer dress, are in the British Museum ; and their general colour on the upper-parts is full rufous brown, passing into blackish brown on the hinder part of the head, the withers, loins, rump, tail, the outer side of the thighs, and the lower surface of the body. With the exception of the muzzle, which is dirty white, the face is greyish brown. The legs become gradually more and more speckled with white, till from just above the knees and hocks downwards they are entirely white. The sides of the head, neck, and throat are speckled brownish grey, which passes into dirty white on the middle of the chest.

Such is the colour of the adult rams. Younger members of that sex in the same dress are nearly uniform rufous brown all over, without any trace of a white rump-patch. Ewes in the summer dress are also rufous brown on the upper-parts, with a broad black dorsal streak running from the back of the head to the loins, and expanding about the withers into a patch ; the under surface of the body and the limbs being nearly white.

In height the rams stand about 3 feet 2 inches. The horns of the type specimen measure 46½ inches along the front curve, but their tips are somewhat broken ; the basal circumference is about 15¼ inches, and the interval between the tips 27 inches.

In the early part of 1900 Mr. Walter Rothschild presented to the British Museum the skulls and skins of a sheep which appeared to be *Ovis sairensis* in the winter coat. They were exhibited by the present writer at a meeting of the Zoological Society of London on 20th February of that year.

The skin of the ram is of a greyish-brown colour above, with a light

saddle-shaped patch on the back, a white caudal disk, which does not include the tail, and the legs below the knees and hocks pure white, as are the under-parts. Above the caudal disk is a dark brown band ; the shoulders and thighs are as dark as the back ; and on the nape of the neck is a tuft of very long slate-coloured hair, which is dark brown at the roots. This tuft is also present in a female skin ; a much shorter one occurs in a female head of *O. ammon*, but it is absent in *O. poli*. From the latter in winter dress the present specimens also differ by the dark shoulders and thighs. The development of a white caudal disk in the winter coat alone is another peculiarity of *O. sairensis*. The specimens were said to have been obtained in the Irtish valley, which drains the Semipalatinsk Altai.

Compared with the Thian Shan variety of Marco Polo's sheep (*Ovis poli karelini*), of which a ram in the winter coat is exhibited in the British Museum, the present animal in the same dress is readily distinguishable by the tuft of long hair on the nape, as it is by the chest, the front of the upper part of the fore-legs, and the thighs being brown instead of white. In the exhibited specimen of *poli karelini* the tail is wholly white, whereas in the ram of Littledale's sheep in winter dress it is fawn-coloured throughout, although in the female white with a fawn tip. In that sex also the rump-patch is whiter than the ram, in which it is much suffused with fawn.

MARCO POLO'S SHEEP

(*Ovis poli*)

The typical Pamir race of this magnificent sheep being fully described in the companion volume on the game animals of India and Tibet, need not be redescribed on the present occasion. It inhabits the whole of the Pamir country, from Hunza to near the sources of the Amu Daria, or Oxus.

THE THIAN SHAN SHEEP

(*Ovis poli karelini*)

From the typical Marco Polo's sheep of the Pamirs the present variety differs by the shorter horns of the rams, the spiral of which seldom much exceeds a single complete circle. In some examples the outer front angle of the horns is completely rounded off at the base, but in other specimens it is prominent and sharp. In the winter coat there appears to be less white on the buttocks and thighs than in the typical *O. poli*, and the upper part of the face is, in many instances at any rate, brownish instead of pure white. The winter coat of the female shows a dark stripe running from the back of the head to the root of the tail; the tail itself being in both sexes frequently almost or completely white, although sometimes, it is said, showing a dark line along the upper surface.

This sheep was first obtained from the Alatau, to the north of Lake Issik-kul in the Semirechinsk Altai, whence it extends southwards to the partially wooded flanks of the Thian Shan range, where, however, it is not very common.

An idea prevalent among sportsmen that the various distinguishable forms of Central Asiatic large sheep pass into one another may be alluded to in this place. The writer has been informed, for instance, by Mr. P. W. Church, that as the habitat of the true *O. ammon* is approached *O. poli* tends to assume the characteristic features of the former. If this be confirmed, and a gradation, more or less complete, be found to exist between these two forms, it is evident that all the argali-like sheep will have to be regarded as local races of *O. ammon*.

THE URIAL, OR PUNJAB WILD SHEEP

(*Ovis vignei cycloceros*)

The widely-spread *Ovis vignei* is another of the species of wild sheep found in the area covered by the present work which has been fully treated of in the *Great and Small Game of India, etc.* It was there shown that the Kelat representative of this sheep, described by Mr. A. O. Hume as *Ovis blanfordi*, appears to be inseparable from the true urial of the Punjab and Afghanistan, and since there is an objection to the use of the term *cycloceros* for the latter, the name *blanfordi* would naturally seem to be the one available.

"But, unfortunately, the name *Ovis arkal* was applied at a much earlier date than Mr. Hume's description of the Kelat animal to a wild sheep from the Kopet-Dagh range, which forms the boundary between Turkestan and North Persia, to the eastward of the Caspian. And this *O. arkal* appears inseparable from *cycloceros*. If this view be correct, the name *arkal* has the right of priority for the Punjab wild sheep. In the absence, however, of skins for comparison, it is almost impossible to be sure that *O. arkal* may not indicate yet another local race of the present species. Monsieur Dauvergne has, indeed, suggested that *O. arkal* may be the same as *O. blanfordi*, which he keeps apart from *O. cycloceros*."

In this unsatisfactory state the matter must remain for the present. Whatever be its correct title, a race of *Ovis vignei* occurs within the area covered by the present volume in Southern Persia, Russian Turkestan, and certain districts of the Caucasus.

THE EUROPEAN MUFLON

(*Ovis musimon*)

(Plate III. Fig. 4)

In spite of its diminutive stature and comparatively small horns (small, that is to say, when contrasted with the enormous cranial appendages of the great sheep of Central Asia), the old ram of the European muflon, or wild sheep of the mountains of Corsica and Sardinia, is one of the handsomest members of its tribe; the large whitish saddle-patch on the back in the winter coat, and the bold contrasts of black and orange-fawn on other parts of the body, rendering it a most strikingly-coloured and conspicuous animal. Conspicuous, that is to say, when mounted in a Museum, for during life its coloration is doubtless adapted to harmonise with that of its inanimate surroundings. The muflon (or mouflon, as the name is generally spelt) is likewise a thoroughly game little animal, inhabiting country which calls for much skill and endurance on the part of the sportsman who desires to secure a good "bag."

Much is heard nowadays of the cruel wrong done to posterity by reason of the extermination or decimation of so many species of animals which has taken place during the nineteenth century. But if report speak true the same fell work had made itself evident in South-Eastern Europe in very early times, for the muflon is stated at one period to have been an inhabitant of Greece and the Balearic Islands, although it must be confessed that there is only legend to this effect. Be this true or false, the muflon at the present day has but an extremely restricted range, being confined to the mountains of Corsica and Sardinia. Possibly each of these two islands may be the habitat of a distinct race of the species. Further information with regard to this point is, however, required, and also in

respect to the occurrence of horns in the ewes. It is commonly stated (as, for instance, in Brehm's *Tierleben*) that the females are very seldom horned. But a considerable number of those now living at Woburn Abbey are furnished with small horns. And the writer has been informed by Dr. Forsyth Major, who some years ago spent a considerable time on the island, that all the female muflon seen by him in Sardinia were horned. The same gentleman was also informed that at that time the muflon was almost exterminated in Corsica, although he could obtain no information with regard to whether the females on that island were horned or hornless.

In answer to inquiries on the subject Sir Edmund Loder wrote to the author as follows :—

"I have always understood that on one island the female muflon is horned and on the other hornless, but I have never been clear as to where the horned females are found. I have had what are called Corsican muflon for many years, but do not know whether the original stock came from Sardinia or Corsica ; the females never have horns. In the small herd in the Monte Carlo gardens all the females are horned."

This renders it certain that hornless females do exist—a fact which has been doubted by at least one naturalist. And from the evidence of Dr. Major it seems most likely that the race in which the females carry horns occurs in Sardinia, while the one with hornless females is Corsican. If this be so, they should be designated by distinct sub-specific titles.

The muflons, it may be observed, form a sub-group of wild sheep characterised by the ewes being at least frequently devoid of horns.

A full-grown ram of the present species usually stands only about 27 inches at the withers ; and $34\frac{1}{2}$ inches along the curve is the maximum recorded length for the horns. In this particular instance the basal girth of the horn is $8\frac{3}{4}$ inches, but other examples show considerably larger measurements in this respect, one pair whose length is 26 inches measuring

10⅜ inches in girth. In those ewes in which they are developed, the horns are very small.

In adult rams the horns, which are of fair size in proportion to the bulk of the head and body, show the normal ovine twist, the right one forming a right spiral. They are relatively stout and marked with bold transverse wrinkles, the front surface being distinctly defined from the outer side, and the inner front angle very sharp, although the corresponding outer one is rounded off. When fully developed, the close spiral forms about one complete circle, the tips of the horns curving forwards and outwards so as to be placed nearly under the eyes.

The hair is close, thick, and somewhat stiff, forming in the rams, when in winter coat, a distinct fringe or ruff on the throat, and having at base a woolly under-fur in both sexes. During the latter part of summer and the commencement of winter the general colour of the coat of the old rams is rufous brown or foxy red, passing into chocolate-brown on the head and face. In contrast with this is the black found on the sides of the neck, the throat, and chest, as well as a band on the flanks, a streak down the withers, the outer and front surfaces of the fore-legs above the knees, and the front and outer sides of the hind-limbs above the hocks. Externally the ears are greyish, but their margins and part of the interior are white. The muzzle and chin are greyish white, passing into greyish rufous in the middle of the black area on the throat; and a broad band grizzled with white defines the hinder border of the black saddle-patch. The buttocks and all the under-parts, with the exception of a narrow streak between the fore-legs, are dazzling white; and there is a streak of white on the hinder surface of both pairs of limbs above the knees and hocks, while below both the latter the legs are white save for a variable amount of black on the front of the anterior pair. With the advance of winter the general colour of the upper-parts deepens and tends more to chestnut-brown; the saddle-patch on each side of the body lightens in colour, till in many of the old

rams it becomes nearly or quite pure white ; and in this condition of coat this fine little sheep is at its handsomest.

In addition to skulls, the species is represented in the exhibition galleries of the Natural History Branch of the British Museum by a ram from Sardinia, presented by Mr. Ford Barclay in 1892.

Muflon are found only on the higher and more exposed portions of certain mountains in the two islands to which they are now restricted. An excellent account of the habits of these sheep, as well as of muflon-stalking, will be found in the first chapter of Mr. E. N. Buxton's *Short Stalks*, and since extracts from this account have already been given in *Wild Oxen, Sheep, and Goats of All Lands*, no repetition is necessary on the present occasion. The muflon in one of the enclosures in the Duke of Bedford's park at Woburn Abbey grow remarkably fine horns, probably from high feeding.

THE ARMENIAN MUFLON

(*Ovis orientalis*)

(Plate III. Fig 5)

At the date of writing *Wild Oxen, Sheep, and Goats of All Lands* no mounted skin of the typical or Armenian race of the Asiatic muflon was exhibited in the British Museum. Since that time this gap in the magnificent series of wild sheep there shown has been filled up by the generosity of Mr. G. C. R. Lee, who in 1900 presented a fine ram of the present form shot in Asia Minor. From the European species the Asiatic muflon (of which three local races may be recognised) differs by the direction of the spiral of the horns, the right horn forming a left spiral and the left horn a right spiral. This causes their tips to be situated over

the withers instead of below the eyes; the spiral usually forming only about two-thirds of a circle.

The Armenian race of the species is a considerably larger animal than the European muflon, standing as much as 33 inches at the withers. The females appear to be always hornless, as indeed is the case with the Cyprian and probably also with the Urmian race. In the rams the wrinkles on the front and lateral surfaces of the horns are well developed and for the most part widely separated, although in old individuals they become more approximated near the bases of the horns, and when an unusually great age is attained these closely approximated wrinkles occupy the greater part of the horns owing to the wearing of their tips and the continual growth of the base. As a rule, the outer front angle of the horns is well developed, so that the front and outer surfaces are perfectly distinct from each other. The largest pair of horns on record measures $40\frac{1}{4}$ inches along the outer curve, with a basal girth of $10\frac{1}{2}$ inches, and a tip-to-tip interval of $5\frac{1}{2}$. In the next best pair the same three dimensions respectively measure $36\frac{1}{4}$, $10\frac{3}{8}$, and $5\frac{3}{4}$ inches.

The general colour of the coat in the adult rams is russet yellow or foxy red on the back, head, flanks, and upper portion of the limbs, but in older individuals it becomes more reddish, with a faint greyish white saddle-mark on each side of the back. The under surface of the body, as well as the lower portions of the limbs, are white; and an area below the eyes, as well as the nose, the chin, and the interior of the ears, are whitish. On the other hand, the chest is marked with a dark brown patch, and there is a purplish brown mark on the front of the fore-legs above the knees, while the ridge of the neck and middle line of the back are somewhat darker than the rest of the upper-parts. The rams have a distinct throat-ruff.

This race of the Asiatic muflon is found in the mountains of Elburz in Northern Persia, as well as in those of Armenia and the Taurus range of

Asia Minor. In Armenia, or Transcaucasia, according to Dr. K. Satunin, the favourite haunts of this sheep are in the neighbourhood of Kars and Eriwan, although it also ranges some distance to the northward of these localities.

Accounts of the habits of this sheep in the wild state are unfortunately few and imperfect. One of the best is given by Messrs. Danford and Alston in the *Proceedings of the Zoological Society of London* for 1880 (p. 55), where the animal is alluded to under the name of *Ovis gmelini*, but as a portion of this is quoted in *Wild Oxen, Sheep, and Goats of All Lands*, repetition here would be superfluous.

THE CYPRIAN MUFLON

(*Ovis orientalis ophion*)

Although regarded by its describer Blyth as a distinct species, there seems little doubt that the Cyprian muflon is best viewed in the light of a local race of the Asiatic species dwarfed by the comparatively small area of its island habitat. It is true that some naturalists insist that distinguishable insulated forms of animals should always be regarded as species rather than sub-species or races; and that such minor rank is to be reserved for cases where there is a complete gradation from one form to another. But this is not the view taken here; and indeed if it were rigidly acted upon it would entail the necessity of regarding the small and stunted representatives of the red deer inhabiting the island of Corsica as specifically distinct from their larger brethren of the mainland of Europe.

The Troödos mountains of Cyprus, whose central peak rises to a height of between 6000 and 7000 feet above sea-level, are the home of this, the smallest representative of the wild sheep. And it is to General Sir Robert Biddulph, some time High Commissioner of the island, that the British

Museum owes the handsome ram now mounted in the mammalian gallery.[1] The collection also contains the head of a female, presented by Captain J. Marriott.

In height the ram of the Cyprian muflon stands only about 26 inches at the shoulder; and the length of the longest pair of horns known is but 24 inches, their basal girth being 8 inches, and the interval between the tips $4\frac{1}{2}$ inches.

In addition to its inferior bodily stature, one of the chief features by which the Cyprian race is distinguished from the typical continental repre-

Fig. 30.—Head of Male Cyprian Muflon. From a figure by Colonel J. Biddulph in the *Proceedings of the Zoological Society of London* for 1884.

sentative of the Asiatic muflon is the rounding off of the outer front angle of the horns of the rams, in consequence of which the front and outer surfaces of the horns are continuous. Occasionally, however, according to Messrs. Danford and Alston, specimens of the Armenian race are met with displaying the same feature, so that the difference is not very great in this respect between the two forms. In correlation with the slender and deer-like build of the animal, the horns are slighter and less massive than in the

[1] In *Wild Oxen, Sheep, and Goats* the specimen is said to have been presented by, instead of through, Colonel J. Biddulph.

continental race, with a more regular curve from base to tip, and finer transverse wrinkles.

In general colour this sheep is a bright foxy red or rufous fawn on the upper-parts, with a few scattered whitish hairs on the sides of the body faintly shadowing out a light saddle-patch. This foxy hue is relieved by a dark line along the middle of the fore part of the back, a blackish band along each flank, which is continued on to the thigh, as well as by markings of the same dark tint on the lower part of the throat and chest, the front of the fore-legs above the knees, and a patch on the inside of each hind-leg just above the hock. On the other hand, the under-parts, a narrow streak on the buttocks, the inner surfaces of the thighs and of the fore-legs above the knees, as well as the entire circumference of the legs below the knees and hocks, together with the muzzle, chin, and throat, are pure white. The description is completed by adding that the upper part of the nose and a patch in front of the eyes are dusky brown, while the ears are grey outside and white inside.

THE URMIAN MUFLON

(*Ovis orientalis urmiana*)

A small island in a lake in North-Western Persia seems an unlikely habitat for a distinct form of wild sheep, and yet a skull picked up on Koyun Daghi, the largest of the numerous islands in Lake Urmi, is regarded by Dr. A. Günther[1] as representing a race of the Cyprian muflon, under the name of *Ovis ophion*, var. *urmiana*. Dr. Günther, it may be well to add, looks upon the Cyprian muflon as specifically distinct from the Armenian ; but states that if, as here, the two are ranked merely as local

[1] *Journ. Linnæan Soc.—Zool.* vol. xxvii. p. 374 (1899).

races of one animal, then the name of the Urmian muflon will be *O. orientalis*, var. *urmiana*.

When found, the skull in question (Fig. 31) was in fairly good condition, with the skin and hair still adhering to the face and forehead, but wanting the lower jaw. It is that of an adult ram, and in the curvature of the horns comes nearer to the Cyprian than to the Armenian muflon, although there is a striking difference in the contour of their sweep even from those of the former.

"The colour of the hair attached to the head," observes Dr. Günther,

Fig. 31.—Front View of Upper Portion of Skull and Horns of Urmian Muflon. (After Günther.)

"is now a uniform light isabelline, but no importance can be attached to this, as the colour may have been bleached by exposure; the horns are also similarly bleached, traces of the normal dark colour being still visible in some parts."

This interesting specimen is now in the British Museum. Lake Urmi, it may be added, is situated in North-Western Persia immediately west of Tabriz and south-east of Lake Van. The author has reason to believe that specimens of this sheep have been obtained in Persia by Prince Demidoff.

THE EAST CAUCASIAN TUR

(*Capra cylindricornis*)

(Plate III. Fig. 6)

In some at least of the numerous dialects of the Caucasus the word *tur* (with the *u* pronounced as *oo*) seems to be employed for wild goats of all and every kind ; and since that range is the habitat of two very remarkable species of goat-like animals which come, properly speaking, under the designation neither of true ibex or true goats, they are conveniently designated by their native title of tur.

The first of these two species, which is frequently known as Pallas's tur, and to many sportsmen as the Caucasian bharal, inhabits the eastern and central part of the range, from Daghestan to Kasbeg, and is consequently termed the East Caucasian tur. Prince Demidoff, in his *Hunting Trips to the Caucasus*, states that the present species is most frequently found on the slopes of the Kasbeg (or Kasbek), and that it also occurs in Svanetia. He adds that where the distributional area of the East Caucasian tur impinges on that of the very different West Caucasian species, presumed hybrids between the two are not uncommonly met with. More will be said with regard to these reputed hybrids at the close of the notice of the next species.

From the general characters and conformation of its horns, the East Caucasian tur might be regarded as a near relative of the bharal, or blue sheep of Tibet (*Ovis nahura*), described in *Great and Small Game of India, Tibet, and Burma*. And since the latter animal serves in some degree to connect the sheep with the goats, this may to a certain extent be true. But the horns of the eastern tur are of a rougher and more rugged type than those of the bharal, while the latter animal lacks the well-marked beard which adorns the chin of the present species. The coloration, also,

of the two animals is very different, although it must be confessed that in this respect the bharal is more like the true goats (as typified by the wild goat) than is the present species. Again, it is evident that the animal under consideration is nearly related to the western tur, which has horns of a distinctly ibex-like character. While, then, it is quite conceivable that some naturalists would prefer to see the bharal and eastern tur placed by themselves between the true sheep on the one hand and the true goats on the other, the view here followed is to class the first-named species with the sheep, while the latter finds a position among the goats.

If we except the aforesaid presumed hybrids, the present species cannot possibly be mistaken for any other of its tribe, being indeed one of the easiest of the goat-like ruminants to recognise. Its most distinctive features are to be found in the cylindrical, dark-coloured, and bharal-like horns of the rams, the short and transversely extended beard which adorns the chin of that sex, and the dark brown or bay, relieved with black points, of the coat.

Standing about 38 inches in height at the shoulder, the eastern tur is a somewhat heavily built animal, with the short tail of the goats. The large and massive horns of the rams have the usual goat-like twist, that is to say, the right horn forms a left spiral, and *vice versâ*. At the base the two horns are separated by a comparatively wide interval. In section they are nearly cylindrical, and externally they bear more or less indistinct transverse ribs, as well as, at long intervals, bolder lines indicating the limits of each year's growth, but they are quite devoid of the bold knots or knobs which form such a conspicuous feature on the horns of the western tur and the true ibex. Their direction is at first outwards and slightly upwards, after which it becomes backwards, downwards, and inwards. The winter coat is of moderate length and thickness, and of a generally uniform dull brown or bay tint, except on the chin, the tip of the tail, the front and inner surfaces of the hind-legs, and the front of the

fore-legs from below the knees downwards, where it is blackish brown or black. The broad and fringe-like beard, which is confined to the chin and is of the same colour as the coat, has a distinctive forward curl. In colour the horns are blackish olive. The "record" horns of this species are in the possession of Mr. Walter Rothschild, and measure $38\frac{1}{4}$ inches along the front curve, with a basal girth of $12\frac{1}{2}$ inches. Female horns have never come under the notice of the writer, who indeed has no evidence that the does are provided with horns, although such appendages are probably present in that sex and attain approximately the same dimensions as those of female bharal.

Doubtless the habits of this tur are very similar to those of its western relative; but it is especially noted by those who have had an opportunity of seeing it in its native haunts that it is very partial to salt-licks or springs impregnated with carbonate of iron.

No example of this tur has ever been exhibited alive in this country.

THE WEST CAUCASIAN TUR

(*Capra caucasica*)

(Plate III. Fig. 7)

The tur of the Western Caucasus is a very different-looking animal to the preceding, having horns of a more ibex-like type, although in its nearly uniform coloration it displays affinity to its cousin of the eastern half of the range. In its generally heavy build this tur is very like *Capra caucasica*, with which it also agrees approximately in size, the height at the shoulder in the adult ram being between 37 and 38 inches. The large and massive horns of the rams, which are separated by a considerable interval from one another at their bases, diverge at an angle of about

45° from the forehead to sweep upwards, outwards, and backwards nearly in one plane, except towards their tips, where they bend somewhat inwards. In section they are nearly quadrangular, and on their broad front surface they carry in the basal half low and flat transverse ribs, and higher up bold knots or knobs. The shorter horns of younger males show knobs throughout their entire length. Hence it is evident that the ribs on the lower portion of the horns of the adult rams are analogous to the closely approximated rings noticeable near the bases of the horns of old males of many species of antelope. The longest horns of this species on record are the property of Mr. St. George Littledale, and measure 40½ inches in length along the outer curve, with a basal girth of 12⅝ inches, and an interval of 15¼ inches between the tips.

As in all the members of the goat tribe mentioned in this volume, the beard of the western tur is restricted to the chin; in the old males it is long and narrow in summer, but broader in winter, when in the younger males it forms only a short fringe.

When in the short and close summer dress the adults of the present species are of a uniformly bright chestnut colour, with the lower lip and chin, the tip of the short tail, and the front surface of the lower portion of both pairs of limbs black or blackish. The hinder surface of the same part of the latter shows a more or less distinctly defined light streak, and there is a white spot on each of the fore-posterns immediately above the hoofs. In winter, when the hair becomes much longer, looser, and coarser, the general colour, at least in the immature males, is light yellowish brown, with the same dark markings as in the summer coat of the old rams, and in addition an ill-defined dark streak down the middle of the back. In the young males at this season the margins of the lips are whitish, and there is no white spot above the fore-hoofs. Except at the root, where it is blackish, the beard of the old rams is of the same colour as the coat. The horns and hoofs are deep black.

A female figured in the original description by the Russian naturalist Pallas,[1] and assigned to this species, has small horns, is light-coloured on the buttocks and the under-parts, in which respect it resembles the female of the wild goat rather than the male of the present species.

Originally described on the evidence of specimens obtained near the sources of the rivers Terek and Kuban, which rise in the Central Caucasus

Fig. 32.—Skull and Horns of Male West Caucasian Tur. Fom a specimen presented to the British Museum by Mr. St. George Littledale.

on the northern flank of the range between Elburz and Dych-tau, this species extends westwards from that district through the western half of the main chain of the Caucasus.

For its best specimens of this very striking and handsome species of tur, the British Museum is indebted to Mr. St. George Littledale. A

[1] *Acta Acad. Petrop.* vol. iii. pt. 2, pl. xvii. B, Fig. 1 (1783).

female wild goat from the Central Caucasus, the survivor of a pair shipped by Mr. H. H. P. Deasy, was exhibited alive in the menagerie of the Zoological Society of London, and is figured by Mr. P. L. Sclater in the *Proceedings* of the Society for 1893 (p. 729) as *Capra caucasica*. It does not, however, seem certain that the animal in question was not a specimen of the wild goat, and not a tur at all in the sense in which that term is used here. Still, it is not unlike the female figured by Pallas to which reference is made above.

Judging from the notes given by Prince Demidoff in his *Hunting Trips in the Caucasus*, the western tur is very similar in its general habits to ibex and other wild goats. It feeds, for instance, on the grazing grounds afforded by the upland meadows, and retires to the more precipitous and less accessible ground for repose or when threatened by danger. When feeding, sentinels are posted to give the alarm to the flock should occasion arise, and a mid-day siesta is always enjoyed. A small flock is described by the Prince in the following words :—

"There were seven of them, three of which carried good heads, the other four being smaller and lighter in colour. They were quietly feeding upwards towards the rocks, where they probably intended to repose during the heat of the day. Now and then one of them would lie down, when another would come up, and giving him a prod with his horns, make him get up. As time was pressing, and all around seemed pretty safe, we proceeded with the intention of cutting off their retreat to the rocks. The wind was steady, and everything appeared to favour our enterprise, when suddenly, on looking at them once more to make sure that they were undisturbed, one of the smaller ones gave signs of uneasiness, and in a few seconds they were all on the move towards the higher ground."

The unexpected appearance of the baggage ponies of the Prince's party on the scene was the cause of the movement ; and it was not till after a long tramp that a buck was bagged on the higher ground. It will be

noticed that this account confirms the statement made above, from the evidence of the specimens in the British Museum, as to the lighter colour of the younger bucks when compared with the patriarchs of the flock.

On another occasion, when following a fine old buck of which a

Fig. 33.—Adult Male West Caucasian Tur. (From Prince Demidoff's *Hunting Trips to the Caucasus.*)

glimpse had been obtained by his shikari, Prince Demidoff was more fortunate.

"Redoubling my precautions," he writes, "I now crept on alone, and, to my great amazement, there came in sight first one, then two other tur lying on a moraine some eighty yards below. Taking my time, I steadily lowered my rifle and fired at the nearest one; he dropped his head to the shot, while the other two sprang up. Instantly I fired my left barrel, and

was pleased to see the second one tumble over. The third luckily gave me time to reload, for he stopped about 150 yards to my left, and I fired two more shots at him, breaking his leg. He stumbled downhill, so I rushed in his direction, the other two giving no further signs of life. I eventually finished him off some 500 yards below, and sat down to enjoy my success."

Before taking leave of this species, it may be mentioned that the name *Capra severtzowi* has been applied to specimens from the Central Caucasus which have been regarded as indicating the existence of a third member of the group in that chain. Neither Prince Demidoff nor Mr. Littledale believe in this reputed third species; and the specimens on which it is founded are considered in *Wild Oxen, Sheep, and Goats* to belong to immature individuals of *C. caucasica*. Recently, however, Dr. Paul Matschie[1] of Berlin has expressed his belief in the validity of *C. severtzowi;* but the present writer sees no occasion to modify the views expressed on this point in his work cited above.

In the same paper Dr. Matschie also comes to the conclusion that the reputed hybrids between *C. cylindricornis* and *C. caucasica*, referred to on page 141, are really a distinct species, for which the name *C. radei* is suggested. Although many naturalists refuse to believe in the existence of wild hybrids as a normal thing, the evidence at present available does not seem sufficient to make it certain that the specimens in question really indicate a distinct species; and the matter is therefore left *in statu quo*.

[1] *Sitzungsberichte Gesellschaft Naturforschender Berlin*, 1901, pp. 27 *et seq.*

THE PYRENEAN TUR

(*Capra pyrenaica*)

(Plate III. Fig. 8)

The wild goat inhabiting the Pyrenees and the mountains of Andalusia is intermediate in several respects between the tur of the Caucasus and the true ibex, being, on the whole, nearer to the former in the characters of its horns, but approximating to some of the latter and to the wild goat in its parti-coloured coat. Although by sportsmen frequently called an ibex, it is perhaps better termed a tur. As it is represented by two distinct although very closely allied local races, the term Spanish tur may be employed when speaking of the species, while the two races may severally be distinguished as the Pyrenean and the Andalusian tur.

The great historians of the species are Messrs. Abel Chapman and Buck, who, in their delightful work *Wild Spain*, have given an excellent description of its habits in a state of nature, and of the kind of country in which it is found. Mr. E. N. Buxton, in *Short Stalks*, has likewise contributed some valuable notes on the species and the manner in which it should be stalked. As extracts from both these accounts have been given in *Wild Oxen, Sheep, and Goats*, the reader who has not the original works at hand may be referred to that volume.

The Spanish tur is an animal of lighter build, with a longer and narrower face, than either of the two species of tur inhabiting the Caucasus. In height it stands about 32 inches at the withers when full grown. The horns of the old bucks are closely approximated at their bases, and are triangular in transverse section, with the inner edge produced into a sharp keel, and the front surface transversely ridged at the base, but towards the extremity, where it becomes posterior in position, strongly

knobbed. In form the horns make a very open semi-spiral, that of the left side forming a right spiral. At first the general direction of the horns is upwards and outwards, but in their subsequent course they trend backwards and inwards, frequently showing an upward and slightly outward terminal flexure, although the inclination of the extreme tips is usually towards the middle line. In colour the horns are nearly black. The record pair from the Pyrenees are in the possession of Sir Douglas Brooke, and measure 31 inches along the outer curve, with a basal girth of $8\frac{1}{4}$ inches.

The old bucks in winter have a magnificent long and narrow black beard, but during summer this appendage becomes reduced to an insignificant tuft, which is its condition in the younger males at all times of the year.

When in the fine and short garb of summer, the general colour of the animal is dark greyish brown, with the nape of the neck, a line down the middle of the back, a band on the flanks, and the greater part of the limbs blackish brown or black ; the sides of the face being brownish white. On the other hand, in the longer and more shaggy winter dress the general hue of the upper-parts is light brownish grey, with a broad blackish brown collar on the chest ; and the tail, together with the parts mentioned as being dark-coloured in summer, also of the same blackish brown tint. The inner surface of the thighs and the back of the legs are whitish at this season.

The horns of the females are short, and flattened before and behind, with a simple curvature. According to the picture by Wolf in the possession of Sir Douglas Brooke, reproduced in *Wild Oxen, Sheep, and Goats*, the colour of the hair on the body and head of the female is uniformly foxy-red ; the tail and the lower portion of the front of the limbs being darker. The present writer has never had the opportunity of seeing a female skin of this species.

The typical, or Pyrenean, race of the Spanish tur appears to be restricted to the southern flanks of the range from which it takes its name.

THE ANDALUSIAN TUR

(*Capra pyrenaica hispanica*)

In order to gain an adequate idea of the amount of difference between the Andalusian and Pyrenean races of the Spanish tur, a good series of specimens of both is much required by the British Museum. In the absence of such a series, so far as the author's personal experience goes, all that can be said is that the present race is distinguished by its inferior bodily size, and by the thinner and more compressed character of the horns of the old rams, in which the basal transverse ridges are said to be more strongly developed.

The home of this race is formed by the Sierra Nevada and the Sierra Morena, together with the hill-ranges of Andalusia and Estremadura, its great stronghold at the present day being the Sierra de Gredos.

THE PERSIAN WILD GOAT

(*Capra hircus ægagrus*)

(Plate III. Fig. 10)

Since the wild goat of Persia, the Caucasus, and Asia Minor (locally known either by the name of pasang or bezoar), together with the representative of the same species occurring in Baluchistan and Sind, appears to be the ancestral form from which the numerous breeds of domesticated goats are principally derived, it is undoubtedly entitled to bear the same

specific title as the latter. Consequently the Persian race, instead of being called simply *Capra ægagrus*, is, as in *Wild Oxen, Sheep, and Goats*, here termed *Capra hircus ægagrus*, or, as some would prefer, *Capra hircus*, var. *ægagrus*.

Of the appearance in the field of this fine and typical representative of the goat tribe no better idea can, perhaps, be conveyed to the reader than by the quotation of the following passage from the writings of Mr. F. C. Selous,[1] the famous African hunter, who, in the early part of 1895, made a trip to the Maimun Dagh, in Asia Minor, for the purpose of shooting specimens of this animal. The passage runs as follows :—

"Having a very strong pair of field-glasses, I had a most excellent opportunity of watching the movements of these shy and wary animals, and was rather chagrined to see that the biggest of the two rams had only one horn. When he stood broadside on it was impossible to detect the loss, but when he turned his head it became very noticeable. The single horn was magnificent, and curled over the shoulder in a fine bold sweep. The smaller ram was also a splendid animal, with a perfectly symmetrical pair of great curving horns, each of which was, however, I should judge, some inches shorter than the single horn of the larger animal. It has been my fortune to look upon many beautiful forms of animal life in their native haunts, but I do not think that I was ever more impressed by the picturesque beauty of any wild animal than I was with the appearance of these two grand old goats, as they stood motionless from time to time, their whitish coats and broad black shoulder-stripes showing out conspicuously against the reddish background of rock and stone, and setting off to the best advantage the contours of their sturdy though symmetrical forms, whilst their great curved horns and long flowing black beards gave them a dignity of appearance not often to be found in so comparatively small an animal. Comparisons being odious, I will not compare them with any

[1] *Sport and Travel*, p. 80 (1900).

other wild game; but I think that the head of a wild goat, with horns well over 40 inches in length and 9 inches in circumference at the base, is a trophy that any sportsman might be proud to secure, the more especially as the bearer of such a head is, according to my experience, a most shy and wary animal, requiring a good deal of patience, perseverance, and hard work to bring to bay by fair hunting."

Tribute like this from one who has seen and shot such magnificent animals as the gemsbuck and the sable antelope affords unassailable testimony to the grand appearance presented by the wild goat in the field. It will be noticed in the foregoing passage that the author alludes to the coat of these animals as being nearly white; as the time of year was January this lightness of colour may doubtless be attributed to the winter bleaching which is so noticeable in many ruminants, as, for instance, the wapiti. In his description Mr. Selous mentions the great length of the beard of these goats, and it is very noticeable in the figure of the one-horned buck given on a later page of his book. On the other hand, in the old male standing in the foreground of the picture by Wolf reproduced in *Wild Oxen, Sheep, and Goats*, it will be observed that the beard is comparatively short. The difference is probably due to the one animal being in the winter and the other in the summer dress.

The horns of the male wild goat, inclusive of all its local varieties, are distinguished from those of all other wild forms of the genus *Capra* save one, by the circumstance that while sweeping backwards with the same bold scimitar-like curve as in the ibex, their inner front edge is sharp and keeled. In the present race of the species this keel continues uninterrupted for some distance above the base of the horns in old bucks, but higher up carries a small number of widely separated prominent knobs. Throughout their length the horns are much compressed, with the inner surface flat, the outer convex, and the hinder aspect rounded. Although occasionally divergent, the tips usually incline somewhat inwards. From

base to tip the horns, which are black in colour, are marked by fine parallel transverse striæ, and at certain intervals by more conspicuous lines indicative of the limits of the annual growths. The longest pair of horns of this race measure 55 inches along the front curve, with an interval of 24 inches between the tips. The basal circumference of this pair, which is the property of Mr. Carl Hagenbeck of Hamburg, is not known. In a pair of 46½ inches in length the girth is, however, 8¼ inches; but the latter dimension is considerably exceeded in several specimens whose length is much less. The horns of the does are short and less compressed than those of the bucks, without knobs.

Owing to variations due to season, age, and sex, it is by no means easy to give a description of the colour of the Persian wild goat which will be applicable in all cases. Speaking generally, it may be said that the ground-colour of the coat is reddish brown in summer, and brownish grey in winter, at which season a woolly under-fur is developed. Old males, however, especially towards the latter part of the winter, tend, as mentioned above, to become paler; and in some instances they show a distinct whitish patch on the shoulders and another on the hind-quarters, and thus approach the Sind race of the species, described in the *Great and Small Game of India, etc.* Some variation occurs in the distribution of the blackish brown or black markings by which the ground-colour of the coat is relieved in the old and sub-adult rams, but they include the whole of the face, a broad streak running from the nape down the middle of the neck and back, the whole of the tail, a collar on the neck which expands inferiorly to form a breastplate, the throat, the chin, the beard, the front surface of the legs, except at the knees, and a stripe along the flanks which is continued down the front of each thigh. The beard and face are the darkest of all, and may be nearly black. White or whitish occupies the under-parts, the inner surfaces of the buttocks and thighs, the knees and hocks, and the inner and hinder sides of the legs below them. About

37 inches is the shoulder-height attained by old bucks of the wild goat.

The present race of the wild goat ranges from the Caucasus through the mountains of Asia Minor and Persia, and in Baluchistan probably intergrades with the Sind race, to which reference has been already made. On Mount Ararat it has been observed at a height of 14,000 feet above sea-level.

Excellent accounts of the habits of the wild goat and of wild-goat stalking are given by Mr. C. G. Danford in the *Proceedings of the Zoological Society* for 1875, by Mr. E. N. Buxton in *Short Stalks*, and by Mr. Selous in the work already cited. An epitome of some of the leading features mentioned in the first two accounts will be found in *Wild Oxen, Sheep, and Goats*.

As an illustration of the difficulty of detecting these animals in their native haunts, a second quotation may be made from Mr. Selous :—

"Motioning me to sit down," writes the narrator on the occasion referred to, "the old man took a seat beside me, and shading his eye with his hand, eagerly scanned the broken ground above us. Suddenly he uttered the one word 'Gay-Eek' (wild goats) and pointed eagerly upwards. For some time, however, although my eyes are fairly well trained to see game quickly, I could not make them out ; but presently I saw a small reddish object move across a wall of rock high above us, and soon made out two or three more, and, on looking through my field-glasses, counted six, all apparently ewes, with very small horns. I was still watching these ewes through the glasses, when a fine ram suddenly showed himself. He was a little in front of the foremost ewe, and almost immediately sprang across a narrow chasm, and stood in full view on a ledge of rock. He looked somewhat darker than the ewes, being still in his reddish summer coat ; and I could see his horns quite distinctly."

THE CRETAN WILD GOAT

(*Capra hircus cretensis*)

In *Wild Oxen, Sheep, and Goats* the wild goat of Crete was tacitly considered to be inseparable from the continental Asiatic animal, while the goats known to inhabit certain of the smaller islands of the Grecian Archipelago were regarded as feral rather than wild, and were accordingly passed over without mention. Since the date of the publication of that work an important paper on the wild goats of the islands in question has appeared from the pen of Dr. Ludwig von Lorenz-Liburnau, under the title of "Die Wildziegen der Griechischen Inseln, und ihre Beziehungen zu anderen Ziegenformen."[1]

According to this account the wild goat of Crete agrees with the Persian race in having the tips of the horns directed as a rule inwards. It is, however, of smaller size, with relatively heavy horns. A goat from Crete formerly living in the menagerie of the Zoological Society of London, of which a coloured figure is given by Mr. Sclater in the Society's *Proceedings* for 1864, plate xxxi., is of this race.

More recently a four-year-old buck was kept alive at Fiume, of which Dr. von Lorenz-Liburnau gives the following description. The general ground-colour of the coat was reddish brown (very similar to that of the summer dress of the chamois), mingled with white to a considerable extent on the neck and in a less degree on the hind-quarters. With the exception of a light patch over each eye, the whole of the face was black; the borders of the lips were also black, with a narrow light streak on the upper lip near the angle of the mouth. The long, straight, and slightly bushy beard was black, mingled with white on the hinder side. The back of the head was mingled black and white; the dorsal streak

[1] *Mittheilungen aus Bosnien und der Hercegovina*, vol. vi. (1899).

completely black ; the shoulder-collar, throat, and flank-stripe, as well as the tail, a streak on the buttocks, and the front of the legs, except the knees, were also black or blackish, mixed here and there with white. The distribution of the white areas was approximately the same as described above in the Persian race.

This description accords very well with the coloration of the buck figured by Dr. Sclater. In the winter coat the ground-colour becomes greyish white. It should be added that the name applied to this race by Dr. von Lorenz-Liburnau is *Capra ægagrus cretensis*.

Fig. 34.—Side View of Skull and Horns of Antimilo Wild Goat. (From Lorenz-Liburnau, *Mt. Bosnien-Hercegovina*, 1899.)

It may also be mentioned that old females of the Cretan wild goat carry a small beard, which leads the author last named to suggest that the same feature may also occur in those of the Asiatic race, although it is generally stated that the females are altogether beardless. Brehm in his *Thierleben* goes, indeed, so far as to say that both sexes have well-developed beards, but this is scarcely a correct statement.

A very remarkable pair of goat horns from the Caucasus, said to be those of a wild individual, are figured in the *Proceedings of the Zoological Society of London* for 1896, p. 618. Each is twisted into a corkscrew-like spiral, and they twice cross one another. The horns lack the knobs on

the front edge, which suggests that they are not those of a wild animal. They are the property of Mr. W. Burton.

THE WILD GOAT OF ANTIMILO

(*Capra hircus picta*)

Although of relatively small bodily size, and showing a slight outward inclination of the tips of the horns, the goats inhabiting the mountains of the island of Antimilo, or Eremomilos, which were named *Ægoceros pictus* by Erhard in 1858, are regarded by Dr. von Lorenz-Liburnau, in the memoir cited above under the heading of the Cretan race, as retaining so many features of the true wild goat as to be entitled to rank as a race by themselves. This race he proposes to designate *Capra ægagrus pictus*. He regards these goats, indeed, as the survivors of a race which once inhabited most of the Ægean islands in a truly wild and pure-bred condition, but considers that they now display evidence of a certain amount of crossing with domesticated breeds. If, as seems probable, this is the correct view, there may be some doubt as to whether the modern goats are really entitled to a distinct name. Moreover, their difference from the Cretan wild goat may be due solely to the strain of domesticated blood, and if this be so, the name *picta*, as the earlier, should stand for both.

Provisionally allowing separate racial rank to the Antimilo goat, it may be mentioned that a detailed description of the coloration of the adult buck is given by Erhard in his *Fauna der Cycladen* (1858), and as this is copied in Dr. Liburnau's paper, it need not be repeated here. A six-year-old buck is figured in one of the two coloured plates illustrating the last-mentioned paper; and the coloration of this animal is stated to agree closely with that described by Erhard. The general tint of the hair of the upper-parts is reddish brown, passing into brownish grey on the back,

and into whitish grey on the neck. The beard, much of the face, a dorsal streak, the tail, a band on the flank, a collar on the neck, the middle line of the throat, and much of the front surface of the legs are black or blackish. In younger bucks the hair is shorter and redder, with the black collar on the neck and shoulders less developed. In the does the foxy red

Fig. 35.—Front View of Skull and Horns of Antimilo Wild Goat. (Lorenz-Liburnau, *loc. cit.*)

colour is still more pronounced, while the dark markings on the body are reduced.

In their native haunts these goats are said to display habits very similar to chamois ; and as they are extremely shy, stalking them is by no means an easy matter. A German writer quoted by Dr. von Lorenz-Liburnau recommends that they should be hunted, especially in winter,

simultaneously by land and sea, one section of the party being in a boat near the coast. Owing, however, to the prevalence of a strong north wind in summer, this somewhat original mode of hunting is not practicable at that season. Hunting with dogs is then frequently practised by the natives.

Goats in a wild or half-wild condition are found on several of the other Ægean islands, notably Joura; but whether any of these should be

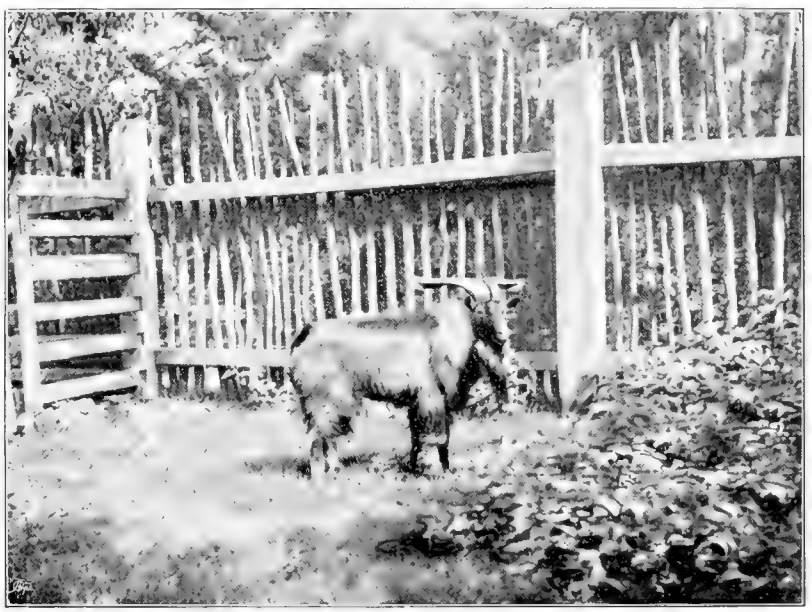


Fig. 36.—Goat from Joura. (Lorenz-Liburnau, *op. cit.*)

regarded as truly wild animals, and if so, whether they are identical with the Antimilo goat, it is difficult to determine. On Joura there is indeed a goat (named *Capra dorcas* by Dr. Reichenow some years ago) in which the characters of domestication, as especially shown by the horns, so largely predominate over the features of the true wild goat that, as Dr. von Lorenz-Liburnau shows, it certainly cannot be allowed to rank as a race of the latter. This goat is shown in the photograph on this page, and examples of the skull and horns in the two following figures.

The Marquis Ivrea, who has shot wild goats both in Antimilo and

Joura, exhibited a series of heads and photographs of these animals before the Zoological Society of London on 16th May 1900, "with the object of

Fig. 37.—Front View of Skull and Horns of Six-year-old Goat from Joura. (Lorenz-Liburnau, *op. cit.*)

Fig. 38.—Side View of Skull and Horns of Three-year-old Goat from Joura. (Lorenz-Liburnau, *op. cit.*)

showing that the effect of a cross between *Capra ægagrus* and *C. hircus* (such as has been proved to have occurred on the former island) was not to produce an animal corresponding to *C. dorcas*, Reichenow, and that

consequently the goat of Joura had not, as was generally assumed, been so produced, but was, as a matter of fact, a local variety of the wild goat, for which the name *C. ægagrus*, var. *jourensis*, was suggested."

If this means that the goat for which Dr. Reichenow proposed the name *Capra dorcas* is really an indigenous wild race (which, as stated above, is almost certainly not the case), it should be known by that name, and there is consequently no justification for the substitution of the title *jourensis*. If, on the other hand, the latter term is intended to apply to another type of goat inhabiting Joura, then the absence of any definition renders it a mere *nomen nudum*.

Quite apart from the question whether the goats of Crete and Antimilo are entitled to rank as truly wild races, they undoubtedly afford excellent sport.

THE ALPINE IBEX, OR STEINBOCK

(*Capra ibex*)

(Plate III. Fig. 9)

Although steinbock is the distinctive title of the wild goat of the Alps in the German-speaking cantons of Switzerland, its application by the Boers, in the form of steinbok, to a small South African antelope has led to the abandonment in English zoological literature of this term in favour of the Latin designation ibex ; the French name bouquetin being never employed in this country.

The Alpine ibex is the typical representative of a small group of wild goats characterised by the horns of the bucks being generally sub-triangular in section, with two front angles or keels between which is a flat surface marked by a number of bold transverse knobs or knots. By the older naturalists, as the reader may see by referring to Hutton's translation

of Buffon's *Natural History*, published in 1821, these knobs were regarded as marking the annual limits of growth of the horns. If this were so, large ibex horns would indicate a prodigious age for the animals to which they pertain ; but, as a matter of fact, the annual lines of growth are indicated by grooves on the sides of the horns, and the space between any two of these includes several knobs. 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. At this distance of time it is probably impossible to record in detail the history of the extermination of the steinbock from the greater portion of its former habitat. But 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.[1] 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, and, as already mentioned, had become exterminated in the Martinswand valley as early as 1540. 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 order to effect this huts were built on the high Alps, in which hunters were stationed during the spring and summer months for the purpose of capturing as many individuals as possible, which were subsequently to be kept in confinement. But although a hundred of the most active mountaineers were engaged in this occupation, the net result of their efforts during the successive seasons comprised only four bucks, three does, and two kids. The process was continued throughout the remainder of the century. In 1666 a few ibex still remained in the Zillerthal. 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

[1] In *Wild Oxen, Sheep, and Goats* both these dates are made a century too early.

the Tyrol and Salzburg, more than one hundred and fifty having in that year been counted in the Floitenthal 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

Fig. 39.—Alpine Ibex Head. In the possession of H.M. the King of Italy.

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.

The most distinctive feature of the Alpine ibex, as compared with its Asiatic relative, is the small size of the beard of the bucks, which forms, indeed, a quite insignificant feature of their physiognomy. It is also a

rather smaller animal, at least if a fair estimate of its true dimensions is obtainable from modern specimens, the height at the shoulder being about 35 inches. In point of size the measured specimens of Alpine ibex horns bear no sort of comparison to those of the Asiatic species. The four finest specimens of which the measurements are known were obtained from the Val d'Aosta, on the Piedmont side of Monte Rosa, and are the property of His Majesty the King of Italy. The finest of these measures 44⅝ inches in length along the front curve, with a basal girth of 10¼ inches. It is, however, quite possible that if careful search were made in continental museums, as well as the private residences of the old nobility of the Tyrol and Piedmont, specimens of larger size might be met with. The small, slightly curved, and knobless horns of the does seldom exceed 6 or 8 inches in length.

From several of the local races of the Asiatic ibex, the Alpine species is also distinguished by the fact that it is practically a uniformly-coloured animal; that is to say, such variations in colour as it possesses are limited to certain shades of grey, brown, rufous, etc., the large buffish white saddle so often noticeable in the Asiatic ibex being entirely wanting in the present species. Like so many ruminants, the Alpine ibex displays a considerable difference in the tint of its coat according to season; the summer dress, as in the deer, tending to rufous, while that of winter inclines more to grey. Reddish grey is the description usually given of the colour of the summer dress, while the winter garb is described as yellowish grey. A chocolate-coloured streak along each flank serves to demarcate the dark upper-parts of the animal from the lighter tint occupying the lower surface of the body. And the central line of the back is ornamented with a light brown stripe. Darker brown is the distinctive tint of the face, throat, beard, the upper surface of the tail, and the lower part of the legs. On the other hand, the chin, an area in front of the eyes, and another below the ears show a rusty tinge; the ears themselves

being fawn-brown externally, and whitish inside. The older an ibex becomes, the more inconspicuous do these darker and lighter areas tend to become, the entire coat thus being more uniform in colour. Like other goats, the length and thickness of the coat varies somewhat according to the season of the year ; and at all seasons the hair on the back of the neck is longer than elsewhere, forming in the old bucks a short mane. Yellowish or olive brown is the colour of the horns.

A good mounted specimen of this species is at present a desideratum in the British Museum ; the largest mounted example in that collection being faded and badly set up, while one recently acquired, although in good condition and well mounted, is small and perhaps not pure bred.

So far as can be gleaned from the accounts of the older naturalists and sportsmen, the habits of the Alpine ibex are essentially similar to those of its Himalayan cousin, and indeed of goats generally. In Switzerland ibex appear to have always kept above the forest level, grazing in summer on the stretches of turf in the vicinity of the snow-fields.

THE THIAN SHAN IBEX

(*Capra sibirica*)

Two races of the Asiatic ibex, namely the Thian Shan and the Irtish, come within the purview of the present work. But since the Himalayan race of the same species has been treated at considerable length in *Great and Small Game of India, Burma, and Tibet*, where the distinctive features of the species are also recorded, a very brief notice will serve on the present occasion. For the same reason it has not been considered necessary to include a figure of the head of this ibex in the plates illustrating the present volume.

So far as can be ascertained, the Asiatic ibex appears to be a somewhat heavier and more bulky animal than its nearly extinct cousin of the Alps, its height at the shoulder reaching to as much as 42 inches, while its weight will sometimes turn the scale at 206 lbs. It is likewise broadly distinguished by the much greater length and size of the beard of the bucks, which is black in colour, and adds greatly to the dignity and imposing appearance of this splendid representative of the goat tribe. The horns, too, are much larger, with their front surface squared at both angles, and its knobs, or knots, very bold and massive. The record length of horn is afforded by a pair in the possession of Major A. E. Ward, which measure 56 inches along the front curve. The other measurements of this unrivalled trophy are not given, but in the next best pair, which were picked up near Gilgit, and are in the mess-house of the officers of the Queen's Own Corps of Guides, the length is $54\frac{3}{8}$, the basal girth $10\frac{1}{4}$, and the tip-to-tip interval 25 inches.

In addition to the apparently somewhat larger relative size of its ears, the Asiatic ibex is further distinguished by the presence of white or buffish white on some portion of the upper surface of the body or on the legs. In the Baltistan, Irtish, and Himalayan races the light area covers a larger or smaller extent of the back, as well as a patch at the base of the neck, at least in the summer coat, as is noticed in some detail below. In the typical or Thian Shan race, on the other hand, as shown in plate xxiv. of *Wild Oxen, Sheep, and Goats*, the whole of the upper-parts, at least in certain specimens and at certain seasons, are uniformly brown, with a darker streak down the back, while the white makes its appearance on the hinder surface of the legs. Additional specimens of the typical race of this species are, however, much required in this country in order to ascertain the constancy or otherwise of the aforesaid type of coloration.

Information is likewise required with regard to the limits of the distributional area of the typical race, which is known to occur in the Thian

Shan range, as well as throughout a considerable portion of Siberia. Towards the east the habitat of the species reaches at least as far as Lake Baikal.

As a summary of the habits of the Asiatic ibex is given in *Wild Oxen, Sheep, and Goats*, and an extract from Mr. Darrah's notes on the same subject in *Great and Small Game of India, etc.*, it will be unnecessary to reconsider the subject on the present occasion. Since, however, the numbers of the Asiatic ibex have been greatly reduced in many localities where it was formerly abundant, the following extract from Prince Demidoff's work *After Wild Sheep in the Altai and Mongolia* is quoted in order to show that there are districts in the heart of Central Asia where this magnificent representative of the wild goats is still to be met with in large flocks.

"The country being still favourable for game," writes the Prince, "we kept on the look-out, but saw no signs of animals of any kind till we reached the bottom of a deep nullah, where Taba suddenly spotted two or three ibex on the top of a ridge to our left. As it was still early in the day, another stalk was imminent. Circumventing the ridge on which we had located the animals, we found ourselves presently, Taba and I, in a small corrie about 600 yards long, up which we had to toil in order to face the direction in which the ibex were heading. This took us nearly an hour, and as I was just reaching the plateau I suddenly saw a pair of horns coming towards me at less than 50 yards in front; but unluckily I was quite out of breath, having walked very fast, and instead of waiting, I carelessly took my shot at the only part of the beast in sight, and naturally missed. When I saw him next he was rushing downhill some 150 yards below me, and great was my amazement when I found that this was my light-coated friend whom I had already missed. As far as I could judge, his horns must have measured well over 40 inches. His companion, whom I just caught sight of, was a young buck hardly worth

shooting. I was much disgusted at this performance, so was Taba. We sat down to wait for the ponies, which presently came up with the head of the ibex. We started back for camp, reaching the tents at 5 P.M. Curiously enough, Littledale came back almost simultaneously, bringing with him the head of a fair ram. He told us that he had come across a herd of sixty rams, almost all with good heads, and another lot of fifteen. These were the largest herds of rams we had yet seen."

THE IRTISH IBEX

(*Capra sibirica lydekkeri*)

This race of the Asiatic ibex was named in 1900 by Mr. Walter Rothschild,[1] on the evidence of three specimens collected by Mr. Carl Hagenbeck's travellers in the Katutay range of the Altai during the winter of 1898-99.

The original description is as follows :—

"Very old male. Centre of back creamy white, with a deep brown dorsal line running from behind the shoulders to the root of the tail. Head, neck, shoulders, and flanks pale brown. Nape of neck and hind-quarters creamy white. Tail from the base for half its length of the same brown colour as the shoulders, rest very deep brown, white on the whole under-side.

"Fore-legs from the hoof to the knee, hind-legs from the hoof to the hock brown. Fore-legs from the knee to the shoulder of the same brown colour as the lower part of the leg in front, much paler behind. Hind-legs from the back to the stifle-joint of a very deep brown in front, much darker than the lower part of the leg, but behind from the hock upwards

[1] *Novitates Zoologicæ*, vol. vii. p. 277 (1900).

pale brownish white, gradually passing into the creamy white colour of the hind-quarters.

"Horns very massive and strongly curved. The circumference at the base in proportion to the length much greater than in the three other known subspecies of *C. sibirica*. The knobs in front of the horns are wider apart, narrower, and not so prominent as in *C. s. sacin*, with which I have compared it. From the description in Mr. Lydekker's book this would always seem to be the case in comparison with typical *C. sibirica*.

"A younger male appears to have the white saddle less extended, the general colour of the head and body darker brown, and the hair of the legs longer with a more reddish tinge, while the white patch on the nape is very large and of a purer white than in the older male. The female is paler brown all over, with less distinct markings.

"The principal differences between this and the other three races of *C. sibirica* appear to be the much larger size and bulk of the animal, the heavy beam of the horns, the large white nape-patch and coloration of the legs, which seems to be intermediate between that of *C. sibirica* and that of *C. s. sacin*. In the former the legs are brown in front and white behind for their whole length, while in the latter they are entirely brown. In this new form, however, the legs of the oldest male are quite brown on the lower half, as in *C. s. sacin*, while on their upper half they are white behind as in *C. sibirica*.

"Length of horns over curve in the oldest male $46\frac{1}{4}$ inches, in the younger male $38\frac{3}{5}$ inches; circumference of horns at base in the oldest male $12\frac{3}{5}$ inches."

In this description the typical race of the Asiatic ibex is termed *Capra sibirica sibirica*, instead of *C. sibirica typica*, the term preferred by the present writer. Other specimens of *C. s. lydekkeri* have been obtained from the Irtish Valley, among them a male of which the skin and horns are now in the British Museum.

Exclusive of the very imperfectly known *C. sibirica dauvergnei*, the local races or varieties of the Asiatic ibex may be distinguished as follows, the characters being in all cases taken from specimens in the winter dress :—

1. *Capra sibirica typica.*—Coat, at least in many cases, uniformly brown, without any light saddle ; hinder surface of legs below knees and hocks white. Thian Shan Range and Siberia.

2. *Capra sibirica lydekkeri.*—A buffish-white patch on the neck separated by a considerable interval from a comparatively small saddle of the same colour bisected by a brown dorsal streak ; legs brown, as are the flanks and most of the rest of the upper-parts ; in type specimen thighs and hinder surface of upper portion of hind-limbs lightish. Katutay Range and Irtish Valley.

3. *Capra sibirica wardi.*—Buffish white saddle larger than in the preceding, and separated by a smaller interval from the neck-patch ; rest of body and legs dark brown, but in some cases a certain amount of white on the hinder surface of the lower part of the legs ; tail brown. Dorsal streak, as in preceding, very strongly marked. Baltistan.

4. *C. sibirica sacin.*—Nearly the whole of the upper-parts buffish white with only a faint light brown dorsal streak ; a narrow band along each flank, the shoulders and thighs, together with the neck and head, light brown ; legs dark brown, golden behind ; tail blackish. Mountains bordering the valley of Kashmir, except on the southern side, and probably their south-eastern continuation.

It is noteworthy that the nearly white Kashmir race inhabits that portion of the Himalaya which has the heaviest snowfall.

THE SINAITIC IBEX

(*Capra nubiana sinaitica*)

An immature male ibex from the Sinaitic Peninsula, presented to the British Museum in 1899 by Captain J. Marriott, of the Norfolk Regiment, differs markedly in the form of its horns from the typical *Capra nubiana* of North Africa, being in this respect intermediate between the latter and the wild goat. The writer could not, however, satisfy himself that the difference might not, in part at least, be due to immaturity. But he has recently been assured by Dr. Oscar Neumann that the same features are characteristic of the adult; and the Sinaitic ibex may accordingly be allowed to rank as a distinct local race of *C. nubiana*. The knobs on the horns are much narrower, taller, and more irregularly disposed than in the typical form. We now have a transition from the ibex to the true goats.

THE SOUTH ARABIAN IBEX

(*Capra nubiana mengesi*)

The typical Nubian ibex is distinguished from both the Alpine and the Asiatic species by the form of the horns of the bucks, which are very long, rather slender, and have the outer front angle much bevelled away, so that the true front surface is relatively narrow, with its transverse knobs proportionately short, while the inner surface is quite flat. In *Wild Oxen, Sheep, and Goats* the ibex from South-Eastern Arabia, named *C. mengesi* by Herr Noack in 1896, was regarded as identical. The author is, however, informed by Dr. Oscar Neumann that it differs by having the inner surface of the horns distinctly convex. The name Nubian ibex should be reserved for the typical African animal.

THE ARABIAN TAHR

(*Hemitragus jayakeri*)

(Plate III. Fig. 11)

The features by which the tahr, or beardless short-horned goats, are distinguished from the true goats of the genus *Capra* will be found in the *Great and Small Game of India, etc.*, as well as in *Wild Oxen, Sheep, and Goats;* repetition here would accordingly be superfluous. For many years the genus was known, in the living condition, only by the Himalayan and Nilgiri species; but in 1894 Mr. O. Thomas, of the British Museum, described a third representative of the group, on the evidence of specimens sent from Oman in South-Eastern Arabia by Lieut.-Colonel Jayakar, at that time stationed at Muscat. The fauna of South Arabia had been previously regarded as closely related to that of Africa south of the Sahara, and it was therefore a matter of considerable surprise to find in this district a characteristically Indian genus represented by a species closely allied to the one inhabiting the Himalaya.

Compared with the Himalayan tahr, the South Arabian species is a much smaller animal, with rather shorter hair, and proportionately longer and more slender horns, which are less boldly knotted on the front keel; the general colour is tawny brown.

The type specimens, one of which is mounted and exhibited in the British Museum, were obtained from Jebel Taw, but it is quite likely that the species may occur on some of the other mountain ranges of Oman. Nothing is known as to the habits of this animal, which indeed has probably never been seen by Europeans alive.

As a matter of fact, very little is known with regard to any of the

animals of Arabia, and any authentic information on this subject would be of great interest.

THE GREY JAPANESE SEROW

(*Nemorhædus crispus*)

The serow inhabiting the mountains of the Japanese islands, where it appears to be represented by two well-marked local races, is one of the smallest members of its kind, agreeing approximately in size with the goral of the Himalaya (see *Great and Small Game of India, etc.*), but conforming to the serow type as regards its structural features. A male was presented to the Zoological Society of London in 1879 by the late Mr. H. Pryer, a well-known collector in Japan, but no other specimen has ever been exhibited in the Society's Menagerie. The mounted skin of a male was presented to the British Museum in 1891 by Mr. J. L. Fletcher, and is now exhibited in the mammal gallery.

In its winter dress this animal has the hair long and stiff, with the general colour very dark blackish grey ; the individual hairs being partly black and partly white.

This race of 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. Nothing is known with regard to its habits.

THE ROAN JAPANESE SEROW

(*Nemorhædus crispus pryeri*)

In the collection of the British Museum is the mounted skin of a male Japanese serow acquired in 1880 from Mr. H. Pryer, which differs from the typical *crispus* by the thicker, softer, and more woolly character of the

fleece, and likewise by its colour, which is pale rufous-brown, much mixed with whitish, especially on the face and neck.

This specimen was purchased in Tokio by Mr. Pryer, who in a letter to the British Museum stated that it differs markedly from the ordinary form of the species. Possibly it may be the one mentioned by Father Heude[1] as seen by himself in Tokio, the colour of the coat according well with his brief description. The type of the *Nemorhædus pryeri* of that writer is, however, undoubtedly the skull figured by him under that name; and there is nothing to connect that skull with the roan-coloured skin seen by its describer in Tokio. Consequently *pryeri* may be a synonym of the typical *crispus*, in which case the present race will require a new name.

In the British Museum specimen the horns are $5\frac{1}{4}$ inches in length and $3\frac{1}{8}$ inches in basal girth. This race is believed to inhabit Tokio.

THE GEMSE, OR ALPINE CHAMOIS

(*Rupicapra tragus*)

(Plate II. Fig. 7)

It has long been a question whether the term "antelope" is sufficiently elastic to permit of its including the chamois, or gemse; but as Messrs. Sclater and Thomas have excluded the animal from the *Book of Antelopes*, we presume that we must regard the question as answered in the negative, and that it is no longer permissible to speak of the chamois as the European antelope. Not that this means that there is no antelope in Europe, for the goitred gazelle ranges into the Caucasus. Assuming the chamois to be allied to the serows and goral of the Himalaya (see *Great and Small Game of India, etc.*), and that to call them antelopes is inappropriate, a collective name for the group is much wanted, for such terms as goat-

[1] *Mem. Hist. Nat. Emp. Chinois*, vol. ii. p. 230 (1894).

antelopes, goat-like antelopes, or caprine antelopes are neither euphonious nor convenient. Chamois is, of course, the French name of the present animal, and gemse, or gems, its German equivalent. The transference of the latter name, in the form of gemsbok, by the Boers to the South African oryx is one of many curious instances of misapplications of names. Had

Fig. 40.—Caucasian Chamois on the watch. (From Prince Demidoff's *Hunting Trips in the Caucasus*.)

that name been given to the klipspringer there would have been but little at which to cavil.

From all ruminants the chamois (inclusive of its different local races) is at once distinguished by the peculiar and characteristic curvature of its cylindrical short black horns, which are smooth and polished at the tips, but marked by fine transverse and longitudinal striæ elsewhere. They

rise perpendicularly, or nearly so, for some distance from the forehead, after which they bend sharply backwards and downwards to form the pointed hooks so familiar to all Alpine travellers. The longest pair of chamois horns on record (Fig. 41) are in the possession of Count Alfred Teleki, and were obtained from Retyezat, in the Carpathians. They measure $12\frac{3}{4}$ inches in total length, and $4\frac{1}{3}$ inches in girth. Several specimens of 12 inches are on record. Generally a buck chamois does not weigh more than about 65 lbs., but the animal to which the record horns pertained scaled 123 lbs. and a fraction, and a weight of 125 lbs. has been recorded. The height at the shoulder varies between about 30 and 32 inches; the hind-quarters being slightly higher. The horns of the bucks are placed wider apart, and are also stouter and more strongly curved than those of the does. In other respects the two sexes are practically similar in general external appearance.

The hair is rather stiff and coarse; in summer short, not exceeding about $1\frac{1}{4}$ inch in length, and brownish grey at the roots and bright rusty red at the tips; in winter it grows to a length of between 4 and 5 inches and to between 7 and 8 inches on the neck, where it forms a short mane, the tips of the hairs being here black. A woolly under-fur is also developed with the winter coat. The colour of the animal varies considerably according to season. In summer the general tint is a dark reddish brown or rusty red, passing into bright reddish yellow on the under-parts; a blackish brown stripe runs down the middle line of the back; the throat and face are yellowish or isabelline fawn; on the shoulders, thighs, chest, and flanks the general tint becomes darker. The upper surface and root of the short and somewhat bushy tail are reddish grey, but the under side and tip are black. From the ear runs a dark brown streak through the eye nearly to the angle of the mouth, dividing the fawn of the throat from that of the face; and there are several small rusty spots between the front angle of the eye and the nostrils. In spring a greyer tinge is often noticeable. The long winter coat is dark brown

or even blackish brown above, and white beneath; the limbs being brighter coloured below than above and tending more to rufous; and the feet are yellowish white, as is the face, with the exception of the blackish brown eye-streak. The colour of both the summer and winter dress alters, however, so rapidly that it is only for a short time each season that the foregoing description will apply. Young animals are reddish brown and brighter coloured about the eyes. Light-coloured varieties or albinos are

Fig. 41.—The "Record" Pair of Chamois Horns. From the Carpathians.

very rare; although malformation of the horns occurs not uncommonly, in most cases at least it is the result of injury. Occasionally four-horned individuals are met with.

It may be added that chamois have small face-glands below the eyes. Hunters distinguish between forest and glacier chamois; the former, probably owing to better nutrition, being stouter in build and generally darker in colour than the latter. These forms cannot, however, be regarded as distinct races, although, as mentioned below, one local race has already been named, and others appear distinguishable although they have not yet received distinct titles.

The foregoing description applies to the typical, or Alpine chamois, but the species is found on most of the mountains of South, Central, and Eastern Europe, including the Pyrenees, the coast mountains of Spain, the mountains of Dalmatia and Greece, the Swiss and Transylvanian Alps, the Apennines, the Caucasus, the Balkans, and the Taurus Range. Although now rare in the Swiss Alps, the chamois is still abundant in the more eastern portions of that range, especially in the districts of Bavaria, Salzburg, Styria, and Carinthia; and in the Caucasus Prince Demidoff speaks of seeing it in herds of forty head, and it appears to be equally numerous in the Central Carpathians, as it probably also is in the Balkans. The limits of the range of the typical Alpine race are not yet ascertained.

Although, as indicated above, a certain number of chamois habitually frequent the glaciers and open snow-fields of the high Alps, the species as a whole may be regarded as a dweller in the upper zone of the forest-clad portion of the mountains; and in many parts of the highlands of Bavaria these animals are found on mountains which are mainly within the line of the forest belt. Naturally, however, there is a great local difference in chamois-ground. Where these animals live among thick forest, their pursuit is easier than Highland deer-stalking, owing to the abundance of cover. On the other hand, where they frequent the higher and more open ground, the difficulty of bringing a stalk to a successful conclusion is proportionately increased. Much, too, depends on the degree of wildness displayed by the animals themselves. In districts where the peasants are allowed to shoot at their own free will, the chamois, from being continually hustled about, are as wild and shy as hawks. In the carefully-preserved territories of large proprietors, on the other hand, where they are only stalked during a brief period in the autumn, the animals are much less difficult to approach. In some districts driving as well as stalking is permitted, but in those where the peasants have the right of shooting, the stalk is the only method in vogue. The pairing-season takes place chiefly

in November, and it is at that time of year alone, when they are in their darkest and richest vesture, that the old bucks are found continuously with the rest of the herds, as they keep themselves more or less apart at other times. Were it not for the heavy falls of snow which usually take place before or during November, the pairing-season would undoubtedly afford good opportunities for successful stalking, as the bucks then allow themselves to be approached with comparative facility. As it is, however, September and October are the months in which chamois-shooting is chiefly practised in the Alps; although there are certain local differences in the period allowed for shooting, which in some cantons commences in July and ends in December, while in others it does not begin till fully a month later.

According to Brehm's *Tierleben* the so-called glacial chamois only resort to the higher grounds during the summer months, deserting the herds for this purpose, and being soon driven back if severe weather sets in for any length of time. In summer all chamois frequent the western and north-western slopes of the Alps, but in winter they resort to feeding grounds exposed to the east or south. When the old bucks join the herds in the autumn, the younger males are driven off to shift for themselves. The period of gestation is about twenty-eight weeks, and the kids, of which there is generally but one at a birth, are dropped in May or June. At birth they are clothed with a reddish woolly coat, and are said to be able to follow their dam within six-and-thirty hours of their arrival in the world. They have, however, often to be defended from the attacks of eagles and lammergeiers (where those splendid birds still survive) by the horns of their dams. A three-year-old chamois is full grown, but it is stated that these animals will live to twenty or even five-and-twenty years. According, however, to Dr. B. Nitsche[1] the milk or deciduous teeth are not entirely replaced by their permanent successors till the fifth year is

[1] "Die Altersbestimmung der Schwarz- und Gems-wildes," *Deutscken Jäger-Zeitung*, vol. ix. (1887).

reached. In the same communication the author likewise points out how the horns of chamois differ according to the age of the animals to which they belong. In an animal of the first year the horn is smooth and curved, and about a couple of inches in length ; this, of course, forming the tip of the horn of the adult animal. In the second year another portion, partly curved and slightly bent, with a length of about three inches, is added at the base ; the half of this portion, which is straight, being marked by fine transverse striæ. In the third year a shorter basal portion, about an inch long, is added ; while in the fourth, fifth, and sixth years the added basal part gradually diminishes in length. In subsequent years the annual growth is only about half or a quarter of an inch. Meantime the smooth tip of the horn becomes somewhat shortened by wear and tear. The whole length of the long portion of the horn is marked by the aforesaid fine transverse striæ, but the annual limits of growth are indicated by more pronounced lines.

In most parts of the Alps chamois are found in herds numbering not more than about fifteen or twenty head, and frequently in much smaller parties, but, as already mentioned, in the Caucasus herds of thirty, or even more, are by no means uncommonly seen. As regards their general habits chamois are very similar to ibex, commencing to feed at the first break of dawn, reposing for some hours in a sheltered position during the middle of the day, and once more wandering forth to feed towards evening ; their food consisting to some extent of lichens, but apparently including herbage of several descriptions. During the time the herd is feeding or reposing a sentinel is posted on some commanding position—frequently a bare pinnacle of rock—to give notice to the rest of the approach of danger, which is effected by a shrill whistle. When this warning sound is heard the members of the flock instantaneously seek safety in flight.

Chamois stand upon the whole surface of their hoofs, like goats, and not merely upon their extreme tips like the African klipspringer. Hence

it seems probable that they cannot stand upon such a small superficies as the latter. Nevertheless their activity and sure-footedness are little short of marvellous ; and the better to enable them to secure a firm foothold, the outer edges of the hoofs are markedly higher than the central portion.

THE APENNINE CHAMOIS

(*Rupicapra tragus ornata*)

This local race of the chamois was described in 1899 by Dr. Oscar Neumann [1] as a distinct species, under the name of *Rupicapra ornata*. It is typified by a male specimen in the Genoa Museum from the Abruzzi, and is specially characterised by the brightness and brilliancy of its coloration, which is described as follows by Dr. Neumann :—

The sides of the head are brown, the pale fawn-coloured patch on the nose and forehead ends superiorly in a sharply defined oval, and the pale streak above the eye so conspicuous in the Alpine chamois is wanting. The chin and cheeks are of the same isabelline fawn as the forehead, and this colour extends down the front of the neck to terminate in a point on the chest. The crown of the head behind the horns is likewise of the same isabelline tint, as are the nape of the neck and shoulders. Externally the ears are dark brown ; this colour being continued as a widening streak down the sides of the neck to the chest so as to divide the isabelline area of the cheeks and fore part of the neck from that of the nape and shoulders. This is, perhaps, the most distinctive and characteristic feature of this race. The lower portion of the chest, as well as the limbs, are of the same general colour as in the Alpine chamois, although less distinctly reddish, the hue being something between sepia and greyish brown. The whole of the rest of the body is of a much brighter brown, partly tending to isabelline fawn, than in the Alpine form, the rump being bright isabelline

[1] *Ann. Mus. Genova*, ser. 2, vol. xx. p. 347.

fawn. From the hinder part of the head a dark stripe runs down the back, which expands and passes into brownish black in the region of the loins.

The type specimen, which appears to be adult, is rather inferior in size

Fig. 42.—Front View of Male Apennine Chamois. (From O. Neumann, *Ann. Mus. Genova*, 1899.)

to two specimens of the Alpine chamois in the same collection, but has longer horns.

It is considered by Dr. Neumann that the coloration of the Apennine chamois, especially the dark band running down each side of the neck, is so peculiar and characteristic that it can scarcely be considered due to individual variation. And specimens displaying a similar type of coloration

are reported from other collections in Italy. The precise locality of the type specimen is Barrea, near Alfedena, in the province of Aquila, East Central Italy.

The describer of this race adds that it is probable the chamois of the Pyrenees, of the Carpathians, and of the Balkans will severally prove to be distinct from the typical Alpine form; also mentioning that specimens from Siebengeburge approximate in size more to the Apennine than to the Alpine type.

THE IZARD, OR PYRENEAN CHAMOIS

(*Rupicapra tragus*, var. *c.*)

Specimens of the Pyrenean chamois are much wanted in the national collection in order that it may be carefully compared with the Alpine form, and if distinct, named. It is known to the French as the izard, and to the Spaniards as rebeco, and is stated to be a smaller animal than the Alpine chamois, of a more foxy red colour and with shorter horns. In the Pyrenees, according to Messrs. Chapman and Buck, it is more or less common; as it also is in the Cantabrian highlands, more especially in the neighbourhood of the Picos de Europa, where the peasants kill it by driving.

THE ATCHI, OR CAUCASIAN CHAMOIS

(*Rupicapra tragus*, var. *d.*)

Lack of specimens prevents the characteristic features of the Caucasian chamois being described, but there are said to be differences from the typical Alpine form which not improbably indicate racial distinction.

Dr. Satunin[1] states that chamois are abundant, at middle and high elevations, in the whole Caucasus range; and that, in smaller numbers, they also

[1] *Zoologische Jahrbuch*, vol. ix. p. 311 (1896).

occur locally in the Little Caucasus, as, for example, in the government of Eriwan and in the neighbourhood of Kars. They have been reported to occur also at Karabag and Talysch, but apparently incorrectly.

In his *Hunting Trips in the Caucasus*, Prince Demidoff writes of this animal as follows :—

"Chamois abound in most parts of the Kouban district, and are far from shy. I had the luck to bag seven in one day. I have met with herds of from seventy to one hundred at one time just above the timber-line in September. When frightened they generally make for the woods, where I have very often found them on hot days lying in the shade. I have also come across ibex [wild goat] hiding in the forest in the same month."

THE BUBAL HARTEBEEST

(*Bubalis boselaphus*)

As this long-faced and somewhat melancholy-looking antelope is common to the north of Africa and Arabia and certain portions of Palestine, it claims mention in the present volume. But since it is essentially an African type, and has been described by Sir Harry Johnston in the *Great and Small Game of Africa*, nothing further need be added in that respect. Canon Tristram, in his *Natural History of the Bible*, writes as follows of this animal :—

"The range of the bubale is extensive, through all North Africa, from Morocco to Egypt, and across into Arabia, where indeed most of the North African desert animals are also found. It lives in small herds. I never myself found it in Palestine, but the Jehalin Arabs know it well by its North African name, and assured me they often obtained it when it came to drink at the streams on the east side of the Dead Sea."

THE SAIGA

(*Saiga tatarica*)

(Plate II. Fig. 8)

At or about the epoch when the lordly mammoth browsed on the leaves of the forest trees bordering the Thames valley, and the two-horned woolly rhinoceros grazed undisturbed on the adjacent stretches of sward, the more sandy and steppe-like localities in the same district were visited, at least occasionally, by the clumsy and uncouth-looking antelope known to the Russians as the saigak, and to the Kalmuk Tatars as gorossun.

That such was really the case is demonstrated by the circumstance that the upper portion of a skull of this antelope was dug up not many years ago in the superficial deposits of Twickenham; the characters of this unique specimen being such as to leave no room for doubt as to the correctness of the determination. From the extreme rarity of its remains it would seem, however, that at the epoch in question the saiga was far from a common animal in England (at that time joined to the Continent), and it may well be that the south-east of England formed the extreme western limits of its range, and that only a few venturesome individuals wandered so far away from the main habitat of the species. Be this as it may, the saiga, like the musk-ox, has long since disappeared entirely from Western Europe, although, unlike the latter animal, it still survives in Eastern Europe and North-Western Asia and is unknown in the western hemisphere.

During the sixties living saigas were once more to be seen in the neighbourhood of their old haunts, four examples (two of which are figured in the Society's *Proceedings* for 1867) having been exhibited in the menagerie of the Zoological Society in the Regent's Park between the years 1864 and 1869. But between about 1870 and the close of the last

century this curious species was totally unrepresented in the Zoological Gardens.

In 1900, however, the Duke of Bedford purchased a small herd of saigas, but by March 1901 only a solitary survivor was alive in the park at Woburn Abbey. One member of this herd—a male—which died towards the end of 1900, is now mounted and exhibited in the British Museum, and although by no means of large size, is the first specimen in that collection which has shown the true form of the muzzle and nose. It is from this specimen that the figure of the head in the plate is drawn.

The peculiar conformation of the muzzle and nostrils, the latter of which are tubular and directed downwards, serves to distinguish the saiga from all other kinds of antelope; the only one which makes any approximation (and that a very remote one) to it in this respect being the chiru of Tibet, a description of which is given in *Great and Small Game of India, Burma, and Tibet.* Nothing is known with regard to the object of this very peculiar departure from the ordinary antilopine type of structure.

In one of the two volumes on *Big Game Shooting* in the "Badminton Library," Mr. R. A. Sterndale, who derived his information from the Russian naturalist Pallas, is quoted as stating that the inflated nostrils of the saiga are so much lengthened as to necessitate the animal's walking backwards when it feeds. And the sportsman is accordingly advised to take up his position in the rear of a herd should he desire the members of the same to advance in his direction as they feed, although it is added he may possibly find that nature has provided the animal with means of twitching its nose out of the way to obviate so uncomfortable a method of grazing. The saigas at Woburn Abbey show no tendency to feed in the manner indicated, but when grazing advance steadily forwards in the ordinary fashion. Still it is a little difficult to imagine how it is that the nose is not in the way when the animal is grazing on short herbage.

The saiga is a near relative of the gazelles, the blackbuck, and the

chiru, and, as in the two latter and a few of the former, the females are hornless. The horns of the bucks, which are of a bright amber-colour, are sub-lyrate in form, with the tips only very slightly turned inwards, and are ringed all round for the greater part of their length ; the usual number of rings in good specimens being about twelve or thirteen. The record pair of horns (Fig. 43), which came from Siberia, are in the Museum of Mr. Walter Rothschild at Tring Park, and measure $14\frac{3}{8}$ inches in length, with a basal girth of $5\frac{1}{4}$ inches, and an interval of $3\frac{1}{2}$ inches between the tips. In the next best specimen the length is $13\frac{3}{4}$ and the circumference 5 inches. Three other examples exceeding 13 inches in length are entered in Mr. Rowland Ward's *Records of Big Game*.

Fig. 43.—The Record Pair of Saiga Horns.

It is difficult to attain accurate information as to the maximum dimensions attained by the saiga, as it is an animal very rarely shot by British sportsmen. The male from Woburn Abbey now exhibited in the British Museum is, as previously mentioned, of rather small stature. A larger and somewhat faded male formerly exhibited in the same collection, but removed from the public gallery on account of the inaccurate modelling of the muzzle, measures 30 inches at the shoulder. A skeleton in the same collection measures $31\frac{3}{4}$ inches at the shoulder, as mounted, but little or no importance can be attached to measurements of skeletons, and it is mentioned here merely on account of the fact that its dimensions are quoted in the "Badminton Library." Speaking generally, the animal may be compared in size to a rather small sheep.

In their summer dress the saigas at Woburn Abbey were pale sandy fawn on the upper-parts, with the face, the lower surface of the body, and the under side of the tail white. Pale fawn is likewise the predominant colour of the specimen exhibited in the British Museum, which appears

to be in the early winter coat. The above-mentioned survivor of the Woburn herd in March was, however, whitish grey in colour, and this appears to be the normal tint of the long winter coat late in the season, and in old animals it may be nearly white. In the large male and female formerly exhibited to the public in the British Museum the coat, indeed, is almost pure white externally, although below their tips the hairs are of the usual pale sandy. Apparently this extreme whiteness has been chiefly caused by the bleaching effect of exposure to the elements during life, but it may be in part also due to fading after death.

When in the long coat of winter, saigas display a special elongation of the hair on the sides of the face. The overhanging and puffy muzzle is very deep, compressed from side to side, with a markedly convex profile. As regards other external parts of these animals, it will suffice to say that the limbs are somewhat inelegantly and clumsily built, that the ears (as in so many animals inhabiting open plains) are comparatively small, and that the tail is relatively short, not reaching within several inches of the hocks.

Essentially an inhabitant of the open sandy and salt steppes, the saiga is an animal whose distributional area has been steadily contracting as the centuries roll by. A century or so ago its western range extended as far as Poland, and, according to Brehm, the lower part of the Danube Valley and the Carpathians; but of late years it has retired more and more to the Kirghiz steppes east of the Volga.[1] Formerly, indeed, it was found on nearly all the steppes of South-Eastern Europe and Siberia, extending, as already mentioned, from Poland and the foot of the Carpathians to the Altai, and from the shores of the Black Sea and the Caucasus along the Caspian Sea and the Sea of Aral to the Irtish and the Obi as far north as lat. 55°. It may now be regarded as one of the most characteristic denizens of the Kirghiz steppes. According to Helmersen it wandered in winter through the south-western steppes of Siberia

[1] See Dr. A. Nehring, *Tundren und Steppen*, p. 90 (1890).

to the eastern flank of the Urals, while in summer it ranged so far north as to come in contact with the reindeer. On the other hand, during winter its southward migration brought it in contact in Turkestan with the goitred gazelle. According to Dr. K. Satunin,[1] small herds of saigas are still to be met with in spring and autumn on the steppes of the North-Eastern Caucasus, and Rossikoff mentions their occurrence on the steppes of Kuma.

Saigas have been reported to occur in Mongolia, and Prince Demidoff and his party, as we are told in *After Wild Sheep to the Altai and Mongolia*, were on the look-out for them when in that country, but failed to find any evidence of their presence.

When first turned loose, after their long journey in a small cage, in one of the paddocks at Woburn Abbey, the saigas crawled about in a sadly limping manner, and it was at first feared that their hind-quarters and limbs were permanently injured from long confinement in a cramped space. With rest and good feeding they, however, gradually recovered, and after a few months appeared but little the worse for their prolonged imprisonment. It cannot, however, be said that their movements at all approach those of the gazelles in gracefulness.

According to the excellent account given in Brehm's *Tierleben*, much of which is derived from the narrative of the old Russian naturalist Pallas, saigas are essentially social animals, associating in herds, from which even the old bucks do not separate themselves during the summer. Towards the beginning of autumn the smaller bands collect together to form immense herds, which may sometimes number thousands of individuals; these wander about together during the winter, to divide again into smaller bands as spring approaches, each of which returns to its own special district. Very rarely is a saiga seen alone. The members of a herd never all sleep simultaneously, some remaining on guard while the remainder lie

[1] *Zoologischen Jahrbüch*, vol. ix. p. 310 (1896).

down to chew the cud or slumber. Old saigas possess such speed that even swift horses and greyhounds can scarcely overtake them, but the younger animals are short-winded, and can be run down with comparative ease. In spite of their speed many are, however, slain by beasts of prey, especially the wolf. As already said, their gait is by no means elegant, and they run with the neck stretched out and the head carried low. Like all steppe-dwelling animals, they are shy and difficult to approach, but they are by no means clever in avoiding the approach of pursuers. Their sight is said to be indifferent, and at times they appear to be partially blinded by the sun, when they will run headlong into danger.

The food of the saiga consists almost exclusively of the salt-loving plants which thrive in profusion here and there on the steppe, especially where saline springs break forth and the soil is encrusted with an efflorescence of salt. The statement of Pallas that these animals walk backwards while feeding, and graze on one side of the mouth, on account of the nose preventing them following the usual custom in these respects, has been already mentioned. It has also been asserted, from the time of Strabo downwards, that in drinking they take in water not only with the mouth but through the nose! The latter statement is, of course, a pure fabrication; while in regard to the former, Brehm, from observation of specimens in captivity, denied its authenticity.

In consequence of the nature of the herbs on which the saiga feeds, its flesh exhales a peculiar aromatic and fragrant smell. During the pairing-season, which commences in the latter part of November, the bucks engage in fierce combats with one another for the mastery of the herd. The period of gestation lasts till the following May, when the does give birth to their young. At birth the kids, of which there is never more than one at a time, are exceedingly helpless, and remain so for some time.

In spite of the 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 the Kirghiz cut paths in the steppe grass, leaving the stiff stalks at a certain height ; into these paths herds of saigas are driven by mounted men, when the unfortunate animals lame and otherwise wound themselves by treading on the sharp stalks of the grass. They are more easily hunted with firearms ; and sometimes eagles are employed in their capture. Nor does this exhaust the list of the saiga's enemies, for 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.

If taken sufficiently young, saigas, it is said, can be readily tamed, and will follow their owners about like dogs. They can be taught to swim rivers, and may even be allowed to mingle with the herds of their wild brethren, from among whom they will return to their own dwelling. In addition to those mentioned above as being kept in England, saigas have been exhibited in continental menageries, but have seldom thriven well.

PRZEWALSKI'S GAZELLE

(*Gazella przewalskii*)

(Plate II. Fig. 9)

This species is one of several mammals discovered by the Russian explorer, the late Colonel Przewalski, during one of his expeditions into Central Asia ; and it was named in his honour by Dr. Eugène Büchner[1] in 1890. Figures, taken from specimens in the British Museum, of the male and female, together with a capital description of the animal, will be found in the *Book of Antelopes*, by Messrs. Sclater and Thomas.

In its general character this species comes very close to the Tibetan

[1] *Mélanges Biologiques*, vol. xiii. p. 164.

gazelle, or goa (*Gazella picticaudata*), which has been fully described in the *Great and Small Game of India, Burma, and Tibet*, and therefore needs no further mention on the present occasion, in spite of the fact that it is probably found in part of the area coming within the province of this volume. Both are characterised by the extreme shortness of the tail, the lack of the usual face-markings distinctive of most gazelles, the absence of horns in the females, and the strongly marked backward curvature of those of the males. Both, too, are of comparatively small size, and have a white blaze on the buttocks, while they also lack glands on the face, and have the nasal bones of the skull pointed instead of notched.

In addition to a slight superiority in point of size and certain differences in coloration, this species, which might well be called the Mongolian goa, is readily distinguished from its ally by the abruptly inward hooking of the tips of the horns of the bucks. These, which are much compressed and of medium length and thickness, diverge regularly outwards and curve as regularly backwards till near their tips, when they are bent sharply inwards and somewhat upwards. Eleven inches is the maximum recorded horn-length.

Between 25 and 26 inches at the shoulder would seem to be the approximate height attained by this gazelle. As in the Tibetan goa, the ears are short and sharp. The general colour of the hair on the upper-parts of the body is deep fawn in summer, but pale finely grizzled fawn in winter, when the coat is much longer and rougher. The inner surface of the ears, the under-parts, and a patch on the buttocks are pure white, the white running on to the back on each side of the tail, which is white save for the upper surface, where it is fawn like the back, becoming browner near the tip. There is also a brownish streak on the front of the fore-limbs.

This gazelle is an inhabitant of the Gobi desert of Mongolia and the adjacent districts, being abundant in the neighbourhood of Lake Koko-Nor,

and extending southwards into Northern Kansu and Orclos. A description of its habits will be found in the English translation of Przewalski's *Mongolia*, where it was regarded as identical with the Tibetan goa. It has also been hunted by Prince Demidoff and Mr. St. George Littledale, to the latter of whom the British Museum is indebted for its first example of the species.

According to Przewalski's account, these gazelles are always found in herds, which in localities where food is abundant may comprise hundreds or even thousands of individuals, although more commonly the number ranges between thirty and forty. In search of the best pasture, they frequently travel long distances in summer, while the snows of winter compel equally long migrations in order to reach open ground. Although at times attracted by the succulent grass which in spring grows on the undulating portions of the steppes, these gazelles avoid hilly ground, and are essentially denizens of the open plains, shunning the covert of either bushes or tall grass, except during May, when the does seek such situations in order to drop their fawns. It is, however, but a short time that the latter require such protection, and in a few days they are strong enough to run with the herd. Like all desert animals, these gazelles are endowed with great speed, as well as with acute sight, smell, and hearing.

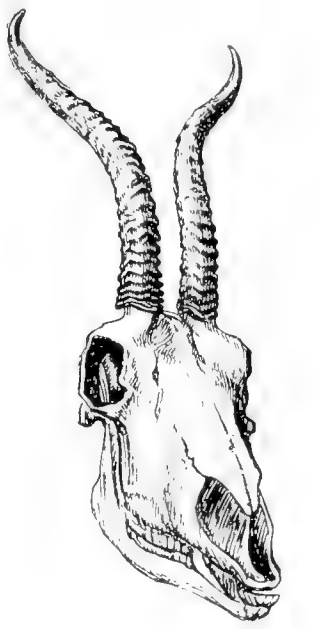


Fig. 44.—Skull and Horns of Male Przewalski's Gazelle. From a specimen shot by Prince Demidoff.

THE MONGOLIAN GAZELLE

(*Gazella gutturosa*)

(Plate II. Fig. 10)

Unlike the last species, the much larger Mongolian gazelle has been known to science for considerably more than a century, the Russian naturalist and explorer Pallas having described it as long ago as the year 1777, while it was familiar to some of his contemporaries at a still earlier date.

Agreeing with the goa and Przewalski's gazelle in the extreme shortness of the tail, the absence of gazelline face-markings, of face-glands, and of horns in the female, as well as in the pointed nasal bones of the skull and the white on the buttocks, the present species is distinguished by its superior bodily size, the slight backward curvature of the horns of the bucks, the much larger extent of the white area on the buttocks, and, above all, by the fact that during the pairing-season the upper part of the windpipe, or larynx, of the bucks becomes enormously inflated. In this latter respect it agrees with the goitred gazelle, in which the swelling appears to be notable at all times of the year, although most conspicuous at the season mentioned above.

In height the Mongolian gazelle grows to at least 30 inches at the shoulder, and may thus be compared in height to an average-sized sheep. Indeed in China it is known as the yellow, or imperial, sheep. In form it is stout and somewhat clumsy ; and during winter it is clothed in a long and shaggy fleece, although its summer coat is much shorter. The ears are short and pointed, with the outer surface very pale fawn, approaching white. The general colour of the back, nape of the neck, and a blaze on the face is pale fawn in the winter coat, as is the tail-tip ; but in the summer dress these

portions are bright yellow or rufous. Elsewhere the colour is white; the whole of the thighs and buttocks, as well as the flanks and limbs, being of this hue. Relatively to the size of the body, the horns of the bucks are short; they are heavily and closely ridged for the greater part of their length, and after running parallel with one another for some distance, they first diverge gradually, and then slightly incurve at the tips. Owing to skulls of other species having been mistaken for those of this gazelle, horn-measurements are not to be relied upon; but it is probable that good horns grow to about twelve or thirteen inches. The skull may always be distinguished from that of the goitred gazelle by the pointed, instead of notched, nasal bones.

The distributional area of this very remarkable species includes the greater part of Northern and Eastern Mongolia, as well as the southern confines of Russian Transbaikalia. It is essentially a desert animal, and in the Kuldja district its habitat is defined from that of the forest-loving Yarkand race of the goitred gazelle by a single mountain range. Prince Demidoff and Mr. P. Church are two of the few sportsmen resident in England by whom this gazelle has been seen in its native haunts. In the exhibition galleries of the British Museum it is represented by an old and wretchedly mounted specimen which stands in urgent need of replacing by a better example.

For an authentic account of the habits of this gazelle naturalists are indebted to Dr. G. Radde, of Tiflis, who travelled in South-Eastern Siberia during the years 1855 to 1858, and published the result of his researches in 1862, under the title of *Reisen im Süden von Öst-Sibirien*. According to this narrative, the distributional area of the present species, like that of the saiga, has been steadily contracting throughout a considerable portion of the century just ended; and at the present day there are few localities on the southern confines of Russian Transbaikalia where it is still a permanent resident. In winter these gazelles are to be met with in enormous herds,

which separate into smaller bands with the approach of spring ; and it is stated that in the former season, owing to the density of the herds, it was no uncommon event for two or three animals to be killed with a single bullet, and that, too, from an old-fashioned type of rifle, if not from a shot-gun. The young, usually two in number, are born in June, and when about three days old are able to run with the herd.

Winter is the time when these gazelles are chiefly hunted by the natives, as in summer they are extremely difficult to approach. In cold weather they are in the habit of proceeding about mid-day to drink at the nearest lake, always selecting the same spot, and breaking the thin ice with their feet. And it is the practice of the hunters to drive the herd on to the ice, when many of its members break through, and are then taken without difficulty. Another plan is for a hunter to drive the herd towards his comrade, who, rifle in hand, lies concealed behind a marmot mound or some other elevation on the plain. As the concealed hunter is neared, the one who is driving the herd imitates the croak of the raven or the howl of the wolf, whereby the attention of the gazelles is momentarily arrested, thus affording a favourable opportunity for a shot. In the autumn the old bucks become very fat, when their flesh is much esteemed. Frozen carcases of these gazelles are exported from Mongolia to Pekin, where they are cut up and offered for sale in the butchers' shops.

THE PERSIAN GOITRED GAZELLE

(*Gazella subgutturosa*)

A full account of the goitred gazelle and its local races is given in *Great and Small Game of India, Burma, and Tibet*, and a few lines will thus be sufficient in this place. Resembling the much larger Mongolian gazelle in the dilatable larynx of the bucks, which becomes most inflated during

the pairing-season, the present species differs in possessing more or less strongly pronounced dark markings on the face, by the longer tail and horns, and the notching of the nasal bones of the skull. The does, at least normally, are without horns ; and the large white rump-patch of the goa is wanting. From 24 to 27 inches represents approximately the shoulder-height of the species. The coat is long and shaggy in winter, when it becomes almost white, but shorter in summer, when it is fawn-coloured.

The typical, or Persian, race of the species ranges from Baluchistan through Persia to Asia Minor and the Caucasus. It is of relatively small size, with long horns, and the face-markings generally not very strongly developed, being restricted in the winter coat to a pair of lateral dark streaks extending from the eyes nearly to the angles of the mouth.

A good account of the distribution of the Persian goitred gazelle will be found in Mr. W. T. Blanford's *Zoology and Geology of Eastern Persia.* According to Dr. K. Satunin's oft-quoted memoir on the mammals of the Caucasus,[1] the goitred gazelle is common throughout the desert tract of Eastern Transcaucasia, being especially numerous in the Mugan steppe. Nordmann also records it from the upper part of the valley of the Araxes, that is to say, in the plain dividing Mount Ararat from the mountains of Achalzik. It does not occur in the Great Caucasus, which, indeed, is not a tract suitable to its habits.

THE YARKAND GOITRED GAZELLE

(*Gazella subgutturosa yarcandensis*)

This race of the goitred gazelle, which was named by Mr. Blanford in 1879, is distinguished from the typical form by its superior size, longer and less numerously ridged horns, more pronounced face-markings, the

[1] *Zoologische Jahrbuch*, vol. ix. p. 310 (1896).

fawn-coloured forehead, and the larger extent of white on the buttocks. The distributional area of this race extends from the plains of Eastern Turkestan to Lob-Nor and the borders of the Gobi desert. A coloured plate of this animal will be found in the *Scientific Results of the Second Yarkand Expedition.*

THE ALTAI GOITRED GAZELLE

(*Gazella subgutturosa sairensis*)

The Altai representative of the goitred gazelle was first recognised as a distinct race in the *Great and Small Game of India, Burma, and Tibet*, on the evidence of a mounted buck from the Sair Mountains presented to the British Museum by Mr. St. George Littledale. It is characterised by its relatively large stature (27 inches at the shoulder), comparatively short and sparsely ridged horns, white forehead, and the slight development of the dark face-markings. The Sair, or Saiar, Mountains are situated in the Great Altai on the north-western border of Mongolia in long. 86° E. and lat. 47° N.

Before taking leave of the gazelles of Central Asia, an extract may be made from pp. 183 and 184 of Prince Demidoff's *After Wild Sheep in the Altai and Mongolia*. The passage runs as follows :—

"In three hours we found ourselves on the table-land, about 1500 feet above camp level. Although our tents appeared to stand at the very foot of the range, yet so deceiving was the distance over the steppe, that the hills seemed gradually moving away from us as we advanced over that endless plain. On our way we came across several herds of antelopes, probably *A. gutturosa*, and here for the first time we also met with antelopes of a much smaller species, which my Kalmuks called *Salte*. They would start at a few hundred yards from us, and jump for some time on the same spot like india-rubber balls, before dashing off at a tremendous

pace. I do not know that this curious little animal has ever been described before, and am sorry that, being intent on shooting sheep, we did not endeavour to secure one or two specimens. We did not see any of them beyond the Snok steppe, in the valley of the Kobdo, nor on the Kash-Agatch plain, where, however, on our return journey, we bagged several of the larger antelopes. I should estimate the height of the smaller species to be about 20 inches at the withers, roughly speaking, and the coat was of a dark brown hue, growing lighter under the stomach."

It is difficult to recognise in this description any known species of Central Asian antelope.

THE MARICA GAZELLE

(*Gazella marica*)

This gazelle was described as a distinct species by Mr. O. Thomas[1] in 1897, on the evidence of skins and skulls from the Nejd desert of Central Arabia which were forwarded to the British Museum by Lieut.-Col. Jayakar, who was for a long time resident at Muscat. It is evidently the Arabian representative of the goitred gazelle, from the Persian race of which it is said to differ by its inferior size, paler colour, and the presence of horns in the female. The almost complete absence of face-markings is given as another distinctive character, but since these are extremely variable in the goitred gazelle, this is not a feature of much importance. Of more value is the presence of horns in the female; but since it is reported that the female of the goitred gazelle is occasionally horned, this feature appears of less importance than was originally supposed. Hence it may turn out that the marica gazelle is only a local race of the goitred species.

This gazelle inhabits the Arabian desert from Nejd to the western

[1] *Annnals and Magazine of Natural History*, ser. 6, vol. xix. p. 162.

districts of Oman, and is also recorded from Bahrein Islands in the Persian Gulf. It is known to the Arabs as the *rim*, a title also applied to a North African species of gazelle.

THE DORCAS GAZELLE

(*Gazella dorcas*)

With this species we come to the typical group of gazelles, in which the central dark band on the face is continuous, horns are present in both sexes, the fawn of the back extends on to the buttocks, the dark flank-band is but indistinctly marked, and the tips of the horns are curved slightly inwards or upwards, and are not bent back at a right angle. From its nearest relatives the present species, which inhabits Algeria, Egypt, and Palestine, is distinguished by the moderately long horns being distinctly lyrate, with the middle portion twisted outwards, and the tips again approximating.

The Dorcas gazelle is described in the *Great and Small Game of Africa*, and therefore needs no further mention here.

THE ARABIAN GAZELLE

(*Gazella arabica*)

(Plate II. Fig. 11)

This species is a medium-sized gazelle in which the horns are not perfectly lyrate, and the muzzle is marked with a black spot. The height at the withers varies from about 24 to 25 inches; and the most distinctive feature by which the species is distinguished from the allied forms is the

dark smoky fawn-colour of the upper-parts. The markings on the face are very distinct, the central band being dark rufous fawn in colour, with the above-mentioned black spot at its lower end. The dark streaks along the flanks and bordering the white of the buttocks are smoky brown ; and the pale band above the former is only a shade lighter than the fawn of the back. The ears, which are of medium length, are brownish fawn externally, the limbs present a more rufous tinge than the body, and the tufts of hair on the knees are either brown or black. The horns of the bucks are relatively short and thick, curving slightly backwards for a considerable portion of their length, but inclining forwards at the tips.

This gazelle is restricted to Western Arabia ; and as that country is almost inaccessible to sportsmen, practically nothing is known with regard to its habits in the wild state, although specimens are commonly brought down for sale to the Red Sea ports. Doubtless its mode of life is practically the same as in the allied species.

THE CHINKARA

(*Gazella bennetti*)

The chief characters by which the Indian and Persian chinkara gazelle is distinguished from the preceding species are its smaller size and lighter colour. A full notice of the species will be found in the *Great and Small Game of India, Burma, and Tibet*, where it was left an open question whether the Persian and Baluchi animal is entitled to rank as a race apart from the typical Indian form.

THE MUSCAT GAZELLE

(*Gazella muscatensis*)

This, the last representative of the gazelles inhabiting any portion of the area treated of in the present volume, belongs to a sub-group of two species differing from the group containing the dorcas and Arabian gazelles by the form of the horns, in which the tips are hooked inwards or upwards, bending nearly at a right angle to the main direction. The special feature by which the Muscat gazelle differs from its ally the Nubian gazelle is its much darker colour; the general hue of the upper-parts being brownish fawn, with the flank-band blackish. This gazelle is only known from Muscat, and was first described by the late Sir Victor Brooke.

THE BEATRIX ORYX

(*Oryx beatrix*)

(Plate II. Fig. 12)

The Beatrix, or Arabian oryx, which received the name by which it is now known from the late Dr. J. E. Gray in 1857 in honour of the Princess Beatrice, is the smallest representative of the oryx group, and the only one unknown in Africa. As a matter of fact, however, it is really the animal described by the Russian naturalist Pallas in 1777 as *Oryx leucoryx*, although that title is now transferred to the species known as the white oryx; and in reality that name is much more applicable to the present species. In height the Beatrix oryx stands about 35 inches at the shoulder. Its coloration is extremely striking and peculiar; the general

tint is whitish, the legs, save for a white ring round each fetlock, are brown, and there is a brown patch on the forehead, and a larger patch of the same colour on each cheek which meets its fellow beneath the throat. The tail-tuft is also brown, but darker than the other markings.

As in other members of the group, horns are present in both sexes. These are of the same straight lance-like form as in the beisa and gemsbuck, but much smaller, the maximum recorded length being $26\frac{3}{4}$ inches, as shown by a specimen in the Paris Museum.

This oryx appears to be confined to the districts bordering the Persian Gulf and Arabia, but its exact distribution in the latter country has yet to be worked out. It is, however, known to occur in the Nejd district, in Oman, and doubtless in the great desert east of the latter place. Some specimens were exhibited in the Gardens of the Zoological Society of London between the years 1872 and 1892; but the British Museum is very poorly off for examples, the species being not yet represented among the series exhibited to the public.

The only skin of a wild-killed animal in that collection is one from Oman presented in 1894 by Lieut.-Col. Jayakar, and mentioned by Mr. O. Thomas in the *Proceedings of the Zoological Society* for that year (p. 451). In mentioning that skin Mr. Thomas remarks that "this wild-killed specimen of the beautiful Beatrix gemsbuck is of much value, as the specimens we have hitherto had have been brought alive to England, and their fur appears to have been altered in character by the great difference in the climate. . . . The present specimen has an exceedingly short close coat quite different from that of the other specimens." Possibly, as Mr. Thomas himself suggests, this difference may be due in part to the season of the year in which the animals were killed.

The species was named by Dr. Gray on the evidence of a male specimen presented to the Zoological Society in 1857 by Captain John Sheperd, of the India House, which was one of a pair shipped from

Bombay, but originally obtained from some port on the Red Sea or the Persian Gulf. The following account of the female is given by the late Dr. Gray :—

"The specimen is not half the size of the gemsbok from the Cape, and is immediately known from it by the distribution of its colours. In form and size it resembles the true oryx (*O. leucoryx*) ; but it differs in the straightness of the horns, the size and form of the cheek-spot, and especially in the dark colour of the legs and the well-marked white ring around the fetlock-joint just above the hoof. The hair is whorled on the middle of the haunches, as in the rest of the genus, and the hairs of the back in front of the withers are directed forwards.

"The animal is intermediate between these species ; it has the straight horns of *O. gazella* and the plain colour of *O. leucoryx ;* but its dark legs and peculiar white feet at once separate it from either."

The writer has not met with any account of this handsome little oryx having ever been seen by an Englishman in the wild state.

THE WHITE ORYX

(*Oryx leucoryx*)

The claims of this species to a place in the present volume are somewhat slight, and its introduction among the fauna of South-Western Asia must be regarded purely as a provisional matter. It is a very distinct species of the genus, agreeing approximately in size with the beisa of North-East Africa, its height at the shoulder being about 40 inches. The horns are, however, of a totally different shape, being long, recurved, and scimitar-shaped. And there is an equally noticeable difference in coloration, the general hue being yellowish or reddish-white, relieved in places by chestnut-brown. This chestnut tint shows itself chiefly on the neck,

shoulders, lower surface of the body, and upper portion of the limbs. On the face there are six brownish patches or streaks, two of which are situated in the middle line, while two form eye-stripes, the other pair being situated between the horns and the eyes. As stated by Mr. Bryden in *Great and Small Game of Africa*, the longest pair of horns yet known measure $39\frac{5}{8}$ inches along the front curve.

No reference is made either in the work just mentioned or in Messrs. Sclater and Thomas's *Book of Antelopes* to the occurrence of this animal elsewhere than in North Africa. Canon Tristram, in his *Natural History of the Bible* (p. 57), writes, however, as follows :—

"The oryx is still found on the confines of the Holy Land, though strictly an inhabitant of the deserts, and, although I never obtained it, I have been quite near enough to it to identify it by the shape of its horns. These are of immense length, sweeping towards its back in a wide curve, and often exceeding 3 feet in length. They are frequently to be purchased in the bazaars of Damascus. It is a large animal, standing between $3\frac{1}{2}$ and 4 feet in height, and though rather heavy in build, has great speed, bounding and leaping like an ibex. Its lower-parts, flanks, and face are of a sandy white colour, with large darker patches of brown and tawny on its face, back, and flanks. Its horns, though so recurved, are a formidable weapon of offence, and when wounded and brought to bay, it will frequently pierce the hunter by a sudden and well-directed blow. The oryx is found throughout all North Africa, in the Sahara, Arabia, the Mesopotamian desert, and Persia."

If this testimony is to be relied on, the occurrence of the white oryx in Syria and Palestine must be regarded as established, for it is difficult to see how the straight-horned Beatrix oryx could have been mistaken for the present animal. The oryx which Dr. Tristram alludes to as inhabiting Arabia, Mesopotamia, and Persia is, however, probably *O. beatrix*.

THE ADDAX

(*Addax nasomaculatus*)

The right of this antelope to a place in the present volume is likewise provisional. As it is described by Sir Harry Johnston in the *Great and Small Game of Africa*, little need be said on this point, except that the addax is a pale-coloured, long-haired, and spiral-horned representative of the oryx group, standing about 38 inches at the shoulder. Its general colour is very pale fawn, with the buttocks, limbs, under-parts, and a chevron between the eyes white, and a tuft on the forehead and the tail-tip dark brown.

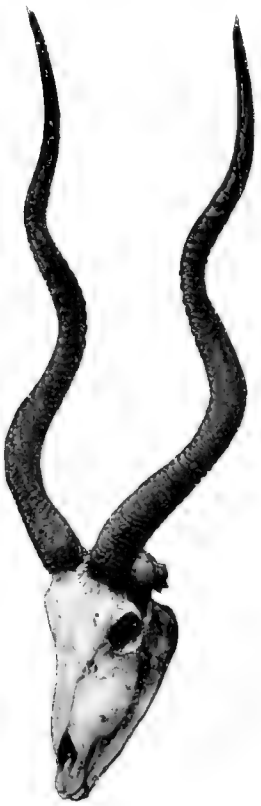


Fig. 45.—Skull and Horn of Male Addax.

Neither Sir Harry Johnston nor the authors of the *Book of Antelopes* make any reference to the occurrence of this antelope in Arabia; but Canon Tristram, in his *Natural History of the Bible*, published in 1867, writes as follows :—

"The addax (*Antilope addax*) has a wide range, being found rather commonly, but not in large herds, in the Sahara, Nubia, Egypt, and Arabia. I never obtained it, but have been near enough to identify it by its horns, on the Arabah, to the south of the Dead Sea, where it is well known to the Bedouin. It is a large animal, over $3\frac{1}{2}$ feet high at the shoulder, and with its gently-twisted horns $2\frac{1}{2}$ feet long. As the horns, though slightly spiral, stretch straight from the head, it can at once be distinguished from the oryx or the bubale. Its colour is pure white, with

the exception of a short black mane, and a tinge of tawny on the shoulders and back."

Here again, as in the case of the white oryx, it is somewhat difficult to refuse credence to such comparatively strong testimony, which (as in the case of the species last named) is accepted by Dr. Trouessart in his *Catalogus Mammalium*. Still, it is somewhat significant that no specimens of white oryx or addax horns from Asia appear to exist in any English collection. The longest pair on record are those of a mounted male specimen from Tunisia (Fig. 45) presented to the British Museum by Mr. J. J. S. Whitaker; their length being $38\frac{1}{2}$ inches measured along the front curve, and $30\frac{1}{2}$ inches in a straight line.

THE RED DEER

(*Cervus elaphus*)

In the case of such a familiar animal as the red deer of Western Europe, of which the typical representative is the stag of Scandinavia, the birthplace of Linnæus, it would be worse than useless to repeat once more anything approaching a detailed description, more especially as a considerable amount of space is devoted to that subject in *Deer of All Lands*. But the red deer is likewise the type of the genus *Cervus*, and a few words are accordingly advisable with regard to the characteristics by which the members of that extensive group are distinguished from the other representatives of the deer family.

In all species of *Cervus* the antlers, which are normally developed in the stags alone, arise from the forehead obliquely and are furnished on each side with a brow-tine, above which are a variable number of other tines and points. Although typically more or less nearly cylindrical, they may (as in the fallow deer) be much flattened out, or palmated. A

considerable portion of the muzzle is moist and devoid of hair. In comparison with certain other deer, the face is long, the ears are generally large, and the tail is either very short indeed or moderately so. A gland, the position of which is indicated by a tuft of long hair of lighter tint than that covering the rest of the limb, is situated high up on the outer side of the hinder cannon-bone, or metatarsus; hence known as the metatarsal gland and tuft. There is, however, no such gland or tuft on the inner side of the hock. The coat, the colour of which differs to a great extent according to season in the majority of the species, may be either uniformly coloured or ornamented with light spots.

In the red deer itself the antlers are sub-cyclindrical and complex, showing, when most fully developed, a bez-tine, and always a trez-tine; the total number of their points exceeding five a side, and those of the summit, or crown, so arranged as to form what is known as a "cup." Compared to that of some other members of the group, such as the wapiti, the tail, which ends in a point, is relatively long. In summer the general colour of the coat of adult animals is uniformly reddish brown, with an incomplete dark dorsal stripe, and a dark brown streak bordering the large light-coloured patch on the buttocks, which includes the tail and is of a pale rufous-orange tint. The under-parts are buffish. In the winter dress the general colour is greyish brown. Fawns are profusely spotted with white or pale straw-colour; but, as a rule, such spotting becomes completely obliterated in adult individuals of the typical western race, although occasionally persisting in the hinds.

The range of the species includes Europe, Northern Africa, Asia Minor, and the north of Persia; but the typical race appears to be restricted to Western, Northern, and Central Europe, although, as it apparently passes by imperceptible degrees into the Caspian race of Eastern Europe and Western Asia, its limits cannot be ascertained with precision. It is apparently in the typical western race that the antlers attain their

maximum degree of complexity ; but few deer at the present day are found with antlers so fine or so numerously pointed as those which are from time to time dug up in the peat and other superficial deposits of the British Islands and the Continent, or even as many of those carried by stags killed two or three centuries ago on the Continent. About 4 feet at

Fig. 46.—Red Deer Antlers, showing splitting on the right side. In the Collection of Viscount Powerscourt.

the withers is the height attained at the present day by wild red deer of the typical race in Western Europe. A stag killed by Lord Tweedmouth in the autumn of 1880 weighed 21 stone 9 lbs. when cleaned. Red deer have been introduced into New Zealand, where they thrive well.

Abnormalities are by no means uncommon in red deer antlers, some of these being of very remarkable types. In the pair shown in Fig. 46, which were bought in Paris by Viscount Powerscourt in the year 1863,

the antler of the right side is bifurcated a short distance above the point of origin of the bez-tine. The lower branch of the fork has two points, representing the third and apparently the fourth tine, while the hinder and larger branch terminates in a fork corresponding to a portion of the crown of the complete antler of the opposite side.

More remarkable still is the specimen shown in Fig. 47, also from the

Fig. 47.—Red Deer Antlers, showing complete duplication on the right side. From the Powerscourt Collection.

Powerscourt collection. Here the left antler is complete, with the normal number of tines. The entire right antler is, however, completely double, from burr to crown, the lower beam showing even a rudimentary brow and bez-tine. Neither of the duplicated antlers displays any trace of a trez-tine, but the crowns of the two are almost replicas of one another. This resemblance between the duplicated antlers is very remarkable and unusual ; in malformations of this nature some of the tines being usually

carried on the upper branch, and the others on the lower branch of the split beam, as in Fig. 46. The beam has, in fact, been split, carrying only the tines proper to the half it represents. In the complete duplication of the right antler the specimen figured on page 212 appears to be altogether unique.

Occasionally red deer antlers are found showing a curious spongy structure, accompanied by imperfect development of the beam and tines, as

Fig. 48.—German Red Deer Antlers, showing spongy malformation.
From the Powerscourt Collection.

in the specimen shown in the accompanying figure, which was purchased at Frankfort by Lord Powerscourt, and belonged to a stag killed in Germany. This type of malformation, which is evidently due to pathological conditions, is much less common in red deer antlers than it is in those of the roebuck.

Some time ago the present writer was asked to tell the age of a red deer from the skull, without the antlers, that is to say, from the evidence of the teeth alone. It is well known that the ages of domesticated sheep and cattle are recognised with ease in this way by experts; but as there is

a difference between the two latter in this respect, and since domestication might also have affected the period of tooth-change, he was somewhat sceptical as to the value of evidence of this nature. It appears, however, that it may be approximately relied upon.

Towards the close of its second year the sheep acquires the full number of its lower teeth, that is to say, four pairs of front ones and six pairs of cheek-teeth, or grinders. At this period, however, the first three pairs of grinders belong to the "baby," or milk set, and it is not till some time in the third year that these give place to their permanent successors. These permanent grinders are always of simpler structure than their predecessors, from which they may also be distinguished by the circumstance that their summits are less, instead of more, worn than those of the three permanent grinders behind them.

But at the period of completion of the permanent series of grinders the two outer pairs of lower front teeth still belong to the milk set, and it is not till the fourth year that the outer pair but one of these are replaced by their permanent successors, while the replacement of the outermost pair does not take place till the fifth year, when the entire dentition is complete. Whether the two outer pairs of lower front teeth belong to the milk or the permanent set can be ascertained not only by their size, but also by the fact that if they belong to the latter they will be less worn than the central pair, while if they are of the milk set they will be more worn than the latter. Although in the ox the outer pair of lower front teeth are changed somewhat before the fifth year, it appears from a paper published by Dr. B. Nitsche, in vol. ix. of the German sporting periodical entitled *Deutschen Jäger-Zeitung*, that in the wild chamois of the Alps the dates of the various tooth-changes are much the same as in the sheep; the completion of the process not being attained till the fifth year. It may, therefore, be presumed that a practically similar state of affairs obtains

in the various species of wild goats and sheep, and probably also in most or all of the antelopes.

With regard to deer, there are unfortunately no definite data upon which to go; but, in the absence of any evidence to the contrary, it would seem probable that the dates of appearance of the different teeth are approximately the same as in the sheep and the chamois. And it may accordingly be provisionally considered that when a deer has attained its complete series of permanent teeth it is in its fifth year. As the antlers of many species of deer afford independent evidence of the age of the individual to which they pertain, an opportunity is, however, afforded of checking the result arrived at by an examination of the teeth. And any sportsmen who may happen to be interested in the matter would do a service to science if he would take the trouble to ascertain the age, as indicated by the antlers, of any stag he may kill, and at the same time to determine in what stage of development are its teeth.

Although occurring here and there in the less settled and wilder districts over the greater part of the rest of Europe, either in the form of the typical or the Caspian race, it is not a little remarkable that the red deer is totally unknown at the present day in Eastern Russia, except in the province of Nijni Novgorod. The subject has been very carefully worked out in a paper by Dr. E. Büchner, entitled "Bemerkungen ueber die Verbreitung der Edelhirsches im östlichen Russland," published at St. Petersburg in 1896.[1] Although Koeppen, writing in 1883, quotes certain writers to prove the existence of the red deer (or maral) in the province of Orenburg about 1762, and in the Southern Urals at a much later date, Dr. Büchner is of opinion that, at the present day, the animal is quite unknown not only in those districts, but also throughout almost the entire extent of the Ural chain. He admits, however, its occurrence in Orenburg during the eighteenth century, and thinks that a few individuals may possibly still

[1] *Annuaire Mus. Zool. de l'Acad. de St. Petersbourg*, 1896, pp. 387-399.

survive in one locality in the province of Perm. In the province of Nijni Novgorod, in Central European Russia, the occurrence of the red deer at the present day is certain. Here, in the vast forests of the Ssemenov district, and perhaps also in those of Markarjev, the stag has found a last refuge in which it still flourishes. This fact, taken together with the circumstance that it still inhabits certain districts in North-Eastern Russia, may be taken as an indication that in former days the red deer ranged over the whole of European Russia, from the Baltic to the Urals ; its extermination over the great part of that vast area being due to persecution by man.

One other curious circumstance remains to be noticed. In Nijni Novgorod the red deer is known among the peasants by the name of *builo*, and since this term might easily be confounded with *buiwol*, the Russian for buffalo, it is probably responsible for the report prevalent some years ago that the bison still survived in Nijni Novgorod.

Evidence has also been collected by Herr A. Brauner, in a paper quoted under the heading of the eastern race of the species, that red deer were abundant during the eighteenth century on the steppes of Southern Russia, especially in the province of Kherson, and that the distribution of the animal extended continuously over South Russia from the Bug to the Kuban river on the northern flank of the Caucasus, where we certainly enter the domain of the eastern race of the species. Red deer still survive in the Crimea, and Herr Brauner is of opinion that they belong to the western rather than to the eastern race of the species, although, as mentioned later, this seems doubtful.

THE CASPIAN RED DEER

(*Cervus elaphus maral*)

(Plate IV. Fig. 1)

Partly, no doubt, owing to the fact that the term "maral" is applied indiscriminately in Western and Central Asia to large deer of all kinds, and partly to an apparent incapacity in many sportsmen to realise the essential difference between the red deer and the wapiti type of antler, an extraordinary amount of confusion is prevalent as to the affinities of the "ollen" or red deer of Eastern Europe and South-Western Asia. In his work entitled *Hunting Trips in the Caucasus* Prince Demidoff makes the following remarks on this subject :—

"As to the classification of the Caucasian stag amongst his fellows of Europe and Asia, as well as the difference between him and his American cousin the wapiti, opinions differ. Although I have no doubt that both in size of body and antlers he approaches the wapiti, nevertheless I think he is more closely allied to the ordinary red deer, and especially to the Carpathian species. I quite agree with the statement that abundance of good food makes a great difference in size, but one must not forget that the climate and surroundings have their influence on his growth, and thus give him his local character. Indeed, I am sure that, if closely examined, one would find slight differences between the Kouban stag and that of the Daghestan and Southern Caucasus, either in the predominance of cups on the antlers, the colour of coat, or, to some extent, divergence of habit. But there seems no reason to separate them as distinct species."

Allowing for a certain lack of preciseness in connection with the use of the term species at the end of the second sentence, this statement shows a very clear appreciation of the real state of the case. The maral of Persia

and the ollen of the Caucasus are really nothing more than local modifications of the red deer, and have nothing in common with the wapiti. Moreover, these two do differ from one another to a certain extent, but so slightly that it seems best to regard them as belonging to a single form.

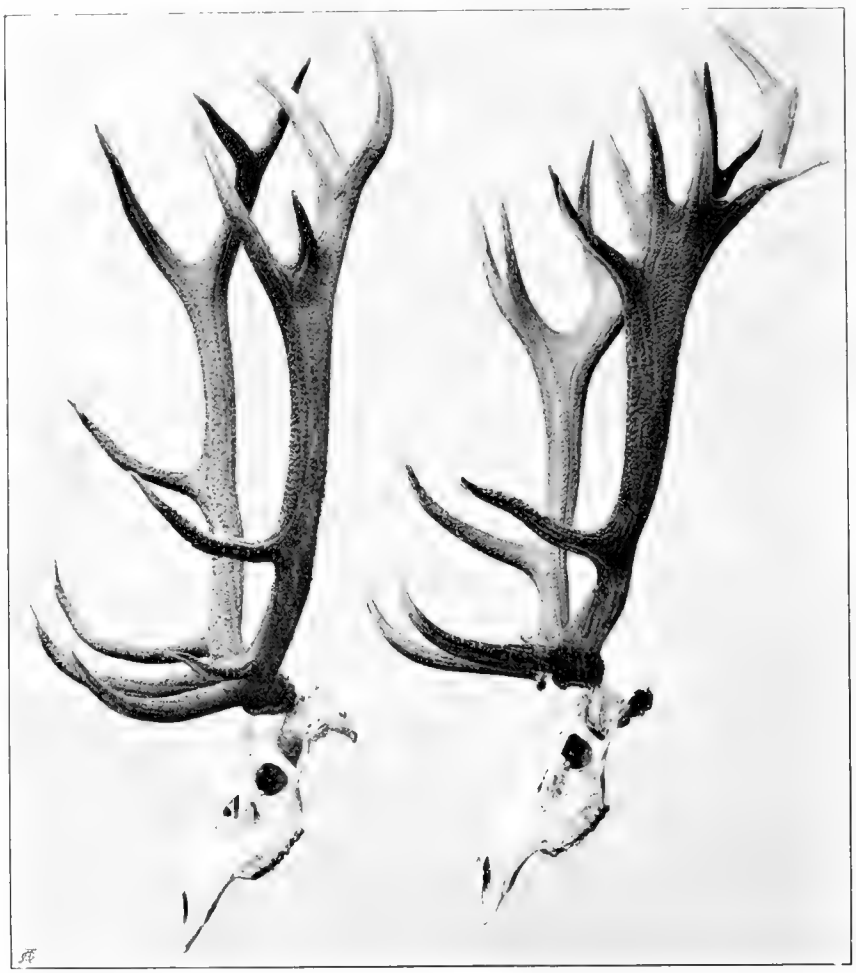


Fig. 49.—Profile View of two (? Caspian) Red Deer Heads. Killed on the estate of Prince Henry of Liechtenstein in the Carpathians.

Again, these deer seem so closely connected with the red deer of Western Europe by means of the Carpathian stag, that they can scarcely be considered entitled to rank as a species by themselves, but should rather be looked upon as a local race, or sub-species, of the red deer. Probably, indeed, there is a complete gradation from the Persian to the Scandinavian

PLATE IV

1. Caspian Red Deer.
2. Yarkand Stag.
3. Manchurian Sika.
4. Pekin Sika.
5. Fallow Deer.
6. Mesopotamian Fallow Deer.
7. European Roe.
8. Manchurian Roe.
9. Siberian Roe.

ASIATIC AND EUROPEAN TYPES.

Published by Rowland Ward Ltd.

animal, the former being the type of *Cervus maral*, as is the latter of *C. elaphus*. Assuming this view to be correct, the name of the eastern race, according to modern views of nomenclature, will be *Cervus elaphus maral*.

After much study the writer has come to the conclusion that it is

Fig. 50.—Front View of Head of (? Caspian) Red Deer. Shot by Prince Henry of Liechtenstein at Tartarow, Carpathians, in 1895. Number of points, 14; length along outer curve, 46 inches; greatest width inside, 36 inches.

exceedingly difficult, if not impossible, to give any definition by which antlers of the Caspian red deer (as the eastern race may be colloquially termed) are distinguishable from those of the true red deer. If, however, the number of points on the antlers of ancient British red deer entered on

page 23 of Mr. Rowland Ward's *Records of Big Game* be compared with those of the antlers of Caspian red deer, catalogued on page 33 of the same work, it will be apparent that the superiority in this respect is on the side of the former, although, as might be expected, there are certain individual

Fig. 51.—Head of an Aged (? Caspian) Red Deer with one Antler. Shot by the late Count Arthur Potocki in Eastern Galicia, 1888.

exceptions. It also appears that when a cup is formed by these antlers it is less complex than in the true red deer, and the fourth tine (as in Figs. 52 and 53) is more distinct from the summit of the crown.

Doubt still exists as to whether the deer from the Eastern Carpathians should be referred to the western or the eastern race, and it is quite

possible that they form the connecting link between the two. In many Carpathian heads (as in some of those in the collection of Mr. E. N. Buxton) the bez-tine of the antlers is very short, and may even be wanting. The same feature is often observable in antlers from the Crimea ; and this

Fig. 52. —Frontlet and Antlers of Caspian (?) Red Deer from the Carpathians. Powerscourt Collection.

has led Herr A. Brauner, in a paper entitled *Einige Bemerkungen ueber den Edelhirsch in der Krim*,[1] to the conclusion that the deer of the Crimea are referable to the western race of the species, as are also those from the Carpathians. And it is considered that the small development or absence of the bez-tine in these deer is indicative of affinity with the red deer of

[1] Odessa, 1900.

Scotland and Corsica. It is, however, very unlikely that this is really the case. And it may be noticed that antlers from the Crimea frequently display a great tendency to flattening, or palmation, in the region of the crown—a feature which is likewise conspicuous in many specimens from Asia Minor, as the writer had an opportunity of observing not long ago in a series of heads from that district sent home by Mr. H. O. Whittall, of Smyrna, for mounting. The deer of Asia Minor, as may be seen from the form of the head in a specimen figured by Mr. F. C. Selous in his *Sport and Travel*, appear undoubtedly to belong to the Caspian race, and on geographical grounds it would seem likely that those from the Crimea should be referable to the same form. Before the exact affinity of the red deer of the Eastern Carpathians and the Crimea can be definitely decided, it is, however, necessary that entire skins should be available for comparison.

It may be added that antlers of old Crimean stags—perhaps in the decadent stage—not unfrequently lose all the tines between the brow and the crown, and the writer is under the impression that he has seen or heard of similar antlers from Asia Minor.

Apart from the antlers, satisfactory and easily recognised characters are afforded by the form and coloration of the Caspian red deer, whereby it may be distinguished from the typical western race of the species. In England an excellent opportunity of realising the nature and value of these points of difference has been afforded by a herd of Caspian deer from the Caucasus and a single stag from North Persia, which have for the last few years been living in the Duke of Bedford's park at Woburn Abbey in the near neighbourhood of the ordinary park red deer.

These eastern representatives of the red deer are of very large size, attaining a height of about $4\frac{1}{2}$ feet at the withers; and they are further distinguished from the typical western race by the longer and more pointed head, the thicker neck, and the stouter and shorter build. The length of

the face seems, however, to be somewhat less in examples from the Caucasus than in those from Northern Persia, which, as already said, is the typical locality for the eastern race. As regards colour, the herd from the Caucasus at Woburn Abbey showed in stags and hinds of three or four

Fig. 53.—Skull and Antlers of Caspian Red Deer. Shot in the Western Caucasus by Mr. St. George Littledale.

years of age distinct yellowish spotting when in the reddish summer garb. And in the dark slaty-grey dress of winter the light rump-patch is of a very bright yellow, while the shoulders, thighs, and under-parts show a large amount of black, especially in Persian examples. This last feature is perhaps the most important characteristic of the eastern race.

From the typical locality, namely, the Caspian provinces of Northern

Persia, this deer extends through Asia Minor into Transcaucasia and the Caucasus. As mentioned above, it seems probable, although not certain, that the red deer of the Crimea are referable to this race, while those inhabiting the Galician Carpathians, Turkey, and Circassia may be in some degree intermediate between the two races, although nearer to the eastern than to the western.

On this latter point the following quotation from the *Sport and Travel* of Mr. Selous has an important bearing. After describing two good red deer heads killed in Asia Minor, the great hunter (page 109) writes as follows :—

"These heads would compare favourably with most Caucasian heads, though I believe that it is in the Caucasus that the biggest 'maral' horns in existence have been obtained by Russian sportsmen and our own countryman Mr. St. George Littledale. I am inclined to think that the red deer of Roumelia and Turkey in Europe, as also the large and mighty antlered race found in Galicia and Hungary, are, if not identical with the *Cervus maral* of Western Asia, at any rate more nearly allied to that species than they are to the smaller and shorter-skulled red deer of the British Isles. At any rate, all the skulls I have seen of deer shot in Hungary, Galicia, and Turkey were very long in the face, and far more like the skulls of the Asiatic maral than those of red deer from Western Europe. When in condition, a good maral stag will weigh 40 stone clean, and exceptional animals probably a good deal more."

If in this extract the word "race" be substituted for "species," the views expressed are practically the same as those mentioned above.

With regard to the distribution of the Caspian red deer in the Caucasus, Dr. K. Satunin, at the date of writing the memoir[1] to which reference has been so frequently made, does not appear to have had very full or definite information. He says that a typical example of this deer, killed in the

[1] *Zoologische Jälrbuch*, vol. ix. p. 309 (1899).

province of Elizabethpol, is contained in the Caucasian Museum; and adds that the occurrence of the animal in Transcaucasia appears to be still doubtful. Dr. Satunin refers the stag of the Crimea to this race.

It is almost superfluous to mention that, like all other red deer, the stags of the Caspian race roar during the pairing-season, and do not squeal in the wapiti fashion.

THE CORSICAN RED DEER

(*Cervus elaphus corsicanus*)

The islands of Corsica and Sardinia are the home of a stunted race of the red deer, in which the antlers of the stags lack the bez-tine, and the general colour of the coat of both sexes is dark brown in summer and blackish in winter. A few examples of this deer were kept in the park at Woburn Abbey a few years ago, but as they presented no feature of special interest, no others have been added to the collection.

THE YARKAND STAG

(*Cervus yarcandensis*)

(Plate IV. Fig. 2)

The deer inhabiting the forests of the Tarim Valley and Maralbashi, in Eastern Turkestan, was described and named by Mr. W. T. Blanford as a variety or local race of the hangul, or Kashmir stag. It is, however, regarded in the *Great and Small Game of India, Burma and Tibet* as entitled to specific rank. Specimens of the entire skin are much wanted in order to determine the affinities and characteristics of the species more fully, but,

according to Mr. Blanford's description, it seems to be broadly distinguished from the hangul by the presence of a large and well-defined light patch on the rump, which includes the tail. The colour of the hair, according to M. E. de Pousargues, is pale fawn, this being probably in the summer dress. The antlers, of which two examples are figured in the work just cited, are usually five-tined, but by the development of a third snag to the crown, they may become six-tined. They differ from those of the hangul in that the terminal fork is placed at right angles to the middle line of the head, so that it looks directly forwards; and they usually have the fifth tine, which is inclined inwards, considerably larger than the fourth. In some individuals, at any rate, the upper portion of the antler is also more curved forwards, so as to overhang the base, thus approximating to the form so characteristic of shou-antlers.

As already mentioned, the Yarkand deer was regarded by its describer as a mere local race of the Kashmir deer, or hangul. Monsieur E. de Pousargues,[1] of the Paris Museum, has, however, come to the conclusion that it is much more nearly related to the shou; and this seems to be borne out by the Bokhara deer, which comes next on our list.

After referring to two specimens in the Paris Museum which he regards as pertaining to the Yarkand deer, M. de Pousargues continues as follows:—

"But is not this form more nearly related to the Tibetan shou, *C. wallichi* (=*affinis*) than to the barasingha, *C. cashmirianus*, of Kashmir? The size is large, and the coloration, although lighter, recalls in its details that of *C. affinis* as described by Hodgson. As Mr. Blanford was the first to remark, its antlers present a marked similarity to those of the shou of Tibet; and in order to be convinced of this resemblance it is only necessary to compare the figure in Mr. Blanford's paper with the numerous illustrations in Hodgson's memoirs, especially the one on page 518 of vol.

[1] *Mém. Soc. Zool. Paris*, vol. xi. p. 203 (1898).

xix. of the *Journal of the Asiatic Society of Bengal.* In the case of *C. cashmirianus* the crown of the antler is multicuspid ; in *C. wallachi*, even when fully adult, it has never more than a simple fork at the summit. Moreover, in all the heads of *C. yarcandensis* mentioned by Mr. Blanford, which are numerous and perfectly alike, there are only five tines to each antler ; namely, two basal tines (the brow and the bez), a median (royal) tine, and a terminal bifurcation. Finally, the vertical and nearly parallel dilatation of the two prongs of this terminal fork indicates the definite and complete type of crown characteristic of the species. The terminal convergence and lateral expansion of the antlers is less in *C. yarcandensis*, but Hodgson informs us that this character is variable in *C. wallichi*, and that the curvature of the antlers is subject to individual variation, as indeed is the length of the interval between the tips of those of opposite sides. It must, however, be admitted that in the Yarkand stag the beam of the antler is less bent forward ; this being the sole point of distinction from the antlers of the shou."

THE BOKHARA DEER

(*Cervus bactrianus*)

This very imperfectly known member of the red deer group was named by the present writer[1] in 1900 on the evidence of a stag (figured on page 109 of *Deer of All Lands*) recently living in the Zoological Gardens at Moscow, of which a pair of shed antlers are preserved in the museum at Woburn Abbey. These antlers form the actual type of the species. The stag in question was reported to have come from Turkestan. It has a large straw-coloured rump-patch, and its general colour is said to be grey at all seasons.

[1] *Annals and Magazine of Natural History*, ser. 7, vol. v. p. 196 (1900).

The antlers are extremely close to those of the shou, and are also very like those of the Yarkand stag, although in the type specimen they have, owing to the absence of the bez, only four tines a side. This, however, may be an individual peculiarity. The figure is herewith reproduced.

In 1901 the Duke of Bedford purchased a hind from Turkestan, which is now (November 1901) living in the park at Woburn Abbey. In the

Fig. 54.—The Bokhara Deer. From the Moscow specimen.

large amount of white on the inner sides of the thighs this hind differs from the members of the wapiti group, and it may turn out to be the female of the Bokhara deer, if the latter is rightly separated from the wapitis.

Certain other stags at Woburn Abbey, reported to be from Tashkend, appear, on the other hand, much more like wapitis, of which they may indicate an undescribed race. Nothing definite can, however, at present

be said with regard to the real affinities of any of these deer till other specimens are available for comparison.

Possibly *Cervus bactrianus*, if rightly separated from the wapiti group, will turn out to be closely allied to *C. yarcandensis*, although, so far as our present information goes, it appears to be distinguished by its colour being uniformly light grey at all seasons, whereas the Yarkand deer, during at least some portion of the year, is said to be light fawn. It must, however, be remembered that M. Pousargues bases his description of the colour of the latter on Museum specimens, which may have faded. In the type of *C. bactrianus* the antlers appear to have a more forward shou-like bend than is ordinarily the case in *C. yarcandensis*. Unfortunately the figure of the Moscow specimen does not show whether the inner sides of the thighs are white.

THE JAPANESE SIKA

(*Cervus sica*)

The common sika, of which the smaller race is an inhabitant of the islands of Japan, while the larger Manchurian form is found on the adjacent mainland, is the typical representative of a small but perfectly well defined group of deer, which, at the present day, are restricted to that portion of Eastern Asia lying between Manchuria and Japan on the north and the island of Formosa in the south. As a rule, they are considerably inferior in point of size to the members of the red deer group. Their antlers are of the same general type as in the latter, but invariably lack the bez-tine, and normally do not carry more than five points a side. But the sikas are perhaps best distinguished by the presence of a pure white patch on the buttocks, which includes the sides of the tail, and the long hairs of which are capable of a fan-like eversion under the influence of excitement or

alarm, so as to produce a large subcircular disk. Another very characteristic feature of these extremely handsome and striking deer is the profuse spotting with white of the summer coat, which is some shade of rufous or fawn. In winter this brilliant garb is generally replaced by a more sombre-coloured dress, of which the prevailing hue is blackish brown in most of the species, and when in this dress the white spots are usually either more or less inconspicuous or totally wanting. The difference in colour between a red deer when in the summer coat and the same animal in its winter dress is striking enough, but it is nothing compared to the change which takes place in the appearance of a sika, especially the Pekin species, when the garb of one season is exchanged for that of the other. In summer we have an animal much more brilliantly coloured than the spotted variety of the fallow deer, while in winter the same animal will be as dully clad as the black phase of the latter species. Nor is this change the only conspicuous transformation to which the sikas are subject. When standing undisturbed in the posture of the stag represented in the photograph on page 233 (Fig. 55), the pure white rump-patch forms a comparatively inconspicuous feature. Startle the animal so as to make it bound off with its characteristic long leaps, and the comparatively inconspicuous patch suddenly expands into a large radiating disk of dazzling white which almost completely conceals the rest of the hind-quarters from view. The transformation is indeed so sudden, and to the uninitiated so unexpected, that it appears almost startling. The tail is much longer than in the red deer group.

Another distinctive feature of the sikas is the bright red hue of the velvet of the growing antlers of the bucks; this brilliant tint being relieved by black at the tip of each tine. When in their brilliant summer coats, with the full-grown antlers still invested in their covering of red and black velvet, the stags of all the species of the group are indeed wonderfully handsome deer.

The Japanese race of the common sika (*Cervus sica typicus*) is the typical representative alike of the species and of the group. In height it is normally about 2 feet 8 or 10 inches at the withers. The large white caudal patch of erectile hairs is bordered both above and at the sides with black. The gland on the outer side of the hind-legs is covered with pure white hairs. When in the winter dress the white spots are more or less completely obliterated, although they are more prone to persist at this season in the hinds than in the stags. The tail appears to be always white at the tip, but is black superiorly either at the base or along the whole of the middle line.

Sikas indistinguishable from the typical Japanese race are met with in Northern China; and between such small continental specimens and full-sized representatives of the larger Manchurian race there appears to be a more or less complete transition. Whether, however, these small continental individuals should be assigned to the Japanese race, or regarded simply as dwarfed representatives of the Manchurian race, depends on whether they have a distinctly defined habitat of their own, or whether they occur within the distributional area of the Manchurian race. It is but very rarely that the antlers show more than four points a side, although, as abnormalities, five or six, and in one instance as many as ten, points are known to occur; in such cases the antlers are almost invariably unsymmetrical, the number of tines being greater on one side than on the other.

The "record" pair of antlers of this race are in the possession of Sir Edmund Loder, and measure 31¼ inches in length along the curve, with a basal circumference of 5¼ inches, and a tip-to-tip interval of 27⅛ inches. The next best pair are also in the collection at Leonard's Lee; their length being 25⅜ inches. Both pairs show the normal four tines on each side. They came from Japan, although the particular island where they were obtained is not known. In the collection made by the late Sir Victor Brooke there is, however, a pair of antlers from Yezo, the northern island

of the Japanese group ; and Dr. Percy Rendall possesses a pair from Kobe, which is situated near the centre of the middle island. As a sika also occurs in Formosa, and the group is apparently represented in the Liu-Kiu Islands, it would seem probable that the typical species is found throughout the Japanese group of islands.

The Japanese sika was introduced many years ago by Viscount Powerscourt into his park in Ireland ; and it is now also a denizen of the Duke of Bedford's park at Woburn Abbey. As might have been expected, when the climate of the northernmost of its native islands is taken into consideration, it does not suffer from the inclemency of an English winter, and it might without much difficulty become thoroughly naturalised in British parks and deer forests. A specimen in the winter coat, presented by the Hon. R. A. Ward, is exhibited in the British Museum.

THE MANCHURIAN SIKA

(*Cervus sica manchuricus*)

This animal, as already said, cannot be regarded as anything more than a large continental race of the common sika, there being apparently a gradation in point of size from the typical Japanese race to the large Manchurian animal, which probably attains a shoulder-height of between 3 feet 3 inches and 3 feet 5 inches.

The type of this race is a stag forwarded by the late Consul Swinhoe from Manchuria to the London Zoological Gardens in 1864, and described by him in the same year as a distinct species. It is now mounted in the Museum at Paris. A fine stag in the summer dress was presented to the British Museum by the Duke of Bedford a few years ago, and is now exhibited in the lower mammal gallery.[1] The coloration is essentially the

[1] This is the specimen mentioned on p. 115 of *Deer of All Lands* as being at Woburn Abbey.

same as in the typical Japanese race, but it may be mentioned that the whole head and neck are entirely unspotted and uniformly brown. The antlers, unfortunately, are small and not fully developed, the animal being immature. Information with regard to the maximum dimensions attained by these appendages is, indeed, much wanted. Hinds in the winter dress are generally more distinctly spotted than the stags.

A sika (*Cervus tæevanus*) inhabits the island of Formosa, which does not,

Fig. 55.—Manchurian Sikas (Stag and Hind) in the Winter Coat.
Photographed by the Duchess of Bedford.

however, come within the limits of the area treated of in this volume. And at the present time (April 1901) there is a sika living in the park at Woburn Abbey, which is reputed to come from the Liu-Kiu islands. The colour of this animal is nearly black, but whether this is due to "melanism," or whether it is the normal coloration of an unnamed species, it is not yet possible to ascertain. The Formosan sika appears to have a much darker tail than the common species.

THE NORTHERN PEKIN SIKA

(*Cervus hortulorum*)

(Plate IV. Fig. 4)

Among the spoils acquired at the sack of the Imperial Summer Palace at Pekin in the autumn of 1860 were the skins of certain deer shot in the hunting grounds. Three of these came into the hands of the late Mr. R. Swinhoe, then H.B.M. Consul in China, and in the following year were received by the Zoological Society of London. One of them was described the same year by the late Dr. Gray under the name of *Cervus pseudaxis*, and is now preserved among the collection of the British Museum. This skin is in the early winter coat, and the small size of the antlers indicates that it belonged to a three-year-old stag. The name *C. pseudaxis* was not invented by Gray for the deer represented by this particular skin, but had been applied many years previously to a species of which the type specimen has been lost, and whose affinities it appears now impossible to determine. In 1864 Swinhoe came to the conclusion that his Pekin deer was not the same as *C. pseudaxis* (whatever that may be), and accordingly renamed it *C. hortulorum*, on account of its having been first discovered in the park of the Summer Palace.

In 1876 Professor L. Taczanowski described in the *Proceedings of the Zoological Society of London* a deer from the southern Ussuri district of North-Eastern Manchuria, which he regarded as new, and named after the explorer Dybowski, with the title of *Cervus dybowskii*. The type specimen of this so-called species was in the winter dress. And it was not till the arrival of living specimens at Woburn Abbey that it was possible to establish the identity of this form with Swinhoe's Pekin deer.

In truth it is no wonder that years elapsed before the identification was

definitely made. For any one who has seen full-grown individuals of this extremely handsome deer in the bright chestnut and white summer coat, and is then shown the same animals six months later, when they have acquired the long, shaggy, and almost uniformly dark brown dress of winter, will find it hard to believe that he has the same species before him. The change is little short of marvellous. Indeed to gain a full idea of the seasonal variations in length and colour of coat in this deer, it

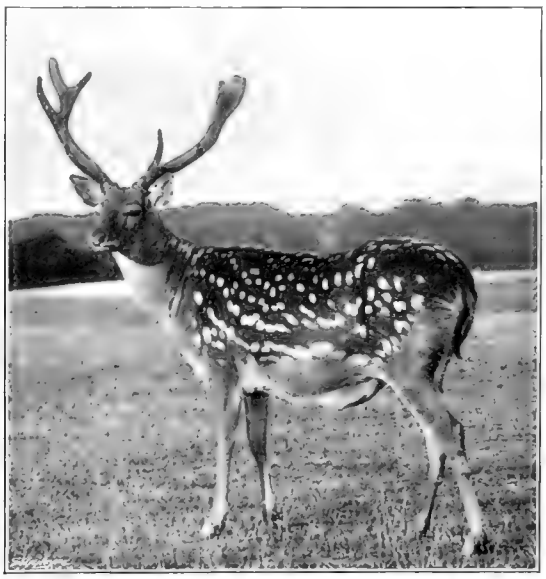


Fig. 56.—Pekin Sika Stag in the Summer Coat, with the Antlers in Velvet. Photographed at Woburn Abbey by the Duchess of Bedford.

would be necessary that the same individuals should be painted once a month for at least a year.

When the *Deer of All Lands* was written there were no fully adult examples of the Pekin deer living in this country, and the immature stag and hinds represented in plate ix. of that work fail to give any adequate idea of the animal when in its full development. Now, however, the Duke of Bedford has a very large herd of these sikas, which are turned loose in the park at Woburn Abbey, and show, at the proper season of the year, the antlers of the stags in their full development. It is a stag from

this herd, with the antlers in velvet, which forms the subject of the annexed photograph; the animal being, of course, in the full summer coat. The stag to which the head shown in the next figure belonged was in the winter dress at the time of its death.

On the assumption that the so-called *C. mandarinus* is not separable, the Pekin sika is the largest member of the present group of deer, the old stags probably attaining a shoulder-height of between 3 feet 7 inches and 4 feet. When in the full summer coat it is a brighter coloured animal than the Manchurian sika, with very large and somewhat elongated white spots, the general ground-colour of the hair being bright chestnut. In young bucks the head and neck are bluish slate. With the development of the winter coat, which when fully grown is very long and shaggy, the colour gradually darkens and the spots tend to disappear, till eventually the general colour becomes dark umber-brown, without any trace of spotting in the old stags. The hinds tend to retain the spotting to a greater degree. During the change from the summer to the full winter coat a complete gradation from a brilliant chestnut, white-spotted, and short-haired animal to one with a uniformly umber-brown dress of great length may be noticed.

The Pekin sika may be distinguished from the common species by the circumstance that the long hair covering the gland on the outer side of the lower segment of the hind-leg is similar in the summer dress to that on the rest of the leg, instead of being pure white. In the summer dress the hairs in the centre of the tuft are grizzled grey, those surrounding the centre being of the same tint as the leg generally. Moreover, the tip of the tail appears to be dark instead of white. For instance, in a stag in winter dress in the British Museum the tail is white, with the upper surface of the tip black, while in a hind in the summer coat standing alongside it is white, with a streak along the upper surface and the tip chestnut. In young stags, as already mentioned, the neck and head are

slaty grey in the summer dress, but in adult hinds, and apparently also stags (Fig. 56), those parts are coloured more like the body, being pale sandy, and the spots are continued along the back of the neck to the ears. Another feature of the species at this season is that the spots are not continued on to the hinder and lower part of the thigh, as they are in the common sika; they terminate nearly in a straight line. There is no dark line down the middle of the back at this season, although the mounted hind in the British Museum shows a small black patch on the middle of the withers.

Fig. 57.—Head of Pekin Sika Stag in the Winter Coat. From a photograph by the Duchess of Bedford.

Chiefly as the result of observations on living animals in the park at Woburn Abbey, it is stated in *Deer of All Lands* that the white rump-patch in the adults of the present species is of smaller extent than in the common sika. The examination of additional specimens in the British Museum shows, however, that this is not really the case, the alleged difference in this respect being due to the different conditions as regards expansion in which the patch was seen, or to the varying extent to which it is concealed by the long brown hair of the surrounding portion of the winter coat. Compared with those of the Manchurian race of the common sika, the antlers of the old stags of the Pekin species are much larger and heavier, and not unfrequently carry five tines on each side.

A fine pair of these antlers, presented by the Duke of Bedford, are exhibited in the British Museum; but information is still required with regard to the size to which the antlers of this species grow. Two

mounted specimens of this deer are exhibited to the public in the Museum; one an immature stag in the winter dress, presented by Professor Taczanowski, and now in bad condition; the other a splendid hind in the winter coat, presented by the Duke of Bedford.

Although it is possible that both may inhabit at least a portion of the same area, it seems not unlikely that the habitat of the present species lies to the north and eastward of that of the Manchurian race of the common sika. The Pekin sika is definitely known to occur in the Ussuri valley of North-Eastern Manchuria, whence it is stated to range into the district south-west of Vladivostock; it is also found on the island of Ascold.

A deer from Northern China or Manchuria was described in 1871 by Professor Milne-Edwards under the name of *Cervus mandarinus*, which is said to be characterised by the retention of the chestnut colour and white spotting in the winter dress, and the red upper surface of the tail. It was accordingly allowed provisional specific rank in the *Deer of All Lands*. There seems, however, to be a considerable probability that the alleged difference in colour from *C. hortulorum* may be partly due to individual variation, and partly to the type specimen having been figured while in the early winter coat, before the spots had fully disappeared and the uniformly brown hue been attained.

As regards its long, thin, reddish tail, this deer agrees exactly with the hind of the present species in the British Museum, and it thus appears highly probable that *C. mandarinus* is not really a distinct form.

If this be so, it seems likely that the deer named *C. mantschuricus major* by Professor Noack in 1889 is likewise identical with *C. hortulorum*. The deer described under the former title are stated to equal a red deer in stature (4 feet at the withers) and to be very rare. This statement is strongly suggestive of the name having been given to unusually large individuals of the Pekin sika.

Very little is known with regard to the Pekin sika in its wild condition.

According to Herr Dörries it is frequently met with in the neighbourhood of the coast among thin forest. The pairing-season, when the old stags are in the habit of calling for an hour at a time, takes place in the latter part of September and the first half of October. Of the specimens sent to Europe nearly all are taken by native hunters at a time when the movements of the herds are hampered by heavy falls of fresh snow. Like those of the Asiatic wapitis, the antlers of the Pekin sika are in great demand in China for medicinal purposes, but whether these deer are ever kept in a semi-domesticated state for the sake of their antlers there is no information available.

Judging from the Duke of Bedford's herd at Woburn Abbey, and also bearing in mind the climatic conditions of its native country, the Pekin sika is a species admirably adapted for acclimatisation in Great Britain. The common sika is a comparatively insignificant animal, whose bodily stature is not sufficiently large to make it an effective park deer. But in this respect the Pekin species is all that can be desired; while the brilliancy of its summer coat and the rich colour of its antlers when in the velvet, coupled with the marked difference between the hue of the summer and winter dress, render it one of the most strikingly attractive and interesting of the deer family.

THE SOUTHERN PEKIN SIKA

(*Cervus hortulorum kopschi*)

The headless and footless skin of a sika in the summer dress recently collected by Mr. F. W. Styan at Chinteh, Aukwei, in the valley of the Yang-tse-kiang, and now in the British Museum (No. 1. 3. 2. 20), serves to show that the deer described in 1873 by Mr. Swinhoe[1] under the name

[1] *Proc. Zool. Soc. London*, 1873, p. 574.

of *Cervus kopschi* is a local race of the Pekin sika, and not, as supposed in *Deer of All Lands*, identical with the Manchurian sika.

The skin sent by Mr. Styan closely resembles that of the mounted hind of the typical *C. hortulorum* in the British Museum, which, as mentioned above, is also in the summer coat. Both show the same brilliant ground colour, large white spots, and metatarsal tuft coloured like the rest of the leg. The Chinteh specimen has, however, a complete dark dorsal stripe, and the spots are much less distinct on the upper part of the neck, and also extend to a rather less degree over the shoulders and thighs. Coupled with the wide distance between the localities whence the two specimens were obtained, these differences appear sufficient to justify the assignation of the Yang-tse sika to a distinct local race of *C. hortulorum*.

The type specimen of *C. kopschi* is a young stag in the winter dress with budding antlers, which is now in the British Museum. It was obtained from Kienchang, in the province of Kiangsi, not far from the borders of Fokien, which is also in the Yang-tse area. It agrees in all characters with the typical *hortulorum* in the same dress; the hair covering the metatarsal gland being mingled black and white in the centre, with a buff border. This, as noted above, is an essential characteristic of *hortulorum*, although in the southern form the centre of the tuft appears to be lighter than in the typical northern race.

But there is other evidence of the existence of a sika of this type in the Yang-tse valley. On pp. 121 and 122 of *Deer of All Lands* reference is made to certain brilliantly-spotted deer seen by Mr. Swinhoe in 1868 in a park at Hong-Kong, and identified by him with the chital, or Indian spotted deer. They are stated to have come from Hankow. In their brilliant spotting and long chestnut-coloured tails these deer, as described by Mr. Swinhoe, agree exactly with *hortulorum* in the summer dress, and undoubtedly belong to the southern race of that species, which may henceforth be designated *C. hortulorum kopschi*.

THE FALLOW DEER

(*Cervus dama*)

(Plate IV. Fig. 5)

By almost all who have written upon the subject, the beautiful fallow deer of our parks is regarded as having been probably introduced into Britain; Mr. J. E. Millais, in his *British Deer and their Horns*, even going so far as to say that it is "undoubtedly an introduction." Very generally the introduction is attributed to the Romans; and the circumstance that antlers or other remains of this species appear to be unknown in the peat of the British fens and bogs is undoubtedly in favour of those who regard it as of foreign origin. On the other hand, as stated in *Deer of All Lands*, there is in the British Museum a pair of fallow deer antlers from Clacton, in Essex, which are reported to have been obtained from a deposit of the polished stone implement period; and if this be their true age, there is a strong probability that the date of the introduction of the fallow deer was long antecedent to the Roman occupation of Britain, if indeed the animal was not actually indigenous. It seems very unlikely that this particular pair of antlers was imported by the ancient inhabitants of East Anglia in neolithic times. Moreover, the fact that remains of a species of fallow deer (*C. browni*) occur not uncommonly in certain superficial deposits on the Essex coast tends in some degree to support the view that the living form may be indigenous to the British Isles.

Whatever may be the truth in regard to this point, the fallow deer exists as a truly wild species, within the area treated of in this book, only in Greece, Spain, Portugal, Anatolia, Rhodes, Sardinia, certain parts of Asia Minor, and Northern Palestine. In addition to the British Islands, it is met with as a semi-domesticated animal in Italy and the south of Sweden.

According to Mr. Millais the herds on some Scotch estates are much wilder than those in English parks, although not apparently more than those of Epping Forest and the New Forest. Wild fallow deer are always spotted in summer; and, judging from a specimen imported by Captain J. Elwes, and subsequently turned out in the park at Woburn Abbey, differ but slightly from spotted breed of the New Forest and many British parks.

In the relative length of the tail, as well as in the presence of a black-bordered white area in its immediate vicinity, the fallow deer resembles the sikas, and differs from all the members of the red deer group. Unlike the sikas, the hairs of the white area on the buttocks are, however, incapable of being erected and everted; and the antlers are of an altogether peculiar and distinctive type.

At the base they are approximately cylindrical, and give off first a brow- and then a trez-tine, above which they flatten out into a large and broad palmation, of which the front edge is smooth, but the summit and hinder border are surmounted by numerous short snags. As a rare abnormality, a bez-tine may be developed between the brow and the trez. In the wild form, as well as in one park breed, the ground colour of the summer coat is brilliant fawn, upon which a number of large white spots are irregularly distributed over the back, the upper part of the sides, and the haunches; a series of ill-defined white lines bordering this spotted area below and behind. A black line runs down the middle of the back and tail, and, as already said, the white area on the buttocks is bordered above with black; the under surface of the tail, the under-parts, and the inner side of the ears and of the upper portion of the limbs being white. In winter the colour of the upper-parts is uniformly greyish fawn. The fawns are spotted. A buck stands about 3 feet at the withers. Mr. Millais records a weight of over 15 stone in a Perthshire buck, but this is quite abnormal, 12 stone being a good weight. According to the same gentleman, a pair of antlers in the collection of Sir Douglas Brooke measure

31 inches along the outer curve, and 7 inches across the widest portion of the palmation, the basal circumference being 5 inches. In the next best pair, which are the property of Mr. Millais himself, and come from the celebrated herd at Drummond Castle, Perthshire (the home of the above-mentioned 15-stone buck), the same three dimensions are respectively 30, $4\frac{1}{2}$, and $4\frac{3}{4}$ inches.

In addition to the spotted breed, a black, or melanistic, breed of fallow

Fig. 58.—Head of Fallow Deer Buck. From a specimen in the possession of Mr. Whitaker, of Ramworth.

deer is common in English parks. The colour of the coat is darker in summer than in winter. There is also a red, or deep dun-coloured breed, in which there is little or no difference in tint between the summer and winter garb. There is also a white breed, of which fine herds exist at Welbeck and Sledmore; but, in most cases, at least, these are not true albinos, having eyes of the normal colour, and often showing traces of fawn on the forehead. Moreover, these white herds show a tendency to revert to the original colour, and are only kept up by carefully eliminating

all fawns of darker colour than ordinary. On the other hand, the black breed keeps very true ; no spotted individuals being, it is said, ever seen in the herd inhabiting Epping Forest in a half-wild state.

Much has been written with regard to the mode of life of fallow deer in British parks, which need not be repeated here. Unfortunately, there is practically no information concerning the habits of the truly wild animal of Southern Europe and Western Asia.

"The fallow deer," writes Canon Tristram in his *Natural History of the Bible*, "is very rare in Palestine, and does not appear ever to have been common. In Arabia it does not exist. A few are still to be found in the wooded glades between Mount Tabor and Lebanon, a district seldom disturbed by travellers. I only once met with it, not far from the sea of Galilee ; and Hasselquist noticed it on Mount Tabor."

THE MESOPOTAMIAN FALLOW DEER

(*Cervus mesopotamicus*)

(Plate IV. Fig. 6)

Although the Mesopotamian fallow deer was not made known to science till 1875, when it was described by the late Sir Victor Brooke in the Zoological Society's *Proceedings*, unrecognised evidence of its existence had been brought to England at a much earlier period. Among the bas-reliefs obtained by Sir Henry Layard from Nimroud, and now in the British Museum, is one of a human figure carrying on its right arm a spotted and antlered animal which is evidently intended to represent the species. A cut of the bas-relief in question is given in *Nineveh and Persepolis*, by W. S. W. Vaux,[1] where it is quite incorrectly lettered

[1] Second edition, second of the two plates facing p. 218, London, 1850.

"figure carrying a gazelle." The ancient Nimroud itself is situated, in Kurdistan, midway between Lake Van and Luristan, and therefore close to the typical locality for this species, which is the mountains of Luristan. Although by no means exact in every detail, the sculpture displays the moderate palmation of the antlers which forms such a distinctive feature of those of the present species.

Although the opinion has been freely expressed that the Mesopotamian fallow deer is only a variety, or indeed an abnormal form of the ordinary fallow deer, there can be no hesitation in regarding it as a distinct species, presenting very peculiar and unmistakable characteristics. Unfortunately, our information with regard to it is still far from complete, and an entire mounted specimen is still (August 1901) a desideratum in the Natural History branch of the British Museum.

Apparently it is a somewhat larger and decidedly a brighter-coloured animal than the ordinary fallow deer, the ground colour of the fur being of the brilliant rufous fawn of the Indian chital. It is further distinguished by the presence of a continuous white line (instead of a broken line of elongated white spots) on each side of the dark dorsal streak, and likewise by the black line on the upper surface of the tail being narrower and confined to its basal half. As regards the antlers, these are quite unlike those of the ordinary fallow deer, as may be seen from the figure of the immature head in the British Museum shown in Plate IV. In place of the great expansion of the antlers occurring at their summits, this is most marked at the base of the trez-tine, which is situated a considerable distance above the brow-tine, and may sometimes at least be cleft. The brow-tine is generally small, and in some instances may be almost or entirely aborted. Above the trez the antlers may be described as flattened rather than palmated, and at the summit carry a small number of snags on the hinder edge. The "record" pair of antlers, which were obtained from Asia Minor, are the property of Mr. F. E. Whittall, of Constantinople.

They carry ten points on one side and eleven on the other. In length they measure 29 inches along the outer curve; their basal girth is $4\frac{1}{2}$ inches, the tip-to-tip interval $30\frac{1}{2}$ inches, and the width of the palmation $5\frac{1}{2}$ inches.

The type of this deer was obtained in the mountains of Luristan, Mesopotamian Persia, and Mr. Whittall's specimens indicate that it extends into the neighbouring district of Kurdistan, where its existence is also indicated by the bas-relief referred to above. Nothing is known with regard to its habits.

THE SZECHUEN SAMBAR

(*Cervus unicolor dejeani*)

The only representative of the Oriental group of rusine deer (see *Great and Small Game of India, etc.*) found within the area treated of in the present volume is a large variety of the sambar inhabiting the province of Szechuen, in North-Western China, which was described by M. E. de Pousargues in the *Bulletin of the Paris Museum*, under the name of *Rusa dejeani*. In size it appears to be fully equal to the typical Indian sambar, but has the whitish legs of the Formosan race of that species. In the type specimen the antlers measure $30\frac{1}{2}$ inches in length, with a basal girth of $5\frac{1}{2}$ inches. A remarkably fine and massive pair of antlers of the Szechuen sambar are preserved in the collection of the Duke of Bedford at Woburn Abbey. In addition to their great massiveness, these antlers are noticeable for the number of "sports," or supernumerary points, arising near the places of origin of the main tines.

THE EUROPEAN ROE

(*Capreolus vulgaris*)

(Plate IV. Fig. 7)

The roe, or roebuck, is the typical representative of a small and easily recognised group of deer which, although exclusively confined to Western, Central, and Northern Asia, present a remarkable approximation in the form of their antlers, and likewise in the structure of the skeleton of the lower part of their fore-limbs, to the American deer of the genus *Mazama*. In place of giving off a forwardly-inclined brow-tine a short distance above the burr, the antler of a roe remains undivided for a considerable space, after which it splits in a V-shaped fork; the hinder and larger prong of this main fork again dividing, thus producing three points to each antler, which may be regarded as the normal and characteristic number for the group. Further subdivision and flattening of the tines of the hinder prong of the main fork may, however, occur, so as to produce a somewhat more complex antler, although the tripartite type is even then retained to a greater or less degree. A further peculiarity of roe antlers is the great rugosity of the beam, from which project a number of small irregular "tags" of bone on all sides; these being more developed in the Siberian than in the European species.

It should be noticed that both the first and second forks of a roe's antler form a distinct V; this feature, together with the long interval between the first fork and the burr, enabling these antlers to be readily distinguished from those of the South American pampas deer, which are likewise three-tined.

Another distinctive peculiarity of the roes is the total absence of a tail; this feature and the form of the antlers being amply sufficient to enable

these deer to be distinguished at a glance from any other members of the family *Cervidæ*.

A word may be added with regard to the foregoing statement that roe resemble the true American deer in the structure of the skeleton of the fore-limb. The two main toes of all deer have a complete cannon-bone above them, which carries at its lower end two pulley-like surfaces with which the uppermost bone of each of these toes articulates. The lateral toes have, however, no complete bones corresponding to the cannon-bone, but only the upper or lower extremities of such bones, which form splints at one or the other end of the cannon-bone. In the typical deer of the genus *Cervus* it is the upper splints which remain, while in the roes and the exclusively American deer the lower splints persist. What may be the reason for these two types of structure no one knows.

The ordinary European roe was described by Linnæus as *Cervus capreolus ;* and those naturalists who are of opinion that a species-name once given must never be tampered with consequently prefer to call the animal *Capreolus capreolus*, rather than by the title standing at the head of this article, which itself antedates the name *Capreolus caprea*.

The European roe is one of the two smaller representatives of the genus, its height at the shoulder being about 26 or 27 inches. It is remarkable for the extraordinary difference in colour between the summer and winter coats, the latter of which is much longer and denser than the former. The ears are long, pointed, and not very densely haired ; while the antlers are only moderately rugose, and usually of the typical three-tined type. The general colour of the winter dress is dark speckled olive-grey above and whitish beneath, the legs being uniform brownish fawn. There is a whitish patch on the throat, and a pure white patch on the buttocks, which extends only to a very slight extent on to the lateral and upper surfaces. In the early summer dress the roe is often uniformly foxy red on the upper-parts, the

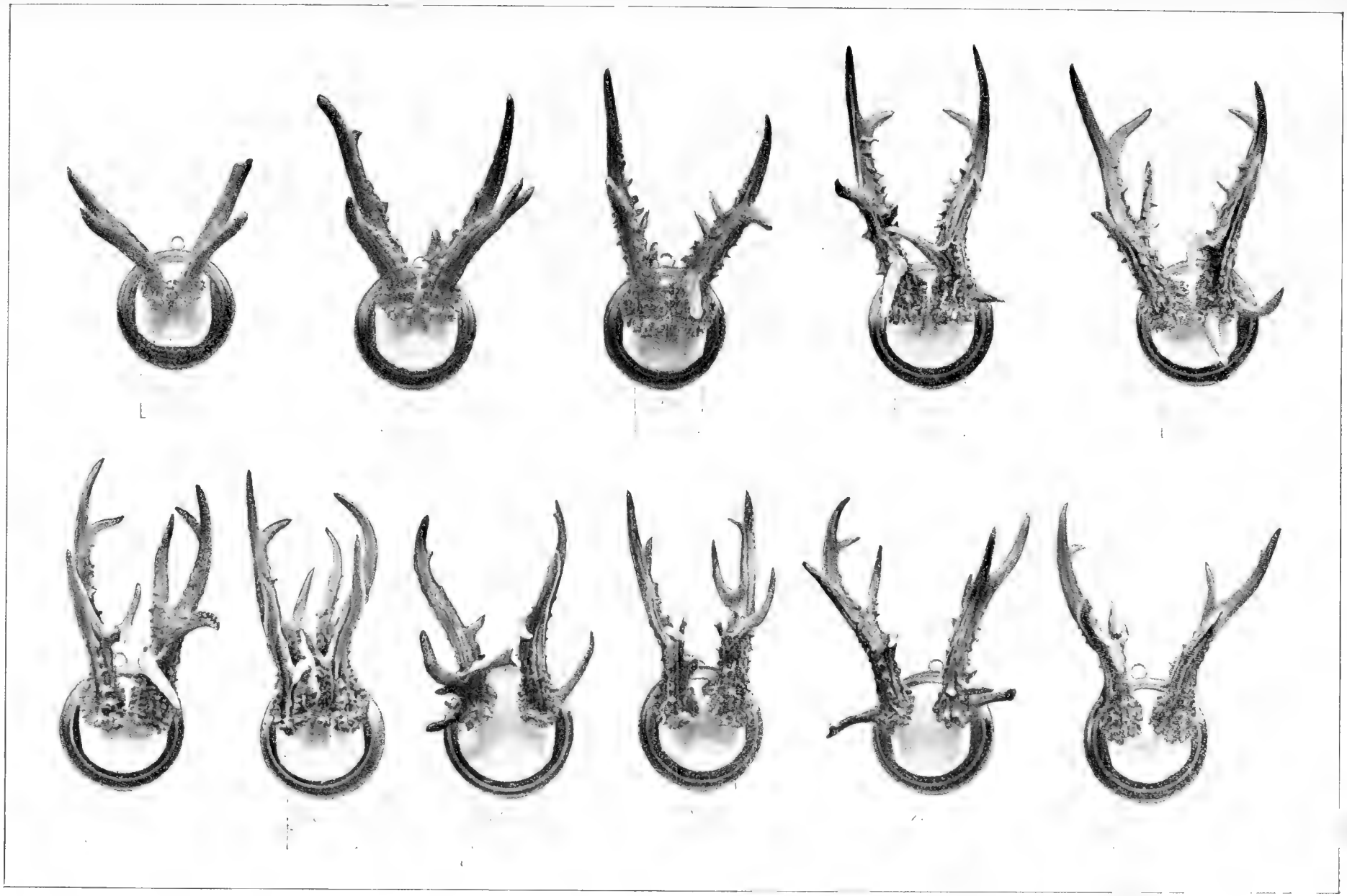


Fig. 59.—Eleven Sets of Antlers of a Roebuck. (From Hennicke, *Zoologische Garten*, vol. xli. 1900.)

inner surface of the ears and the muzzle being alone differently coloured. Such individuals at any rate show no light rump-patch at this season, but later on in the year the hair in this region becomes buffish, apparently by bleaching. Possibly this bleaching later on in the year may explain the statement as to some roes having a buffish rump-patch in summer, which is wanting in others. But it is also possible that there may be individual or local variation in this respect.

In this connection the following extract from a letter written to the author by Sir Arthur Grant will be of interest :—

"I am now certain that here [Aberdeenshire] some roe retain the white sterns in summer, and some turn yellowish red all over. From the New Forest I hear from my friend the Hon. Gerald Lascelles, the deputy-surveyor under the Woods and Forests, that he has but few roes there, which he thinks retain the white. In the forest of Compiègne the Marquis de l'Aigle tells me that the roes retain the white all the year. But in Germany, in the forests round Wiesbaden, Herr Borggieve, one of the chief forest officials, informs me that the roes are yellowish red all over, except in one district near Minden, in Hanover, where they turn absolutely black in summer, although in winter they are of the ordinary brownish grey colour."

Both in winter and summer the roe shows the same black and white markings on the muzzle ; and as these markings afford one of the best means of distinguishing between the three living species of the genus, they may be noticed in some detail. On the upper jaw a dark moustache-like mark runs obliquely from above along the sides of the naked nose to the angle of the mouth, extending to a small degree on to the lower jaw. Between this and the naked area below the nose is a pure white patch of considerable relative size on each side, and the whole of the chin is also pure white.

Both albino and melanistic examples of the roe are far from un-

common, and Mr. J. E. Millais has figured a pied example which was killed some years ago in Scotland, and is preserved in his own collection. Young fawns are fully spotted.

The first antlers of the roe are in the form of simple spikes; in the second year they are forked once, the hinder prong of the fork being the longer; and in the third year this hind prong again bifurcates, thus producing the three-tined type. The shed antlers of one individual have been collected and preserved for a period of eleven successive years by Dr. C. R. Hennicke, of Gera, and described and figured in the *Zoologische Garten*, vol. xli. (1900). The plate, with the author's permission, is reproduced on page 249. The buck was captured in 1889, when he was in his second year. In 1900 he was still flourishing, although, as will be seen from the illustration, the size and beauty of his antlers commenced to decline in 1896. His antlers were generally fully developed in April and shed in October.

Old, and probably barren, female roedeer not unfrequently develop antlers of considerable size, which, however, are never shed. The phenomenon seems analogous to the assumption of male characters by old barren hens of many species of game birds.

Roe antlers are extremely prone to malformation in various ways; a large number of such malformations being figured by Mr. Millais in the work already cited. In some instances, by duplication, the number of the antlers may be increased to three or four; the supplemental ones being generally, if not invariably, smaller and simpler than the normal pair. Occasionally, as in a specimen in the Munich Museum (represented by a cast in the British Museum), the two antlers coalesce in the middle line as far as the first fork; the union of the beams in the instance cited being so complete that no trace of the original duality is perceptible. The commonest malformation appears to be a spongy or "mossy" growth of the surface of the antlers, as in the figure on page 252. The extent to

which this abnormal spongy growth develops varies in different examples. In a specimen figured by Mr. Millais on the last page of *British Deer and their Horns* the growth forms a kind of beehive-shaped casque, enveloping almost the whole of the top and front of the head, from the ears to half-way between the eyes and the nose, and only leaving one eye free.

The longest roe-antlers recorded in Mr. Rowland Ward's work on horn

Fig. 60.—Antlers of European Roe showing Spongy Malformation. From a specimen in the Collection of Viscount Powerscourt.

dimensions measure 13 inches along the front curve; this length being attained in six different specimens.

Before leaving the subject of roe-antlers, reference may be made to two shed antlers figured (Nos. 4 and 5) by Mr. Millais on page 171 of *British Deer and their Horns* as those of the "Pleistocene Roe." One was found in Ross-shire and the other in Perthshire; but the curious thing is how they came there, since they belong to the South American pampas deer, and have nothing to do with the roe. This is sufficiently evident from

the figures, which exhibit the shortness of the beam below the first fork, the somewhat U-like form of the two forks, and the great length and decided curvature of the tines.

The geographical distribution of the European roe is extensive, and comprises the greater portion of Europe, where physical conditions are suitable to its habits, from Great Britain to the Caucasus, and probably also includes a portion of Asia Minor. In Ireland roe are naturally unknown ; in addition to Great Britain, they are found in the south of Sweden, France, Germany, Austria, Hungary, Spain, Tuscany, Greece, Turkey, and the northern districts of Palestine. For their present distribution in Great Britain the reader may consult *British Deer and their Horns*.

In that work Mr. Millais likewise gives an excellent and interesting account of the life-history and habits of this little deer. Especial attention may be directed to the beautiful plate of a buck and doe swimming a lake, as illustrative of a very characteristic trait in the habits of this species ; while not less instructive are the sketches of a buck skulking to escape its foes, and of a doe endeavouring to make her fawn lie down for the same reason.

European roe are never found in large herds, but commonly associate in small family parties, numbering from a pair to half a dozen, although occasionally many more may be seen in company. These family parties keep together till the early part or middle of May, when the bucks leave the does and fawns to pass six weeks or two months by themselves. During July the bucks have again rejoined the does, sometimes taking up with their old partners and sometimes forming a new alliance. Contests at this season may occasionally, although not very commonly, take place among rival bucks. In being strictly monogamous the roebuck differs very markedly from both the fallow deer and the red deer and its allies. Bucks shed their antlers about the end of the year, and have generally

completed and cleaned their new pair by the latter part of February. At this time the bucks are in their finest and handsomest condition; but, unlike what obtains among the majority of deer, it is not then that the pairing-season takes place. This is deferred till well on in the summer; and although in Scotland some of the bucks may be heard calling on the hillsides during June, in the opinion of Mr. Millais the real breeding-season is in August. The fawns, of which there are generally two at a birth, most commonly make their appearance in Scotland some time in June, although a few are dropped during the last week in May. In many parts of the Continent the greater number of births appear to take place during the latter month.

"Roe," writes Mr. Millais, "shed their winter coats at the beginning of May, but are frequently not in full red till the middle of June. They are tolerably regular in this, but in the shedding of this red coat for the winter one they are most irregular. As a rule the dark thick coat is not fully developed till the middle of October, but I have seen in Perthshire the red coat all off by the beginning of September. In the north, however, they are generally a month later." The fawns exchange their spotted first coats for the dark winter livery of their parents in September, but the "moult" is not completed till October is well advanced.

In thickly wooded districts roe spend the greater part of their time in covert, only coming forth to graze in the glades, but in many districts of Scotland they are to be found in quite open country.

THE MANCHURIAN ROE

(*Capreolus manchuricus*)

(Plate IV. Fig. 8)

Although the Manchurian roe was described by Professor Noack in 1889 as a local variety of the Siberian species, it really appears, both as regards stature, hairiness, and the black and white marking on the muzzle, much more nearly related to the European animal. This is the more remarkable seeing that the habitats of the two are separated by an enormous tract of country.

The mounted head and neck of a young buck of this species, presented to the British Museum by the Duke of Bedford, show that the general arrangement of the markings on the muzzle is of the same type as in the European species. The moustache-mark on the upper lip is, however, larger, so that there is scarcely any white between it and the bare portion of the muzzle in front; there is also a somewhat larger area of black on each side of the lower jaw. This description, it must be confessed, does not accord with the one given by Professor Noack (quoted on pp. 231 and 232 of *Deer of All Lands*), but it may be that the comparison should have been with the Siberian rather than with the European species.

The ears and antlers in the British Museum specimen are very similar to the same parts in the European roe; but the general colour of the hair on the head and neck of this specimen, which appears to be in the winter dress, is more rufous than in the common roe during winter. And it is mentioned that a pair of this species formerly living at Woburn Abbey were distinctly red in mid-winter. Further information with regard to the coloration of the Manchurian roe is, however, much wanted.

As confirming the relationship of the present species to the European

rather than to the Siberian roe, it is interesting to notice that Professor Noack describes it as living in pairs or small family parties, and not making long migrations to the southward in winter. It is an inhabitant of the mountains of Manchuria, which it seems never to desert for the plains below.

THE SIBERIAN ROE

(*Capreolus pygargus*)

(Plate IV. Fig. 9)

The comparatively recent acquisition by the British Museum of a fine mounted buck of this species in the winter coat renders the public much better able to learn the distinctive characteristics of this handsome roe than was previously possible. As mounted this specimen stands $33\frac{1}{2}$ inches at the withers. The coat is very rough and thick, and its general colour on the back is light greyish fawn, profusely speckled with blackish brown. The white rump-patch is much larger than in the European animal, and intrudes to a greater extent on to the back and thighs, forming on each of the latter a distinct V. The markings on the muzzle are also decidedly different, the dark upper one being less moustache-like and covering much more of the upper lip. Indeed, the dark brown on the muzzle extends as a broad ring completely round both jaws, so as to leave only a very small white area on each side of the naked portion of the muzzle, and only a small white patch on the tip of the chin. The difference in this respect between the Siberian and the European species is well shown in the two figures on Plate IV.

But it is not by size and coloration alone that the Siberian roe is distinguished from its European cousin. The former is a much more roughly-haired animal than the latter; this being especially shown by the

dense mass of long hair which completely fills the interior of its ears when in the winter dress; the ears themselves being also relatively shorter and broader. The same hairy character is also characteristic of the velvet of the antlers, as is well shown in a pair exhibited in the British Museum above the stuffed specimen.

The present writer has not had the opportunity of examining a speci-

Fig. 61.—Skull and Antlers of Siberian Roe. From an animal shot in the Altai by Mr. St. George Littledale.

men of this roe in the summer coat. When in that dress the colour is, however, said to be of a brighter and lighter rufous, and the hairs lie more smoothly. When first assumed, this coat shows no light rump-patch; but a yellowish white one subsequently makes its appearance in most specimens owing to the bleaching of the hair in this region.

In addition to their superior size, the antlers of the Siberian roe are generally easily distinguishable from those of the other species by the much greater development of the "tags" of bone on the beam, which are sometimes so large as to be almost like small tines. There is also a decided tendency to the development of more than the normal three tines, especially in the case of specimens in which the upper portion of the antler is more or less flattened and expanded.

The largest pair of antlers of this species recorded by Mr. Rowland Ward are in the possession of Mr. Carl Hagenbeck; they measure $18\frac{1}{2}$ inches along the curve. Next to these come a pair in the collection of Viscount Powerscourt, which have a length of 16, a basal girth of $4\frac{1}{2}$, and a tip-to-tip interval of 12 inches. In the pair figured on the preceding page the length is 14 inches and the tip-to-tip interval $13\frac{3}{4}$ inches.

The habitat of this roe is definitely known to extend from the Altai and the mountains of Turkestan to Eastern Siberia, while it is quite probable that it also includes the Caspian provinces of Persia. The range does not extend so far east as the mouth of the Amur river, neither does it reach so far north as that of certain species of true deer. During winter the roe migrates southward into Manchuria and apparently Corea, remaining there from the latter part of November till the end of March or beginning of April, when it returns northwards to its mountainous Siberian resorts.

By this migratory habit, as well as by its gregarious nature, the Siberian roe is broadly distinguished from the European species. It is in early winter that these deer collect in herds preparatory to migration; the number thus assembled being not unfrequently between three and five hundred. During winter thick forests form the favourite resorts of the species; small coverts and swampy districts being more affected in summer, when these animals take to the water as readily as their European relatives. The pairing-season occurs in September, by which time the full winter

dress has been assumed; the change from the winter to the summer coat usually taking place during the latter part of April. In unusually mild winters, like that of 1882, when the snowfall is small and local, the Siberian roe does not migrate at all, and collects in small bands instead of in large herds.

The cry of the bucks in the pairing-season is of the same bark-like character as that of the European roe, although said to be louder and deeper. It is compared by Mr. Littledale to the cry of the Indian barking-deer or muntjac.

PÈRE DAVID'S MILOU DEER

(*Elaphurus davidianus*)

(Plate V. Fig. 1)

It may seem somewhat illogical to include among "game animals" a species now represented apparently only by a few individuals kept in a state of semi-domestication, and that, too, in countries far removed from its existing habitat. Nevertheless as this deer—the mi-lou of the Chinese—was kept until recently in the park of the Emperor of China as an animal of chase, and may even yet be found living in some part of that vast empire, its exclusion from the present volume would be somewhat difficult to justify.

The existence of the milou deer was first made known to science by the great Tibetan traveller the Abbé (then Père) David, who in 1865 obtained the skin of a specimen from the herd kept at that time in the Imperial Park at Pekin. This skin, with the skull and antlers, was sent to Paris, where it was described in 1866 by the late Professor Milne-Edwards. At the time of Père David's visit there appears to have been a

large number of these deer in the park at Pekin, but even then they seem to have been quite unknown in a wild state.

Regarding the subsequent fate of the Pekin herd information is afforded by a letter from Dr. S. W. Bushell, dated July 1898, and published in the *Proceedings of the Zoological Society of London* for the same year.

"I am well acquainted," writes the Doctor, "with the habits of the *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 45 miles in circuit. But four years ago [1894] 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. It is strange that none have been found wild in Kashgaria, which is said by a Chinese author of the early part of the last [eighteenth] century to be the native country of this peculiar deer, which they call the 'Ssū pū hsiang,' or 'Four unlikes.'"

As nothing has subsequently been heard of the survival of any members of the imperial herds in the neighbourhood of Pekin, it may be concluded that they all perished in the manner indicated in Dr. Bushell's letter. And there is but little hope of the species being found in the wild state in Eastern Turkestan, if indeed that country really be its original habitat, as stated by the Chinese writer referred to above.

Fortunately, long before the extermination of the imperial herds at Pekin a considerable number of specimens of this most interesting deer had been brought to Europe, where it has bred readily. A pair were presented in 1869 to the Zoological Society of London by the late Sir Rutherford Alcock, and a second pair were purchased by the Society in 1883. Of late years the Duke of Bedford has been forming a herd at Woburn Abbey, which now (June 1901) includes over twenty head. So

PLATE V

1. Père David's Deer.
2. Chinese Water-Deer.
3. Michie's Tufted Deer.
4. Wild Boar.
5. Manchurian Tiger.
6. Manchurian Leopard.
7. Wild Cat.
8. Fuchow Cat.
9. Spanish Lynx.
10. Wild Dog.

EUROPEAN AND ASIATIC TYPES.

Published by Rowland Ward Ltd.

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 ; and its destiny will consequently be watched with great interest by naturalists. Hitherto its condition and progress have been fairly satisfactory, the losses by death not being excessive, and the proportion of males and females among the fawns not unduly high. In 1901 five fawns were born, one of which was a male, while two were

Fig. 62.—Stags of Père David's Deer. From a photograph taken at Woburn Abbey by the Duchess of Bedford.

females ; the sex of the others was not ascertained when this passage was written.

Many years ago the British Museum acquired a fine skeleton of a stag of this species, but a stuffed specimen was long a desideratum in the collection. By the generosity of the Duke of Bedford this want has been supplied ; and there are now exhibited to the public an entire stag and the head and neck of a hind. Unfortunately the taxidermist has

mounted the stag in a posture similar to that frequently assumed by the red deer, that is to say, with the neck erect and the head carried high. As a matter of fact, this stag habitually carries his head low, and has altogether a somewhat "slouching" attitude, as is well shown in the photograph on page 261.

The leading characteristics of the species are likewise well displayed in the same illustration. In lacking a brow-tine, and dividing in a regular fork-like manner, some distance above the burr, the large and cylindrical antlers conform to the general structural type characteristic of the true American deer. They have, however, absolutely peculiar and distinctive features of their own, which render them very different from all American antlers. The front prong of the main fork curves somewhat forwards and again divides at least once; while the hinder prong of the same is of great length, undivided, and directed backwards in a manner found in no other deer. The finest pair of antlers recorded in Mr. Rowland Ward's book of horn-measurements are the property of Sir Edmund Loder. Their length along the outer curve is $32\frac{7}{8}$ inches, the basal girth $6\frac{3}{4}$ inches, the tip-to-tip interval $13\frac{5}{8}$ inches, and the maximum width of the enclosed space $18\frac{1}{2}$ inches; the number of points being eight a side.

At the time of writing *Deer of All Lands* it had been noticed at Woburn Abbey that in one instance the antlers of this species were shed and replaced twice a year for a certain period, and subsequent observations tend to show that this double change is normal. In the illustration on page 263 (reproduced from *Deer of All Lands*) are shown in the left upper figure the first antlers of this stag, which were grown in 1893. The second figure in the same shows the second pair, which were shed in October 1894; the third figure displays the third pair of antlers, which were discarded in October 1895; while in the next figure are shown the fourth pair, which were dropped in September 1896. These

four show a progressive increase in size and complexity. The fifth pair (bottom figure of illustration), which were shed early in 1897, are, however, very much smaller and less complex than either the fourth, third, or seventh. Later on in the same year (1897) this stag grew another pair of antlers of the type of the third and fourth, which were shed that autumn. These were followed by a small pair like those of

Fig. 63.—Breeding and Non-Breeding Antlers of Père David's Deer. The first four pairs are the breeding, and the fifth pair the non-breeding antlers. Photographed by the Duchess of Bedford.

1896, which were clear of the velvet by Christmas 1897, and were shed the following February, to be again succeeded by a more complex pair.

As the pairing-season only occurs once annually, during the latter part of June or July, when the old stags in the park at Woburn Abbey may be heard uttering their braying cry, the individual in question, at any rate, may be said to have developed in two successive years one pair

of large breeding antlers and a smaller non-breeding pair; the former being shed in September or October, and the latter in January or February.

Some uncertainty prevailed for a considerable period as to whether this double change was merely an individual peculiarity, or whether it is a normal feature of the stags of this species.

The following note, kindly communicated to the writer by the Duchess of Bedford, tends to show that it is constant :—

"I really think," writes Her Grace," it is quite safe now to say that the Père David stags do shed their horns twice a year. The whole of our eight adult stags cleared their horns at the same time, and of course I know that they were also just clean in February [1901], at least two of them, but I cannot give positive dates for the whole party till next spring.

"It is also curious how at one time a perfectly healthy adult stag grows a large pair of horns and next time a small one, not regularly in alternate seasons or changes, but, I believe, at a certain age; this, however, will require years of observation to determine." Later observations indicate the constancy of a double growth of antlers each year.

The object of this double antler-change, which must involve a heavy strain on the system of the animals in which it occurs, is by no means easy to divine, but it may be noticed that, as the normal breeding pair of antlers are not grown in the late summer, this species escapes the serious annoyance from flies to which the European red deer is exposed when its antlers are in the velvet.

To return to the description of the animal, it may be noted that a distinctive feature is the great relative length of the tail, which reaches the hocks, and is donkey-like rather than deer-like in form. The head is long and narrow, with a prominent ridge for the support of the antlers, moderate-sized ears, and a narrow and pointed muzzle. A gland and tuft

are present on the outer side of the upper part of the hind cannon-bone; but, unlike the American deer, there is no such gland on the inner side of the hock. Another feature by which this species differs from the American deer is the conformation of the bones of the lower part of the fore-leg, which have the same structure as in the red deer and its allies. The coat is of moderate length, but the hair on the neck and throat of the old stags is elongated to form a mane and fringe.

Although the new-born fawns are fully spotted, the adults of this species are in the main uniformly coloured, the general tint of the coat at all seasons of the year being a reddish tawny with a more or less marked tendency to grey. The lower part of the limbs is, however, paler, and the monotony of the coloration is relieved by white or whitish on the muzzle, round the eyes, inside the ears, and on the buttocks and under-parts; as well as by the black tail-tip and the stripe down the middle of the neck, back, and throat. A well-grown stag may be compared in size to a red deer, standing about 3 feet 11 inches at the withers.

The general carriage of the animal is, however, very unlike that of a red deer, and the same holds good with regard to its gait, which recalls that of a donkey, and is quite unlike the graceful movements of the more typical deer. In fact, like many other things Chinese, Père David's deer is an altogether peculiar creature, with ways and habits distinctively its own.

It is very unfortunate that we have no account of the habits of these deer in the Imperial Park at Pekin, where they probably existed in a practically wild condition. In England during summer they are very partial to water, often wading out as far as they can go, and sometimes swimming; at this season they feed largely upon water-plants, especially rushes. The long and widely-expanding hoofs, which form one of the characteristic features of this species, are evidently adapted for walking on

marshy ground. The fawns are born in May ; and, as a rule, but one is produced at a birth.

With regard to the call of the old stags another quotation may be made from the letter referred to in connection with the antler-change :—

"The Père David's roar is difficult to describe, but is much more like the bray of a donkey than the call of an ordinary deer. If you can imagine the donkey without the 'up-and-down' of the 'he-haw' and the lower note given out more as a grunt, that is the nearest approach to a description."

THE CHINESE WATER-DEER

(*Hydrelaphus inermis*)

(Plate V. Fig. 2)

This pretty little species is one of the smallest representatives of the deer family, and one of the few in which the males are unprovided with antlers ; the offensive weapons in that sex taking the form of long sabre-like tusks in the upper jaw, very similar to those of the male musk-deer. Nevertheless, as shown by its internal anatomy, the Chinese water-deer has no near relationship with the musk, its resemblances to which are due to what it is now the fashion to call parallelism in development. In all its important structural features this species agrees with the more typical deer.

Twenty inches at the shoulder is about the height of the Chinese water-deer. The colour of the coarse and thick coat is uniformly foxy red, stippled with black at all seasons of the year, the limbs being devoid of the black stippling. The chin, upper lip, a ring round each eye, the inner surface of the ears, and the under-parts and inner sides of the buttocks are alone greyish white. The ears are of moderate size and

rather sharply pointed ; but the tail is represented by a mere stump. In the adult the individual hairs, in place of being uniformly coloured throughout, are ringed, or banded. In a young skin in the British Museum the hairs of the upper-parts are, however, uniformly chestnut-red, without differently coloured bands ; they are also softer than in the adult. Light yellow spots, although very faint, are present, and on the hind-quarters are arranged in regular longitudinal rows.

This is one of the very few deer in which there are glands neither on the hock nor on the cannon-bone. These glands apparently enable deer to ascertain the whereabouts of their fellows by the scent they leave on the ground and herbage. The sub-aquatic habits of the present species probably render such a function impossible, hence the absence of the glands.

Originally discovered on the islands in the Yang-tsi-kiang, this species appears to inhabit other river-valleys in the north-east of China, and it is not improbable that it also occurs in the Corean peninsula. It is represented in the exhibition series of the British Museum by the mounted skeleton of a buck and the stuffed skin of a doe ; the latter presented by the Duke of Bedford.

Two specimens—both, unfortunately, females—were a year or two ago living together in the park at Woburn Abbey. And they illustrated in a striking manner how clever is this deer in concealing itself when among long grass. Indeed, unless the tell-tale ears were detected projecting above the grass, it was almost impossible to see these deer until quite close to them, and even then they might escape notice. When aware that their presence was detected, they would spring suddenly up and race off in a series of long bounds. On the Continent these deer have bred in captivity ; and they are quite peculiar among the *Cervidæ* in that they produce three or four fawns at a birth.

MICHIE'S TUFTED DEER

(*Elaphodus michianus*)

(Plate V. Fig. 3)

This species is extremely closely allied to the Tibetan tufted deer (*E. cephalophus*), and since the latter has been described at some length in the *Great and Small Game of India, etc.*, only a few lines are necessary in this place. The tufted deer are closely allied to the muntjacs, from the plain-coloured representatives of which they differ by the non-eversion of the tips of the tusks of the bucks, the coarse and shaggy hair, the large, rounded, and thickly-haired ears, and the medium length of the tail. The young are spotted only along the middle line of the back.

The present species is found in the neighbourhood of rivers in Eastern China near Ningpo, and not improbably in other districts. It is chiefly distinguished from the Tibetan species by certain details of coloration ; the general colour of the coat being more decidedly iron-grey.

It may be added that the Chinese muntjac (*Cervulus reevesi*) extends as far north as Ningpo ; it is, however, essentially an inhabitant of the south of China (and Formosa), and therefore in the main lies beyond the purview of the present volume.

THE HIMALAYAN MUSK

(*Moschus moschiferus*)

A full description of the Himalayan musk, or musk-deer, has been given in *Great and Small Game of India, etc.* (as well as in *Deer of All*

Lands), so that all that is necessary here is to briefly notice its distribution in the area treated of in this volume.

With the exception of the mountains of Turkestan (including the Karakorum, the Pamirs, and the Thian Shan), the distribution of the musk includes all the ranges bordering the central plateau of Asia. Starting from the Altai, its habitat embraces the mountain ranges from which the great Siberian rivers rise, the neighbourhood of Lake Baikal and Transbaikalia, and thence eastwards to Amurland, Manchuria, and the borders of the Sea of Japan. It is also found on the island of Saghalin. Although apparently unknown to the northward on the coasts of the Sea of Okhotsk, it reappears in the interior in the Stanovoi Mountains and the chains forming the northern prolongation of the Baikal Mountains. It even penetrates the Arctic Circle in North-Eastern Siberia, although it appears to be unknown in the peninsula of Kamchatka and the extreme eastern corner of the Asiatic continent. To the southward the range extends into Kashmir, the Himalaya, Yunnan, and other parts of the area treated of in the *Great and Small Game of India, etc.*

THE KANSU MUSK

(*Moschus sifanicus*)

This form of musk is at present only known from the province of Kansu (Kan-su), China, where the ordinary species is also found. According to the description of Dr. E. Büchner, by whom it was named, it differs from the typical musk by the ear being half as long again, and of a more intense black on its external surface, except at the tip, where it has a large yellow spot ; internally the edges of the ears are furnished with long yellow hairs, sometimes washed with rufous, and with a black or blackish brown line along the borders of their upper half. In the

common musk, on the other hand, the outer surface of the ears is coloured like the head, although sometimes darker towards the tip, where it may even be blackish. Otherwise the Kansu musk seems to be very similar externally to the Himalayan species.

Its skeleton is, however, sharply distinguished from that of the latter by the more massive and much longer skull; the elongation occurring chiefly in the facial portion. Moreover, the nasal bones are very much longer, and abruptly truncated superiorly, instead of penetrating for some distance between the frontals.

No specimen of this musk appears hitherto to have been brought to England.

THE BACTRIAN CAMEL

(*Camelus bactrianus*)

The great Russian traveller Pallas reported more than a century ago that two-humped camels were to be found in a wild condition (that is to say, free from human control) in the deserts of Central Asia; and although this assertion was received with incredulity by naturalists in Europe, its truth has been demonstrated by the explorations of Przewalski and other modern explorers. Major C. S. Cumberland may be mentioned as an English sportsman who has both seen and shot these camels in the deserts bordering the Tarim river. Whether, however, these camels are truly wild, or whether they are the descendants of individuals formerly kept in domestication which have reverted to the wild condition (that is to say, what naturalists designate "feral"), is extremely difficult to decide. Major Cumberland is convinced that these camels were only feral; and there appears to be good evidence that this is the case in that particular district. But it by no means follows that the same holds good for the camels found

wild in all the deserts of Central Asia. With regard to this point the following passage may be quoted from a paper by Monsieur E. de Pousargues, of the Paris Museum, on the Ruminants of Central Asia[1] :—

"The question has been much discussed whether the camels found wandering at liberty in the Gobi are truly wild and constitute the source of domesticated (two-humped) camels, or whether they are simply the descendants of the latter which long since escaped from subjection and

Fig. 64.—Adult Male Bactrian Camel in the Park at Woburn Abbey. From a photograph by the Duchess of Bedford.

resumed in the desert the original wild life and habits of the species. Pallas admitted both hypotheses; considering as truly wild—'*camelos feros*'—only those camels found in the deserts immediately north of China, and distinguishing those inhabiting the steppes of Dzungaria and the valley of the Ili as the descendants of domesticated animals which had become free—'*quondam armentis libertate donatis ortum traxisse videntur, pascales, potius quam spontanei appellandi.*' Nowadays zoologists have reopened the question, which they hope to decide easily by the examination of a few skins and skulls now and again brought to Europe

[1] *Mém. Soc. Zool. France*, vol. xi. p. 137 (1898).

by explorers; but these researches have not hitherto afforded any decisive results either one way or the other. And, in truth, it appears very doubtful whether this perplexing problem can ever be solved by zoological methods alone, even if students were provided with all the requisite material, including complete series of skulls and other bones."

The camels inhabiting Dzungaria (Western Mongolia) 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. These animals also frequent the plateau lying between the Bogdo-ola range on the north and the Kuruk-Tagh to the south; while to the south-east of the latter range they are to be met with in the lower Tarim Basin and the neighbourhood of Lob-Nor, on the Chinese side of Eastern Turkestan. They are, however, by far most numerous in the district known as the Kum-Tagh Sands, situated on the south-western side of the Gobi between Khami and the oasis of Sha-Chau, and thus on the borders of the tract separating the Kuruk-Tagh from the Nan-Shan chain. Eastwards they do not appear to range farther than the districts watered by the Edzina River, and they are quite unknown in the Ala-Shan desert (long. 105° E.).

According to the information furnished by Przewalski, during the heats of summer the camels frequenting the Tarim Basin seek a cooler climate by ascending to the higher valleys of the Altyn-Tagh, and travelling thence southwards to the plateaus in the neighbourhood of Tsaidam. During these migrations they are accompanied by bharal and argali sheep.

Westwards from Lob-Nor they become scarcer and scarcer as the valley of the Cherchen Daria is ascended, Przewalski stating that they are unknown beyond Cherchen itself (long. 86° E.) in the direction of Khotan. Nevertheless, they were met with by Major Cumberland at Takla-Makan and in the desert between Khotan and Lob-Nor.

Major Cumberland's notes on the wild camels met with by him are as follows[1] :—

"The habitat of the wild camel is the Gobi steppe 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. They prefer the snow, I imagine, as being less salt than the water, although it also is impregnated to a certain extent soon after it falls. The camel is very shy in its habits, and, so far as I could ascertain, has never been caught and domesticated. The natives told me that no horse in the country could catch the camels in the deep sand of the region they frequent. 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. Their origin has yet to be traced. I take it that they have sprung from camels which escaped when the district known as Takla-Makan was buried in a great sand-storm some centuries ago. Tradition relates that no human beings survived ; but it is likely enough that some of the camels and horses did so, and that this was the origin of the wild camels and ponies which are found in this district."

Whether any of them be truly wild or not, it is quite clear that the camels which roam at liberty over the deserts mentioned above are specifically identical with the domesticated two-humped Bactrian camel. It is also well-nigh certain that Central Asia was the original habitat of that species. If any of the reputed wild camels of Asia are really wild, and differ in any important features from the domesticated breed, they would be entitled to rank as a distinct race.

[1] *Proc. Zool. Soc. London*, 1892, p. 370.

To describe the Bactrian camel on this occasion would be quite superfluous. It is a huge beast, with two humps, and a very long and shaggy coat in winter; the summer dress being comparatively short. When in the winter coat the animal carries a large top-knot of long hair on the crown of the head, which gives it a curious likeness to its fur-capped Tatar masters. The size of the humps is subject to great variation according to the time of year and the supply of food the animal receives.

In a note on the skull and skin of a reputed wild specimen brought home by Major Cumberland, Mr. Blanford remarked that the former differed somewhat from the skull of a domesticated individual with which he compared it, while the humps on the latter were very small and represented by tufts of long hair.

The latter peculiarity may be due merely to the condition of the animal at the time of its death.

Owing to the great uncertainty with regard to the claims of the Bactrian camel to be considered a truly wild animal, its portrait has not been included in the plates illustrating this volume.

The following notes on the origin and habits of the Bactrian camel were contributed by the present writer to *Nature* for August 1901:—

"Of few of our larger domesticated animals is the origin so buried in mystery as is that of the camels. Till a few years ago, indeed, naturalists were in doubt whether the two-humped Bactrian species was really a native of the countries where it is now kept in a domesticated condition. The probability was, however, all in favour of such being the case; and the recent discovery of remains of fossil camels in several parts of Europe, as well as the occurrence of such remains in Asia, afford strong corroborative evidence that Eastern Europe and Northern Asia formed the original habitat of the wild Bactrian species.

The subject has recently been discussed in *Globus* for 2nd May 1901,

by Dr. A. Nehring, of Berlin, who expresses himself in favour of the view that some, at least, of the two-humped camels which roam at liberty over the wastes of the Gobi are indigenous wild animals.

Years ago the occurrence of remains of fossil camels (*Camelus sivalensis*) was recorded by Falconer and Cautley in the Tertiary strata of the Siwalik Hills of Northern India. The dentition of this species is numerically the same as in the two living members of the group ; and from this circumstance, coupled with the well-known affinity between the extinct fauna of the Siwaliks and that of Africa at the present day, it is not improbable that the Siwalik camel was the ancestor of the single-humped African species, since, as will be shown below, there is a probability that the ancestor of the Bactrian species had a fuller dental series.

And here it may be well to mention that in adult modern camels there are normally five pairs of cheek-teeth in the lower jaw behind the tusks, or canines. The first pair (the first premolars) are, indeed, somewhat like a canine in form, and are separated by a gap from the canine in front and from the remaining four of the cheek-teeth behind. Of the latter, the last three pairs are the true molars, while the tooth in front of them represents the last of the typical series of four premolars.

Now in the lower jaw of a fossil camel recently described from the Pleistocene Tertiary strata of Rumania, by Herr Stefanescu, under the name of *Camelus alutensis*, there are six, in place of five, pairs of lower cheek-teeth, the tooth representing the third lower premolar being developed. Evidently we have here an ancestral type of camel, and it is noteworthy that, according to Dr. Nehring, this supernumerary lower tooth occasionally makes its appearance in living camels, although it is not mentioned in which species. The remains of the Rumanian camel were discovered on the left bank of the Aluta (Olt) river, a tributary of the Danube, not far from Slatina.

Evidently, remarks Dr. Nehring, this Rumanian camel was a member

of the steppe fauna, of whose former existence in Central Europe evidence is afforded by the occurrence of fossil remains of the saiga, Kirghiz jerboa, and other species now characteristic of the Volga steppes. Another fossil camel has also been described, under the name of *Camelus knoblochi*,[1] from strata in the neighbourhood of Sarepta, on the Volga, and also at the mouth of the Tscheremschan, in the government of Samara. The number of lower teeth in this camel is apparently the same as in the existing species.

As members of the steppe fauna, these Rumanian and Russian fossil camels were almost certainly the ancestors of the living Siberian species; and since the Rumanian species has a larger number of lower teeth than the still older Siwalik camel, it is manifest that the latter cannot have been the progenitor of the Bactrian species. Hence the reason for regarding it as the ancestor of the single-humped camel of Africa.

The Russian camel-remains, it may be added, were found in association with molars of the mammoth.

Remains of camels (*C. thomasi*) have also been found in the Pleistocene strata of Oran and Ouen Seguen, in Algeria; and certain remains from the Isle of Samos have recently been assigned to the same genus, although this has been found to be incorrect. The Algerian Pleistocene camel was doubtless the direct ancestor of the living African species, which it serves to connect with the extinct *C. sivalensis*.

With regard to the camels of the Gobi, which, as already mentioned, Dr. Nehring regards as truly wild, it is interesting to note that some years ago Dr. Langkavel described them as being much smaller than the domesticated breed, not, indeed, much superior in size to a horse, with relatively slender limbs. Observations in confirmation of this statement are, however, urgently required; and any travellers who may visit the Gobi neighbourhood would do service to science if they would bring back skins and skeletons of the wild camels.

[1] See Nehring, *Sitzungs-Bericht Ges. nat. Freunde, Berlin*, 1901, p. 137.

Nothing is more remarkable in connection with the Bactrian camel than its capacity for standing extremes of heat and cold, provided always that the climate be dry. Herr O. Lehmann (*Zeitschr. wiss. Geographie*, 1891, p. 27), for example, writes as follows :—

"The most severe winter cold of Asia cannot prevent the presence of the camel. In West Siberia, from the Kirghiz steppe to the neighbourhood of Lake Baikal, are camels found. . . . In Semipalatinsk the mean winter temperature falls to $-21{\cdot}9^{\circ}$ C. ; the most intense cold registered between the years 1854 and 1860 was $-49{\cdot}9^{\circ}$. During his journey Przewalski experienced the most intense cold without losing a single camel. Throughout his whole journey across the Mongolian plateau he daily encountered a temperature of -37°. . . . Again, in Zaidam, where camel-breeding establishments exist, a night temperature of $-23{\cdot}6^{\circ}$ was observed, which in November was intensified to $25{\cdot}2^{\circ}$. In the neighbourhood of Tarai-nor, on the 50th parallel of north latitude, the Burjæts keep numerous camels, which even in winter are allowed to wander about without the slightest protection. . . . Here the camel reaches the 50th parallel, westward of Lake Baikal, on the Upper Yenisei, where the Samoyeds keep both reindeer and camels. Here, indeed, the breeding-area of the camel overlaps that of the reindeer."

In regard to its capacity for heat, the same author records the following observations :—

"If the degree of cold that the Bactrian camel can withstand is wonderful, not less remarkable is the heat it can undergo. In the Gobi desert Przewalski took the temperature of the ground in summer and found it to be $62{\cdot}5^{\circ}$ C."

THE WILD BOAR

(*Sus scrofa*)

(Plate V. Fig. 4)

"Pig-sticking" is a sport almost, if not entirely, unknown in Europe, and shooting wild boar is but little practised by English sportsmen, in part, no doubt, owing to the poor trophies yielded by this bold and ferocious animal. Nevertheless, boar-shooting is a favourite sport in many parts of Southern and Eastern Europe and Asia Minor; Albania, the Caucasus, Spain, and parts of Russia and Asia Minor being favourite hunting-grounds.

To describe such a comparatively familiar and unmistakable animal as the wild boar of Europe would be mere waste of time, especially as it is now represented in the British Museum by a magnificent entire stuffed specimen as well as by the mounted head of a still larger individual. The long coat of stiff bristly hair covering the entire head and body is coloured a mixture of black and brown more or less tinged with grey; and these bristles are capable of erection along the middle of the neck and back, whereby the height of the animal when enraged is perceptibly increased.

The largest boars are said to be found in the neighbourhood of the Caucasus, especially, according to an account published by Mr. C. Phillips-Wolley in the "Badminton Library," in the chestnut forests of Circassia and among the dense reed-brakes bordering the Kuban. Here it is stated by the writer just cited, on the authority of Professor Radde of Tiflis, that boars may sometimes attain the enormous weight of 600 lbs. Actual weighing is, however, desirable before such weights can be definitely accepted, because in cases where boars have been put in the scales their weights have proved much below this. For instance, a boar killed by

Prince Demidoff in the Caucasus weighed 372 lbs., while one shot by the Duke of Orleans in Spain turned the scale at 302 lbs.

The swamps bordering the Black Sea and the Caspian are likewise favourite resorts of the wild boar; and these animals would be still more numerous than they are, were they not relentlessly hunted down and killed by the peasantry on account of the damage they inflict on corn-crops.

The two longest tusks of the European wild boar recorded by Mr. Rowland Ward respectively measure $11\frac{1}{2}$ and $11\frac{1}{4}$ inches along the outer curve. These dimensions are exceeded by one normal and one malformed tusk of the Indian wild boar, as well as by one of the Javan species.

THE THIAN SHAN WILD BOAR

(*Sus scrofa nigripes*)

Certain skulls and skins of wild swine obtained by the members of the Second Yarkand Expedition at Kashgar were described in 1875 by Mr. W. T. Blanford[1] as probably indicating a variety, or local race, for which the name *nigripes* was suggested. The animals from which the skins were taken inhabited the Thian Shan Mountains. Mr. Blanford's description is as follows:—

"The two specimens brought, skins with skulls, are of large size, and appear to agree fairly in external characters with the common European wild boar, except that the whole of the fore and hind-feet, with the greater part of the legs, are nearly black. Elsewhere the colour is dull, rather light brown, the fur consisting, as usual, of long bristles and shorter woolly hairs; the former black, except towards the ends, where they are pale yellowish brown; the latter rather light hair-brown; just around

[1] *Journ. Asiat. Soc. Bengal*, vol. xliv. pp. 2, 112 (1875); and *Mammalia of Second Yarkand Expedition*, p. 79 (1879).

the eye is black; and the ears are clothed with brown hair, darker than that of the head and back.

"The skulls are very similar to those of the European wild boar, but present, nevertheless, several marked differences from the only example I have for comparison, that of a male from Hungary. The first difference to be noticed is that, in both the skulls from Turkestan, the occipital plane makes a more obtuse angle with the base of the skull, and a more acute one with the superior one."

The author then proceeds to notice certain other structural differences in the skulls of the forms which it would be out of place to quote on this occasion. Having done this, he concludes as follows :—

"How far these differences entitle the Thian Shan pig to specific differences I cannot say without much better means of comparison than I at present possess. If the cranial differences pointed out are never found in European pigs, and if the black legs are equally unknown in typical *Sus scrofa*, the animal of Turkestan may have fair claims to be separated."

THE WILD HORSE, OR TARPAN

(*Equus caballus ferus*)

The uncertainty as to whether any of the two-humped Bactrian camels roaming at large over the wastes of Central Asia are wild in the proper sense of the word has been already mentioned. A similar state of uncertainty exists with regard to the troops of horses which wander over the same tracts. Although the Russian naturalist Pallas appears to have been convinced that these tarpan, as they are called, are indigenous inhabitants of the steppes, many later writers refused to accept this view, and regarded these horses as the descendants of animals escaped from captivity. Of late years, however, there has been a tendency to revert to the earlier opinion, which is supported by Dr. A. Nehring, of Berlin, in

a little work published in 1890 under the title of *Ueber Tundren und Steppen.*

Pallas's description of these animals, as given in volume i. of his *Zoographia Rosso-Asiatica*, is so excellent that it may be translated at length :—

"The wild horses," he writes, "roam over the steppes of Great Tartary and Mongolia, from the Dnieper to the Altai, and through the whole of Central Asia . . . in small troops. The majority are of a grey roan or pale grey colour, with the mane, the dorsal streak, and the tail reddish brown, the muzzle whitish, and the neighbourhood of the mouth blackish. In size they are smaller than the average domesticated horse, but the head is larger, as are the ears, the summits of which are bent back in a sickle-like form, while the limbs are thinner. The forehead is convex above the eyes, with a whorl in the hair between them. The small hoofs are nearly cylindrical. The mane extends from the space between the ears[1] as far back as the shoulder-blades, and is of moderate length and half upright. In winter the coat is long, ragged, and on the back waved ; the tail being of medium length. Newly-born foals can be easily tamed, but the adults are quite untamable. These horses are wonderfully swift, and, when to leeward, do not allow human beings to approach within a long distance. . . . They frequent sunny, undulating steppes, avoiding forest and bare mountainous districts."

To this excellent description it should be added that, owing to crossing with horses escaped from captivity, the colour of some members of the troops of tarpans differs more or less markedly from the typical grey roan.

In Pallas's time tarpan were to be met with on the steppes of the Volga and Urals, but for fully a century they have disappeared from those tracts and have been steadily driven farther and farther into Central Asia. Even there, according to Przewalski, true wild horses are only to be met with in comparatively small troops, seldom of more than fifty head each.

[1] Eyes in the original.

After referring to the opinion held by many as to the domesticated origin of tarpan, Dr. Nehring says that he believes that these animals are (in spite of a certain amount of mixture with domesticated breeds) really the direct descendants of the original wild horses of Prehistoric and Pleistocene Europe.

PRZEWALSKI'S HORSE

(*Equus przewalskii*)

In the year 1881 Monsieur Poliakoff announced the discovery of a distinct species of the genus *Equus*, one example of which had been obtained by the late Colonel Przewalski while searching for wild camels in the deserts of Central Asia near Zaisan.

"It is described," wrote the late Sir W. H. Flower,[1] "as being so intermediate in character between the equine and asinine group of *Equidæ* that it completely breaks down the generic distinction which some zoologists have thought fit to establish between them. It has callosities on all four limbs, as in the horse, but only the lower half of the tail is covered with long hairs, as in the ass. The general colour is dun, with a yellowish tinge on the back, becoming lighter towards the flanks and almost white under the belly, and there is no dark dorsal stripe. The mane is dark brown, short, and erect, and there is no forelock. The hair is long and wavy on the head, cheeks, and jaws. The skull and hoofs are described as being more like those of the horse than the ass.

"Until more specimens are obtained it is difficult to form a definite opinion as to the validity of this species, or to resist the suspicion that it may not be an accidental hybrid between the kiang and the horse."

This very natural supposition seems to be negatived by the fact that

[1] *The Horse*, p. 79 (1891).

numerous examples of this horse have been subsequently obtained. The Museum at St. Petersburg, for instance, possesses several mounted skins, and there is another in the Paris Museum of Natural History, although at present, unfortunately, this interesting animal is unrepresented in the collection of the British Museum.

The following short note on the Paris specimen appeared in the *Proceedings of the Zoological Society of London* for 1901:—

"A recent letter from Mons. Oustalet had assured Mr. Sclater (in answer to inquiries) that there were, without doubt, callosities (chestnuts) on the hind- as well as on the fore-legs of this animal, so that it would have to be placed in the typical section of the genus *Equus*, and was, in Mr. Sclater's opinion, in all probability a descendant of the original stock whence the horse of domesticity (*Equus caballus*) had been derived."

Another note on this animal, by Mr. W. B. Tegetmeier, appeared in *The Field* newspaper of 31st August 1901, illustrated by a reproduction from the photograph from which the figure on page 284 was taken.

The photograph on the next page is taken from one of six of these animals recently brought to Russia. According to this photograph, the tail is clothed with long hair up to its root, and is in this respect intermediate between that appendage in the horse and the kiang. In the horse the long hairy covering is much more dense and bushy, while in the kiang the upper portion of the tail is short-haired. In the African wild ass the long hair is confined to the tip of the tail. The upright mane and the absence of a forelock are well shown. The ears are shorter than in the kiang, and therefore very much shorter than in the African wild ass. The hoofs, especially the front pair, are of the large size characteristic of the horse and kiang, and are thus very different from those of the zebras and African wild ass.

From the foregoing evidence, imperfect as it is, it would seem probable

that Przewalski's horse is neither a hybrid nor a wild ass. In some respects it seems to come nearer to the tarpan, but it lacks a forelock and a dark dorsal stripe, while the mane and tail also appear to be somewhat different. Further comparisons are, however, much required. If Mr. Sclater be

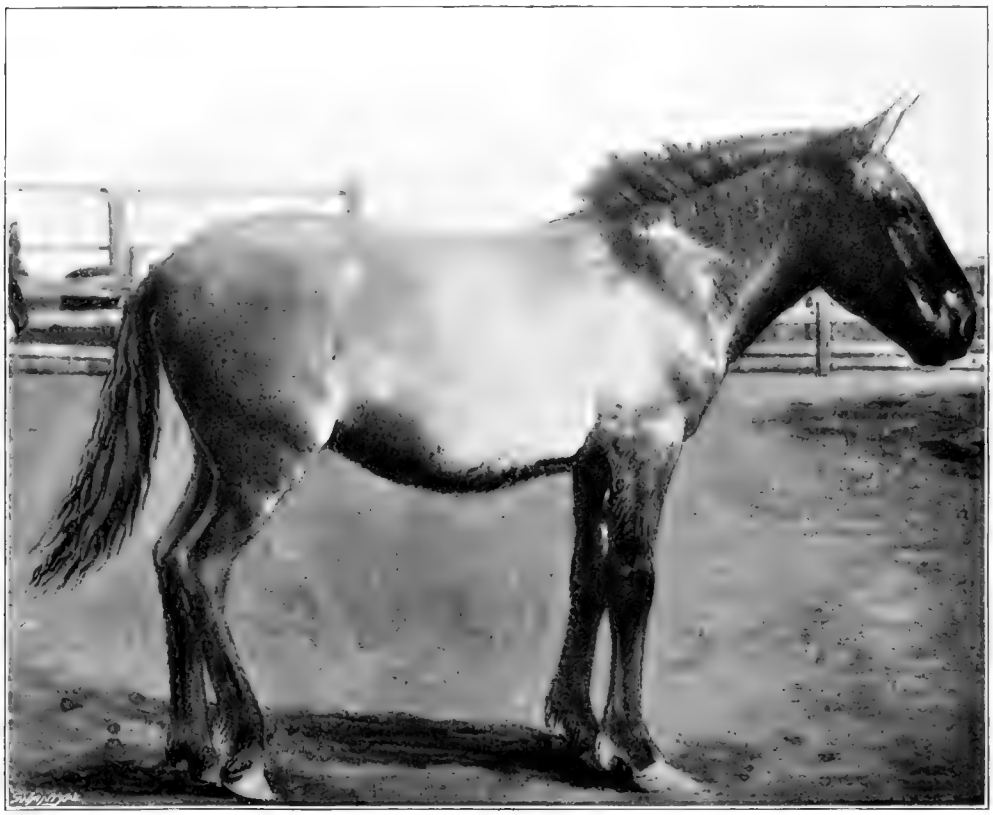


Fig. 65.—Przewalski's Horse. From a photograph in the possession of Mr. Carl Hagenbeck.

right in regarding this animal as the ancestor of the domesticated horse, it could only rank as a race of *E. caballus*.

On the whole, in the form and characters of the ears, tail, and hoofs, the horse, the present animal, and the Asiatic wild ass appear to form a group of closely allied species all of which differ in these respects from the wild ass, quagga, and zebras of Africa.

THE ASIATIC WILD ASS

(*Equus hemionus*)

Very few words will suffice with regard to the representatives of this species found within the area under consideration ; firstly, for the reason that they are of but slight interest to sportsmen ; and secondly, because some considerable amount of space has been devoted to the forms inhabiting Tibet and Baluchistan in the *Great and Small Game of India, etc.*

The typical representative of the species is the chigetai, or dzeggetai, of Tartary and Mongolia, with which the kiang of Tibet appears to be identical. This is the darkest and reddest variety of the species. The kulan of the Kirghiz steppes to the north of the Caspian is generally identified with the chigetai, but further comparisons between them are desirable.

The other variety found in the area treated of in this volume is the Persian wild ass, or ghorkhar (*E. hemionus onager*), which is a paler animal, with a broader dorsal stripe. The Syrian wild ass, the so-called *E. hemippus* of E. Geoffroy St. Hilaire, appears inseparable from this form. And it is doubtful whether the Baluchi wild ass is really distinct. If it be so, it should be called *E. hemionus indicus*, and not, as in *Great and Small Game of India, etc.*, *E. hemionus onager*, which is the proper title of the Persian form, the *E. onager* of Pallas.

It may be well to add that by Dr. Paul Matschie,[1] of Berlin, six forms of Asiatic wild ass are recognised, viz.—

1. The true *E. hemionus* of Pallas, the chigetai of the Mongolians and the kulan of the Tatars.
2. The kiang—the *Equus kiang* of Moorcroft—from Tibet.
3. The Baluchi and Indian *E. indicus*.
4. The South Persian *E. hamar* of Hamilton Smith.

[1] *S.B. Ges. naturfor. Berlin*, 1893, p. 208

5. The *E. hemippus* of E. Geoffroy St. Hilaire, from Syria, Mesopotamia, and North Arabia.

6. The *E. onager* of Pallas, from North Persia.

THE LION

(*Felis leo*)

The Asiatic lion having been noticed at considerable length in the *Great and Small Game of India, etc.*, a few lines with regard to its distribution within the area treated of in the present volume will be sufficient in this place. In the event of the Indian lion being sub-specifically distinct from the African animal (which has recently been divided into a number of local races by Messrs. Neumann[1] and Matschie[2]), it should be known as *F. leo guzeratensis*, and it is highly probable that the Persian lion is identical.

In Persia the lion at the present day, according to Mr. Blanford, 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 Shiraz. It is unknown on the Persian table-land.

In Syria, Asia Minor, and Greece the lion was still to be met with in Greek classical times. "In Palestine," writes Canon Tristram in his *Natural History of the Bible*, "the lions had their lairs in the forests, which have perished with them, and in the cane brakes of the Jordan. Not only did they supply the imagery of Psalmists and Prophets, but they lingered there till the times of the Crusades, and are mentioned as living about Samaria by historians of the twelfth century. . . . It was probably during the period of the Greek and Roman dominion that it became almost extirpated, and now the lion can scarcely be said to exist in Asia west of

[1] *Zoologische Jahrbuch*, vol. xiii. p. 551 (1900).

[2] *S.B. Ges. naturfor. Berlin*, 1900, p. 98.

the Euphrates. The Arabs say it is found in Arabia ; but of this we have at least no evidence. Occasionally it crosses the Euphrates, and a few years ago a lion's carcase was brought into Damascus. Between the Lower Tigris and Euphrates they still abound."

THE PERSIAN TIGER

(*Felis tigris virgata*)

The Persian tiger, which was long ago distinguished by Illiger as a distinct race under the above name, is a small and somewhat rough-haired variety of *F. tigris*. It is represented by a mounted specimen in the British Museum. Of its distribution Mr. W. T. Blanford writes as follows in *Eastern Persia* :—

"The tiger is only found in Persia in the Caspian provinces, Mazandaran, and Ghilan, lying to the north of the Elburz Mountains, and corresponding in part to the ancient Hyrcania. 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 to 6000 feet. To the westward it extends as far as the Caucasus and Mount Ararat, being found not far from Tiflis."

With regard to the occurrence of tigers in the Caucasus, Dr. Satunin, in his oft-quoted paper, observes that formerly these animals used to range as far as the crest of the Great Caucasus, and that one was killed near Tiflis in 1835. In the Talish plain, adjoining Persia, on the Caspian, as well as in the neighbouring foot-hills, it is still far from rare, but in Russian Talish it is but seldom seen.

A description of two specimens of the Persian tiger imported from Tiflis to Berlin is given by Dr. Matschie in the *Sitzungs-Berichte Ges. naturfor. Berlin*, 1897, p. 13.

THE MANCHURIAN TIGER

(*Felis tigris longipilis*)

(Plate V. Fig. 5)

The Manchurian race of the tiger, as stated in *Great and Small Game of India, etc.* (where a skin is figured), is distinguished by its large size, heavy build, relatively short and thick limbs, and the great length, thickness, and fineness of the fur. In many skins the ground-colour of the fur is less deep than in the Indian tiger, with the stripes less numerous and more incomplete. And a comparison of the skin of the Manchurian tiger figured on p. 279 of the work cited with the one of the Indian tiger on p. 277 of the same will show that the white of the under-parts and inner sides of the limbs occupies a much larger area in the former than in the latter, with, of course, a proportionate reduction in the extent of the tawny of the back and outer surface of the limbs. Specially noticeable is the great constriction of the tawny area on the hinder part of the back.

The name *Felis longipilis* was applied by Fitzinger to the tiger of Amurland, which is thus the typical representative of this race. Long-haired tigers are to be met with in suitable localities over almost the whole of Central and Northern Asia, from Amurland and the valley of the Hoang-ho to the neighbourhood of Lake Balkash and the Tarim valley, and thus on to the Aralo-Caspian region, where we enter the habitat of the Persian race, with which the West Central Asian form not improbably intergrades. At no very distant epoch tigers inhabited the New Siberian Islands, in the Arctic Ocean, where their bones have been found. They are unknown in Kamchatka, as they are in Japan.

Dr. Matschie,[1] who is of opinion that more than one race of the species

[1] *S.B. Ges. naturfor. Berlin*, 1897, pp. 16, 72.

is to be found in this vast area, states that the true Amurland, or Manchurian, tiger is very light-coloured, with comparatively few stripes, which are relatively narrow. On the other hand, the tiger which inhabits the Hoang-ho valley, and thence north nearly as far as Vladivostock, is described by him as being of very large size and darker coloured, with the stripes broader, and those on the thighs dark brown instead of black ; the tail, as in the tigers inhabiting Amurland, being very thick and bushy.

Authentic measurements of the Manchurian tiger are urgently required. A dressed skin belonging to Mr. A. Bignold measures 13½ feet in length, and one in the possession of the publisher a foot less.

Careful comparison between the skulls of the Manchurian and Indian tiger would likewise be desirable, if the necessary specimens were available. And information with regard to the habits of the former animal is much wanted.

THE PERSIAN LEOPARD

(*Felis pardus panthera*)

This race of the true leopard has been described at some length in *Great and Small Game of India, etc.* It will accordingly suffice to state that it is a comparatively long-haired and bushy-tailed animal, ranging from the Caucasus and Anatolia through Persia into Baluchistan, and so on into North-Western India.

In the Caucasus these animals are known as *bars*. Prince Demidoff, in his book on hunting in that region, gives the following account of them :—

"Leopards have taken up their abode in the higher rocks, but can hardly be said to be numerous, although I have occasionally come across their droppings on high cliffs. They generally go out at night and wander

in search of a chamois, or anything else they can get. It is most difficult to keep them down by strychnine, for they very seldom feed on animals which they have not killed themselves. Two years ago the keepers succeeded in poisoning two in one week. . . . On 17th September, as we were crossing the Urushten stream on our way from one camp to another, we suddenly saw a hind going at full speed and a leopard following her at very close quarters. . . . This was the only glimpse I had of one."

THE MANCHURIAN LEOPARD

(*Felis pardus fontanieri*)

(Plate V. Fig. 6)

The Manchurian representative of the leopard is a very distinct form, which was first described by the late Professor Milne-Edwards on the evidence of a specimen brought from Manchuria to Paris by Monsieur Fontanier, who collected so many animals from that part of Asia. Like the Persian leopard, the present animal has been described at some length in the *Great and Small Game of India, etc.*, but since it is peculiar to a portion of the area treated of in the present volume, that account may be repeated. In its general massiveness of build the leopard of Manchuria is very similar to the tiger of the same region, having stout and somewhat clumsily built limbs, a relatively short and broad head, and long thick fur. The spots are much larger and more widely separated from one another than is the case in the Indian leopard. The ground-colour of the fur is very pale sandy, but the light centres of the black rosettes, especially on the back, are very much darker than the general body-colour. The solid spots of the head are continued on to the region of the shoulders, and thence down the whole of the fore-limbs, similar solid spots reappearing on the hind-

legs. These large spots are widely separated from one another, and nearly circular in shape, and are thus markedly different from the small, closely-crowded, and irregularly-shaped solid spots on the fore-quarters of the African leopard, while they are equally different from the ringed spots occupying the same position in the Indian leopard. The dark rings are, in fact, much less broken up than in either of these races of the species.

This leopard is definitely known to occur only in Manchuria and some of the neighbouring districts of China, but it may have a much wider distribution in North-Eastern Asia. In the Altai its place appears to be taken by the snow-leopard. A leopard skin from Shensi, Northern China, presented by Father Hugh to the British Museum, seems to be intermediate between the Manchurian and the Persian or the Indian leopard. It has the long fur and thick bushy tail of the former, but resembles Indian skins in the rich tawny ground-colour of the fur, as well as in the prevalence of rosettes, in place of solid spots, especially on the hind-quarters.

The Manchurian leopard is chiefly known in England by trade-skins, and well-preserved skins as well as skulls are much wanted. Careful measurements of freshly killed specimens, and likewise observations on the life-history of the animal, are also required.

THE SNOW-LEOPARD

(*Felis uncia*)

Nothing need be added to the account of this species given in *Great and Small Game of India, etc.*, except that it has a wide range in Central Asia, where it is met with in the Altai and the Thian Shan, but not apparently in Eastern Siberia. Its alleged occurrence in the Caucasus, and probably also in Persia, is due to the Persian leopard having been mistaken for this animal.

THE WILD CAT

(*Felis catus*)

(Plate V. Fig. 7)

Until a comparatively recent date the European wild cat, in the British Islands at any rate, was regarded by sportsmen rather in the light of "vermin" than as a game animal; and it is only in consideration of its increasing rarity that it has been looked upon more favourably. In a work on the wild cat of Europe published in 1896, Dr. Edward Hamilton came, indeed, to the conclusion that pure-bred specimens of this animal had practically ceased to exist in Great Britain. This idea as to the extermination of the species seems, however, to be premature, since several skins showing all the characteristics of the full-blooded wild cat have recently been received at the British Museum from Scotland. The notice of the species given here is brief; those readers who desire to know more about it being referred to the above-mentioned work by Dr. Hamilton.

In general appearance and colour the wild cat is very like an overgrown and powerfully-built "tabby" of the old-fashioned domesticated English breed, previous to the introduction of the Persian strain which is now so common. The general colour of the fur is yellowish grey, with an interrupted dark stripe along the spine, two dusky bands on the cheeks, and numerous obscure transverse bands of the same colour on the body and limbs. The tail, which is of equal thickness throughout, is less than half the length of the head and body, and ringed and tipped with black. Usually the greater part or the whole of the sole of the hind-foot is black or blackish brown. In a full-grown male the length of the head and body is about 34 inches, and that of the tail about 11¼ inches.

Although never an inhabitant of Ireland, and now exterminated in

England and Wales, the wild cat, which is a forest-dwelling species, still lingers in the more remote parts of Scotland, and over a large area in the Continent of Europe, occurring in France, Switzerland, Germany, Belgium, Italy, Spain and Portugal, Austria-Hungary, the South of Russia, Poland, Dalmatia, Greece, the Caucasus, and certain parts of Asia Minor, whence it is said to extend into some of the forest districts of Northern Asia. In Scandinavia it is unknown, although it was named and described by Linnæus.

According to Dr. Hamilton, the wild cat has now become exceedingly rare over the great part of the Continent, even in districts where it was formerly abundant, and over certain areas has become completely exterminated.

PALLAS'S CAT

(*Felis manul*)

In the deserts of Asia the place of the wild cat of the European forests is taken by the manul, or Pallas's cat, which was first described by the great Russian naturalist whose name it bears. In the time of Pallas the range of this cat extended from the southern foot-hills of the Urals through the Kirghiz, Turkestan, and Mongolian steppes, and from Southern Siberia along the Altai to the borders of Lake Baikal. At the present day the species seems to have disappeared from the Orenburg steppes, although it is still found in the neighbourhood of Lake Leman. It feeds chiefly on picas, or tailless hares.

In size this species is somewhat inferior to an average domestic cat. It is specially characterised by its abundant coat of long and soft fur, the short and ringed tail, and the presence of a few dark transverse bars on the hind-quarters. The general colour of the fur is pale whitish grey,

with a few obscure dark markings on the chest and the upper portion of the limbs, and some narrow and widely separated bars of the same hue across the loins; the rings on the tail being black. A white streak between two lines of black extends obliquely forwards and downwards from behind the eye, and there is a black patch on the back of each ear.

THE EGYPTIAN CAT

(*Felis libyca*)

This cat is noticed in the *Great and Small Game of Africa*, where it is regarded as inseparable from the Kaffir cat. According to Mr. de Winton, it should be known by the name given above, although it may perhaps be better regarded as a local race than a species. It is recorded by Mr. O. Thomas,[1] under the name of *Felis maniculata*, from Arabia, while Dr. von Lorenz-Liburnau[2] vouches for its occurrence in the south of Europe.

FONTANIER'S CAT

(*Felis tristis*)

This imperfectly known species is characterised by its comparatively large size, whitish grey ground-colour, and rather short tail. It is described as having soft and long fur, of a whitish grey ground-colour, marked with large dark brown solid spots upon the upper-parts and limbs, and with three or four blackish brown lines running from the back of the head down the whole length of the spine. There are also two

[1] *Proc. Zool. Soc. London*, 1900, p. 100.

[2] *Verh. Ges. Wien*, vol. xlviii. p. 341 (1897).

rufous brown bars across the chest. The bushy tail is rather less than half the length of the head and body ; it is rufous brown above and yellowish brown beneath, with a series of obscure dark bars on the upper surface. The length of the head and body is about 33 inches, and that of the tail 16 inches. This cat was described on the evidence of a skin purchased at Pekin ; it probably inhabits Northern China.

THE FUCHOW CAT

(*Felis dominacorum*)

(Plate V. Fig. 8)

Another and very handsome Chinese cat has recently been named by Mr. Sclater,[1] on the evidence of a skin brought by Mr. J. La Touche from Fuchow. The last-named gentleman describes it as follows :—

"It would appear to resemble *Felis temmincki* of India, but differs in some ways so far as I can see. . . . In size it would seem to be about 3 feet from head to root of tail.[2] The tail is long and of uniform width, perhaps it may measure 20 inches. The height at the shoulders is quite 18 inches. The marks on the face answer to those given in the description of *F. temmincki;* the chin is white, head dirty white without well-marked stripes ; ears black outside with paler centres. The general colour is a reddish brown ; the hair would appear to be grey at the base, brown in the centre, and tipped with grey or whitish, which gives the beast a greyish brown appearance. The tail is, I believe, darker at tip and buff underneath. The nose is dull red, and the iris a brownish yellow, pupil round or nearly so."

[1] *Proc. Zool. Soc. London*, 1898, p. 2.

[2] The description was taken from the living animal.

Other specimens of this cat are much needed, and observations in relation to its geographical distribution would be of considerable interest.

THE JUNGLE-CAT

(*Felis chaus*)

The typical jungle-cat was first described from the shores of the Caspian Sea, but is also found in the Caucasus, Persia, and Turkestan. It differs from the Indian race of the species (*Great and Small Game of India, etc.*, p. 318) by its rather shorter tail, duller colour, and heavier build.

In the Northern Caucasus, according to Dr. Satunin, this cat is to be met with on the shores of the Caspian, and it has been found in the reed-beds near Kisljar. It is very common throughout the plains of Transcaucasia, and sometimes occurs in the valley of the Kur. In the high mountains it is, however, unknown. Dr. Radde states that it occasionally occurs in the Talish district.

THE SYRIAN JUNGLE-CAT

(*Felis chaus furax*)

This race of the species closely resembles the Egyptian jungle-cat in form and proportions, but, if it is safe to judge by a single skull (brought from Syria by Canon Tristram), differs by the great relative size of the teeth, which are nearly as large as those of a female leopard, and are thus larger in proportion to the skull than in any other member of the feline tribe. This race, which was named by Mr. de Winton in 1898, is probably spread over the whole of Syria and Palestine in suitable localities, where,

according to Canon Tristram, it appears to be the most common kind of wild cat.

THE YARKAND DESERT CAT

(*Felis ornata shawiana*)

The *Felis shawiana* of Mr. Blanford seems to be nothing more than a local race of the desert cat, of which a description is given in *Great and Small Game of India, etc.* The present race probably ranges over most of Kashgaria.

THE CARACAL

(*Felis caracal*)

A full description of this lynx having been given in the work just cited, it will suffice to say that within the area treated of in the present volume it occurs in Palestine, Arabia, Syria, Taurus, Mesopotamia, Persia, and the Transcaspian countries.

The late Mr. W. Dodson, as quoted by Mr. Thomas,[1] trapped a specimen when travelling in Arabia, and wrote the following note regarding the occurrence of the animal in that country :—

" I think the beast is not uncommon, for I saw spoor on many occasions near villages, and twice I was sent for to come and shoot an animal that was doing great damage among the sheep—always tearing the throat out. Now a wolf almost invariably attacks the flank and kills that way, so it was no wolf, and the only other animal I could put it down to was this cat. Native information is more unreliable in Arabia than anywhere I have been ; the natives know nothing of the habits of animals, nor do they know tracks of different beasts when they see them."

[1] *Proc. Zool. Soc. London*, 1900, p. 100.

THE MEDITERRANEAN LYNX

(Felis [Lynx] pardina)

(Plate V. Fig. 9)

This well-marked species is a member of the fauna of the Mediterranean tract, and probably bears much the same relationship to the true lynx of the more northern parts of the Old World as is presented by the red lynx of lower North America to the Canadian form of the common lynx.

It is a smaller and shorter-coated animal than the common lynx, and, judging from the series of skins in the collection of the British Museum, appears to be distinctly spotted at all seasons and at all ages. The ground-colour of the fur is of a rich rufous yellow, quite different from either the grey or the rufous phase of the common lynx. The spots are black, very small in size, irregular in shape, and numerous, and are thus very different from the few large and widely separated spots often seen in the dark-spotted phase of the common lynx. The contrast in this respect between the two species is very clearly shown by two mounted specimens now exhibited in the British Museum, the one being an ordinary example of the present species, and the other a dark-spotted common lynx from Norway. As in the common lynx, the tail is tipped with black. The white on the throat forms only a small triangular patch. When viewed in profile the skull differs from that of the common lynx by the elevation and convexity of the region between the sockets of the eyes ; and the nasal bones also extend further up on the forehead. The arrangement of the bones of the post-palatal region of the skull is, however, very similar to that of the common species, and thus different from the condition obtaining in the American red lynx, as described under the heading of that species.

This lynx has a wide range in Southern and South-Eastern Europe, being found in Spain, Portugal, Sicily, Sardinia, Greece, and Turkey.

THE STRIPED HYÆNA

(*Hyæna striata*)

Within the area coming under the purview of the present volume, the striped hyæna (see *Great and Small Game of India, etc.* p. 335) is found in Persia, Syria, Palestine, Arabia, and the adjacent districts of South-Eastern Asia, as well as in the Caucasus. In Arabia the late Mr. W. Dodson [1] wrote of these animals as follows :—

"They keep to the hills and only come into the desert at night, although, if a meal is to be found, they often lie up in the nearest *wadi* [valley] that offers shelter for several nights, or till the feast is finished. . . . Putting down poisoned meat was a failure (except so far as pariah dogs were concerned, and I got a good bag of them), no hyæna ever coming near my baits."

In the Caucasus, according to Dr. Satunin, hyænas are nowadays seldom seen either in the Talish mountains or in those of the Araxes range. In some of the Armenian villages on the banks of the Araxes scarcely a year passes without one of these animals being seen. Twenty years ago hyænas still made their appearance in the vicinity of Tiflis, and the skin of a specimen killed in that neighbourhood is preserved.

[1] See Thomas, *Proc. Zool. Soc. London*, 1900, p. 100.

THE INDIAN WOLF

(*Canis pallipes*)

The wolf of Southern Arabia, according to Mr. O. Thomas, is identical with the Indian *C. pallipes*, of which a sufficient notice will be found in the *Great and Small Game of India, etc.* It is not uncommon in the hills, where it attacks sheep, goats, and even donkeys. The whelps of this wolf have been described as a distinct species, under the name of *Canis hadramauticus*, by Professor Noack. The nearest African ally of this wolf appears to be *Canis lupaster*.

THE SIBERIAN WILD DOG

(*Canis* [*Cyon*] *alpinus*)

(Plate V. Fig. 10)

The wild dog of the Altai and other districts in Central and Northern Asia is best distinguished from its Oriental cousins by the relative shortness of the upper carnassial, or flesh-tooth, as compared with the united length of the two teeth behind it. Like the latter animals, the present species is subject to great variations in colour, according to locality, season, and perhaps sex. In the winter coat of Siberian specimens, for instance, the fur is very long and woolly, and either nearly white or whitish tinged with yellow. The summer dress is described, however, as being of a foxy red tint, becoming darker on the back, with the tips of the hairs white or whitish, as are also the under-parts and the inner sides of the limbs. On the dark areas the individual hairs are white, red, and black in different parts of their length.

The range of this wild dog extends from Eastern Siberia and Amurland to Turkestan and the Altai. According to Dr. Radde, it is somewhat locally distributed, and generally associates in packs, numbering from about ten to fifteen individuals ; each pack being led by an old dog. Occasionally, however, solitary individuals may be met with. It is but seldom seen on the open steppes, preferring the dense mountain forests. It is fully as fierce and cunning as its southern cousins, preying chiefly upon deer, which it sometimes drives completely away from their ordinary haunts.

THE JAPANESE BLACK BEAR

(*Ursus japonicus*)

The black bear of Japan was distinguished from the Himalayan *Ursus torquatus* by its describer Schlegel on account of its not possessing the long fringe of hair on the throat distinctive of the latter, and likewise by the white gorget so conspicuous in that species being either totally absent or present only in the young condition. Apparently the Japanese bear is also a smaller animal than its Himalayan cousin. Whether the differences between the two are not rather those of race than of species may, for the present at all events, be left an open question.

Recently Dr. Matschie [1] has described a black bear from Japan living at Berlin as a new species, under the name of *Ursus rexi*, on the ground of its preserving the white gorget of the typical *U. torquatus*, and likewise a white patch on the chin. And he suggests that each of the islands of the Japan group may be inhabited by a particular kind of black bear. In place of indicating a distinct species (or race), the specimen described by Dr. Matschie is rather suggestive of a closer relationship between the black bears of the Himalaya and Japan than has previously been considered the case.

[1] *S.B. Ges. naturfor. Berlin*, 1897, p. 72.

Fig. 66.—Head of Rocky Mountain Wapiti. Shot by Mr. W. Moncreiffe.

SECTION III

AMERICAN TYPES

THE AMERICAN BISON

(*Bos* [*Bison*] *bison*)

(Plate VII. Fig. 1)

Although belonging to the same group of the ox tribe, the American bison is such a totally different animal from its European cousin that it is rightly regarded as a distinct species, and is consequently placed in the present section of this work instead of (together with the European species) in the first section. In one sense, indeed, the two species of bison constitute a circumpolar "type," but not in the sense in which that term is used on the present occasion, where it is restricted to forms so closely related to one another that they may well be regarded as specifically identical.

The present species, of which two races are recognised by American writers, has been so fully described in *Wild Oxen, Sheep, and Goats of All Lands*, that it will be unnecessary to say much on that point in this place. Among other features, it is specially distinguished from the European bison by its weak hind-quarters, the relatively taller withers, the great mass of blackish brown or brown hair clothing the head, neck, and fore part of the

body, and the shape of the horns and skull. Were the hind-quarters at all equal in development to the withers, the American bison, with its magnificent head and robe of long hair, would undoubtedly be a far finer and handsomer animal than its relative of the Caucasus and Lithuania; as it is, it must yield the palm to the latter. The two reproductions from photographs illustrating this account are taken from a magnificent pair of

Fig. 67.—Bull American Bison at Woburn Abbey. From a photograph by the Duchess of Bedford.

these animals now living in the Duke of Bedford's park at Woburn Abbey, and may be compared with those of the European bison on pp. 117 and 119.

The American bison, or "buffaloe," as it is almost universally called in its native country, is now well-nigh extinct in the wild condition, although a few of the typical race survive in the Yellowstone National Park, and others are reported to occur in the Pan Handle of Texas, while more of the woodland race still remain in the neighbourhood of the Great Slave Lake.

As regards the numbers of this animal now surviving, an excellent

account has recently been published by Mr. Mark Sullivan in the *Boston Evening Transcript* of 10th October 1900, from which the following summary is taken :—

The bison now surviving are reckoned up under thirty distinct headings ; the total number being estimated at 1024. In the majority of cases the numbers are accurate, but this is not so with regard to those running wild near the Great Slave Lake, in the far North-West. The estimate of these is given at 200, and this has been arrived at by a process of

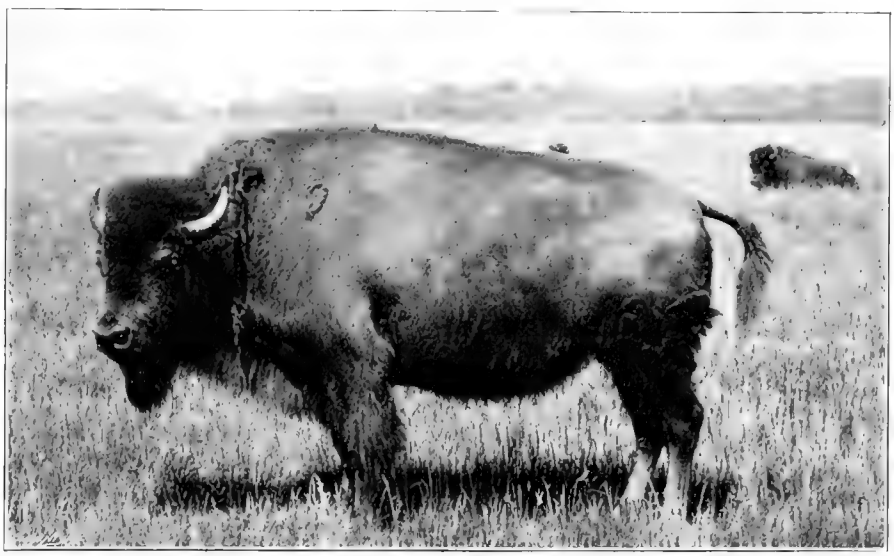


Fig. 68.—Cow American Bison at Woburn Abbey. From a photograph by the Duchess of Bedford.

averaging. But it is only fair to add that by some authorities the number of these wood-bison is put at not more than 100 or even less ; and as they are hotly persecuted by Indians, their numbers appear to be steadily diminishing. Apart from these and certain bison reported to survive in Colorado, twenty different herds are known to exist in America, the largest of which is the Allard herd, at Hathead Lake, Montana, which numbers 259. Next to this comes the herd of Mr. J. Goodnight, in Armstrong county, Texas, which includes 110 head. Under the head of "scattering" fifty are entered, which includes odd specimens here and there.

Of American bison in England the London "Zoo" possesses a single example, the Duke of Bedford has 12 at Woburn Abbey, and there are altogether 13 others in different parts of the country. France, Belgium, and Holland collectively possess 14, Germany has 46, Russia 2, and Australia 12. For the numbers of the herds in foreign countries, which are put down at 23, Mr. Carl Hagenbeck is responsible; but the author of the article expresses some degree of doubt as to whether all these are full-blooded animals.

Some considerable degree of doubt exists as to whether the reputed wild bison in Colorado really exist, or, if they do, whether they are truly wild. On this subject Mr. Sullivan writes as follows:—

"Like the so-called 'park' of Colorado, the sections of Yellowstone Park where the buffaloes range are so wild and inaccessible that for a year at a time no buffalo is seen. For this reason old buffalo-hunters shake their heads when it is claimed that a forlorn remnant of the great plains' herd has for all these years found refuge from poacher, Indian wolf, and coyote in the mountains of Colorado. They hope it is true, but they doubt it. Even if it is true, these animals can hardly survive long."

Later on he adds that "it may be timely to utter a warning against the belief that there are any buffaloes running wild other than those here mentioned. Such reports appear periodically. They are fiction pure and simple."

In 1887, when Mr. Hornaday took his census, the number of bison was estimated at 1091, of which 256 were in captivity, and 835 running wild. Of the 1024 alive in 1900, no less than 684 were captive, and only 340 wild or semi-wild. Manifestly, therefore, it is to the semi-domesticated herds that we are to look for the perpetuation of the species, if this indeed be a practical possibility. Against the bison in captivity there are three adverse influences. Firstly, the mere fact of restraint and a more or less confined area, together with unsuitable climatic conditions. Secondly,

in-and-in breeding. And thirdly, the circumstance that when animals are living under unsuitable conditions, the preponderance of male over female offspring becomes so marked as to lead eventually to extermination. In the herd at Bronx Park, New York, nearly all the calves have been males; and at one time this was the case with those at Woburn Abbey, although subsequently this has been reversed.

The ill effects of in-and-in breeding may, the author thinks, be counteracted by exchanges between the numerous herds now kept in captivity. But in regard to the prospect presented by the abnormally large percentage of bull calves he is very desponding; and to this cause he considers the ultimate extinction of the species will be due.

Recently a Bill was brought before Congress proposing that 20,000 acres in New Mexico should be devoted to forming a bison reserve, and stocked with at least a hundred head of these animals, but it failed to pass. And, although the project is likely to be again brought up for consideration, it is improbable that it will ever become law.

For the former range of the American bison the reader may be referred to *Wild Oxen, Sheep, and Goats*.

In the typical prairie bison of Texas and other districts in the United States the head, neck, chest, and shoulders are blackish brown, or in some instances almost pure black; the rest of the coat being paler and passing into cinnamon on the rump. The muzzle, horns, and hoofs are black. A bull from Kansas in the Field Columbian Museum at Chicago measured 2949 millimetres in total length, 1742 in height at the withers, and 3050 in girth at the shoulders; these dimensions being taken in the flesh.

THE WOODLAND BISON

(*Bos bison athabascæ*)

The type specimen of this race of the American bison was obtained from a spot fifty miles to the south-west of Fort Resolution, Great Slave Lake, and is now preserved in the Museum at Ottawa. The animal is an inhabitant of the wooded uplands of the North-West Territories, and in former days its distributional area appears to have extended from the eastern slope of the Rocky Mountains to the 95th meridian, and from latitude 63° N. to latitude 55°, and probably southwards along the line of the Rocky Mountains into the United States.

It is described by American naturalists as a larger and generally darker animal than the typical race, with the horns longer, more slender, and more incurved. The general colour is light brown shading into dark brown, and becoming nearly black on the head, limbs, and under-parts; the ears and tail-tip being wholly black.

In spite of the statement as to its larger size, the measurements of a bull of this race given by Dr. D. G. Elliot in his *Synopsis of the Mammals of North America* are smaller than those of the typical form.

The writer must confess that (perhaps from not having seen a sufficient number of specimens) he has hitherto been unable to distinguish between this and the typical race. In this connection it may be of interest to quote from some observations on the woodland bison published by Dr. J. A. Allen in the *Bulletin of the American Museum of Natural History* for 1900[1]; the basis of the notice being a head obtained from the neighbourhood of the Great Slave Lake. Referring to this specimen, Dr. Allen writes as follows:—

"Compared with specimens of the plains bison of corresponding age,

[1] Vol. xiii. p. 62.

it is rather above the average size of the latter, with the base of the horn-cores relatively thicker. The head-skin has the whole pelage darker, softer, and more silky than the bison of the plains. . . . The present specimen confirms, as far as it goes, the characters recently assigned to the wood-bison by Mr. S. N. Rhoads, and quite warrants its recognition under the name of *Bison bison athabascæ*. . . . Formerly it doubtless completely intergraded with the southern form. Now that it is on the point of extinction, the following summary of its recent decadence may not be without interest :—

"As is well known, the American bison formerly ranged continuously from the northern boundary of the United States northward over the Saskatchewan plains to the region about Great Slave Lake, in latitude 60° N., and even, according to Richardson, to the vicinity of Great Marten Lake, in latitude 63° or 64°. Their range in the north, as well as in the south, gradually became more and more restricted, the last remnants consisting of only a few widely separated bands.

"There is abundant evidence to show that the wood-bison formerly ranged from the Liard River, in latitude 60°, eastward to the eastern end of the Great Slave Lake, and from the district just north-west of Great Slave Lake southward, including the half open-country on both sides of Great Slave River, to the western end of Lake Athabasca, and westward to the east base of the Rocky Mountains."

The author then makes the following among other extracts from a letter written to him by Mr. Frank Russell, who hunted them in 1894 :—

"The herd at present consists of a few hundred only. They are so wary that but one effective shot can be fired, when they betake themselves to instant flight, and, as with the moose, pursuit is altogether futile. They cannot be hunted in summer, as the country which they inhabit is an impenetrable, mosquito-infested, wooded swamp at that season. They

can only be killed by stalking in mid-winter, when their pelage is at its best.

"The Indians along the Peace and Slave Rivers make occasional trips into the buffalo-country with dog teams to establish lines of marten traps. When they discover a band of buffaloes they, of course, kill as many as they can, but they have not made systematic efforts to hunt them for their robes, as they have the musk-ox. . . . During the winter of 1892-93 forty buffaloes were killed; the largest number that had been secured for several years. I saw most of these robes, which were very dark, the hair thick and curled, making a robe superior to that of either musk-ox or plains buffalo; they were so large that the Indians had cut many of them in halves for convenience in hauling on the sleds."

The price of these robes ranges between £2 and £10 apiece.

Additional observations on the woodland bison, by Mr. A. J. Stone, will be found on page 41 of the volume cited above.

THE CANADIAN MUSK-OX

(*Ovibos moschatus*)

(Plate VII. Fig. 2)

Some persons are unfortunate in their names, and the same is the case with certain animals. The ruminant popularly known as the musk-ox and scientifically as *Ovibos moschatus* is an instance of this, for although no objection can be taken to the prefix "musk," and its Latin equivalent *moschatus*, yet the English title "ox" is in the highest degree misleading, while the technical *Ovibos*, which suggests characters intermediate between the oxen and the sheep, is equally unsatisfactory. To say that the creature is an animal *sui generis* would be a truism, seeing that it is the

sole existing representative of the genus *Ovibos;* and yet this expression perhaps best conveys the real state of the case, namely, that it is a more or less isolated member of the ruminant group, coming under the designation neither of an ox nor a sheep, nor yet being a connecting link between the two. Under these circumstances it would be much better if the name "musk-ox" could be dropped altogether, and (unless it be altogether unpronounceable) its native Greenland equivalent adopted instead. Unfortunately, however, the writer has hitherto been unable to ascertain by what name the creature is known to the Greenlanders.

Although now restricted to Greenland and Arctic America eastward of the Mackenzie River, the musk-ox was formerly a circumpolar animal, its remains being occasionally met with in the interior of Alaska, more commonly in the frozen cliffs of Eschscholtz Bay, and also in the ice-bound soil of the Lena and the Yenisei valleys. The musk-ox is unknown in Franz Josef Land and Spitzbergen, but extends polewards through Parry Island and Grinnell Land into North Greenland, where its northward range is probably only limited by the limits of vegetation. South Greenland at the present day is, however, too hot for such a cold-loving beast, and Melville Bay now forms the southernmost point to which it wanders on the west coast. Consequently it would seem probable that the musk-oxen on the west coast are isolated from those on the eastern seaboard; the central mountain range of the interior of Greenland being apparently impassable even by such hardy animals, while a transit *via* Cape Farewell is, as we have seen, barred by climatic conditions of an opposite nature.

In America, however, the musk-ox still ranges considerably farther south, its limits in this direction being approximately formed by the 60th parallel of north latitude; but it is stated that year by year its southern range is slowly contracting—possibly owing to pursuit by man. When the musk-ox ceased to be an inhabitant of the Siberian tundra, or why it should

ever have disappeared from regions apparently so well suited to its habits as are Northern Asia and Alaska, there are no means of ascertaining. But the date of its disappearance was probably by no means remote, comparatively speaking, and it is even possible that man himself may have taken a share in its extermination. However this may be, it is beyond doubt that the musk-ox was an inhabitant of the south of England, as well as of parts of France and Germany, during, or about the time of, the glacial epoch ; its remains occurring not uncommonly in the gravels of the English river-valleys, such as those of the Thames and Severn, as well as in the brick-earths of Kent. It is also probable that they occur in the "forest-bed" of the Norfolk coast, which somewhat antedates the great glaciation of Britain.

This being so, it is evident that the musk-ox was a living British animal within the period during which our islands have been inhabited by man, for in many of the deposits in which its remains occur flint-implements and other evidences of human presence are likewise found. Probably, indeed, the early human inhabitants of Britain not unfrequently made a meal of musk-ox beef; but the disappearance of the animal from the British fauna may apparently be attributed rather to a change in climatic conditions than to pursuit by man.[1]

As regards the general characteristics of the musk-ox, a very few lines will suffice, as the reader who requires a more detailed description may refer to *Wild Oxen, Sheep, and Goats of All Lands*. In size the animal may be compared to a rather small and heavily-built Kerry cow. The neck is short, the muzzle, with the exception of a naked triangular space between the nostrils, is clothed with hair, and there are small glands on the face below the eyes. The rudimentary tail is completely concealed among the long hair of the hind-quarters. On each foot the two broad main hoofs are

[1] The foregoing paragraphs formed the commencement of an article published in *Knowledge* for June 1900.

unsymmetrical to one another, and the lateral pair of hoofs are relatively large ; hair covers the lower surface of the feet. Both sexes carry horns, but those of the bulls are much larger than those of the cows, and nearly meet in the middle line of the forehead along their greatly expanded and much flattened bases, where they are also grooved. In adult bulls the horns commence near the occiput and spread nearly to the eyes, curving at first outwards and downwards, and then upwards at the tips. The coat is extremely long and shaggy, and for the most part of a uniformly dark brown colour, although there is always a light saddle-shaped patch on the back, and there may be much white on the lower parts of the legs.

At the time when *Wild Oxen, Sheep, and Goats* was written only a single living form of musk-ox was recognised, for which the name Greenland musk-ox was adopted. The selection of this title was somewhat unfortunate as the typical representative of the species was collected somewhere in the neighbourhood of Hudson Bay. And since the musk-ox of Greenland now turns out to be distinguishable from the one inhabiting the American mainland, it has been found advisable to restrict the name of Greenland musk-ox to the former and to call the latter the Canadian musk-ox.

The Canadian animal is specially characterised by the great length of the expanded border of the base of the horns of the old bulls and the absence of any white on the face ; the general colour being dark brown, approaching to black on the head, neck, and sides of the body in old bulls, with a large yellowish white saddle-shaped patch on the middle of the back. The legs are lighter coloured than the back, but exhibit little white. With regard to the present condition of musk-oxen in America, Mr. A. J. Stone [1] writes as follows :—

"Their range is becoming more and more contracted all the time, as roving bands of Indians from the Hudson Bay posts, on Great Slave Lake

[1] *Bull. Amer. Mus.* vol. xiii. p. 42 (1900).

and near Great Bear Lake, make occasional raids upon them, and almost always destroy the entire herd attacked."

From time to time reports are current as to the occurrence of musk-oxen in Alaska. And in regard to these the following passage may be quoted from a paper written by Dr. J. A. Allen,[1] who corresponded on the subject with Mr. Stone :—

"In Mr. Stone's notes on the musk-ox he stated that his inquiries among the Indians and Eskimo west of the Mackenzie River had led him to believe that this animal 'has not inhabited that region for a very long period.' Since the preceding part of this paper was put in type I have had opportunity again to discuss with him the question of the existence of musk-oxen in Alaska, and as a result he has kindly acceded to my request to put in writing a more detailed statement of his reasons for this belief. This statement . . . seems to show that there is very little if any probability that the musk-ox still exists in any part of Arctic America west of the Anderson River. While Mr. Stone does not question that the supposed Alaska musk-ox skins mentioned above were shipped to San Francisco from Camden Bay, he claims, apparently with good reason, that they must have been taken far to the eastward of this point and brought to Camden Bay by whalers."

THE GREENLAND MUSK-OX

(*Ovibos moschatus wardi*)

(Plate VI.)

The first idea that the musk-ox of Greenland might prove distinct from the American animal was suggested to the present writer by the sight

[1] *Bull. Amer. Mus.* vol. xiv. p. 83 (1901).

PLATE VI

Greenland Musk-Ox.

EAST GREENLAND BULL MUSK-OX

Published by Rowland Ward Ltd

of two yearling calves received by the Duke of Bedford in 1899. These animals, both males, were captured on 16th August of that year on Clavering Island, situated off the coast of East Greenland, in about latitude 74° 5′; and they appear to have been the first living examples of their kind ever brought to England, and probably to Europe. One survived its arrival at Woburn Abbey only a short period, but its companion fared better, and is now (May 1901) in splendid condition.

Fig. 69.—Bull Calf of Greenland Musk-Ox, from Clavering Island, at Woburn Abbey in the autumn of 1899. Photographed by the Duchess of Bedford.

These Clavering Island calves were at once seen to differ from the adult specimens exhibited in the British Museum, as well as from the descriptions usually given of the species. The difference consists in the presence of a large patch of white hair on the forehead, as well as an ill-defined white streak down each side of the face, and some scattered white hairs in the middle line between the muzzle and the eyes.

In noticing the survivor of the two calves, in an article published in *Knowledge* for June 1900, the present writer stated that when this difference was first observed it was thought that the East Greenland musk-ox might

prove to be a race distinct from the West Greenland and American form, in which the face is uniformly dark brown. Certain small-sized photogravures of East Greenland musk-oxen, which came under the writer's notice about this time, seemed, however, to indicate that the presence of white on the face was not a constant feature of the East Greenland musk-ox, and the idea of its distinctness was consequently for the time abandoned.

But towards the end of 1900 the skulls and skins of an adult male and female musk-ox from East Greenland were received at the establishment of Mr. Rowland Ward in Piccadilly ; and these when mounted showed a considerable amount of white on the face. A brief note was communicated to *Nature*[1] by the present writer, making these two specimens the types of a new race, under the name of *Ovibos moschatus wardi ;* Mr. Ward having in the meantime generously presented the female specimen to the British Museum.

On 4th December 1900 the present writer exhibited the female specimen before the Zoological Society, remarking that both specimens differed from the musk-ox of Arctic America (and probably West Greenland) by the presence of a large patch of long whitish hair in the middle line of the face between the horns and the muzzle, and also by the hair on the rest of the front of the face being grizzled, instead of uniformly dark brown. In the female the hair between the bases of the horns was also white, and a little white hair was observable between the closely approximated horns of the bull.

It was then mentioned that the author had previously been struck with the presence of the white on the face of the young East Greenland musk-oxen at Woburn Abbey, but had not been satisfied that the feature might not be due to immaturity alone. Now, however, it was demonstrated to occur in the adult of the East Greenland race, which it was proposed to name

[1] Vol. lxiii. p. 157 (13th Dec. 1900).

Ovibos moschatus wardi. The race would be sufficiently characterised by the presence of the light grey tuft in the middle of the face of both sexes of the adult. But not improbably the still larger amount of greyish white, or white, on the face of the calves was also a distinction; for the author had been informed that in young American musk-oxen the face was uniformly brown.

It was also suggested that in future the fossil Asiatic and European

Fig. 70.—Young Greenland Musk-Ox at Woburn Abbey in April 1901. Photographed by the Duchess of Bedford.

musk-ox, which was doubtless subspecifically distinct from both the living American races, might be designated *Ovibos moschatus pallantis* (De Kay), the name *maximus* being available for the fossil American form if considered desirable.

About the time that these preliminary notices were written in England, Dr. J. A. Allen was investigating the Greenland musk-ox in America, and in March 1901 he issued, in vol. xiv. of the *Bulletin of the American Museum of Natural History*, a memoir entitled the "Musk-Oxen of Arctic America and Greenland." His new material consisted of specimens

brought from Ellesmere Land and Grinnell Land by Lieut. Peary, U.S.N. Dr. Allen adopted the name *wardi* for the musk-ox not only of East Greenland but of Greenland generally, and provisionally included under the same title the Grinnell Land and Ellesmere Land animal. Since, however, the two latter territories are separated by sea (Smith Sound, Kane Basin, and Kennedy Channel) from Greenland, it is quite probable that the musk-ox found there may be distinct from the Greenland form, in which event it was suggested that it should be called after the celebrated American explorer. It should be added that Dr. Allen regards the Greenland musk-ox as a species rather than a local race ; his comparisons showing that it differs from the American form in respect to the shape of the horns of the bull and also of the front hoofs. His description accords well with the two type specimens, of which the male is shown in Plate VI. of this volume.

In general coloration, inclusive of the horns, the Greenland musk-ox is lighter than the American animal, having a large white or whitish patch on the face, and the ears and the whole of the front of the head more or less grey. In the bull the basal expansion of the horns is much shorter (from above downwards), and its shape somewhat different. The front hoofs are also narrower and less curved outwardly, so that the space enclosed between each pair is slit-like instead of being balloon-shaped.

Dr. Allen's description is as follows :—

"Above with a 'saddle-mark' of light brown or whitish brown on the middle of the back, varying somewhat in degree of lightness, size, and shape in different individuals ; rest of the body dark brown, lighter and more rufous brown on the shoulders, a white area on the front of the head, forming a broad face-spot ; ears, and a rather broad, not well-defined patch below the ears, spreading forward on the sides of the head, grey ; the rest of the head, where not white, whitish, or greyish white, is more or less

grizzled through the admixture of white hairs; whole nose white or whitish, the white of the nose separated from the white of the forehead by a darker band half-way between forehead and nose; feet white or whitish from the hoofs upward to or a little beyond the carpal and tarsal joints [knees and hocks], including nearly all of the portion of the limbs not concealed by the long shaggy coat of the body, becoming darker proximally [*i.e.* superiorly], so that the white of the feet rather gradually merges into the darker colour of the upper segments of the limbs. The white on the head in old males often forms a band behind the horns; in others it is partly in front of them and partly behind them, or entirely in front of them.

"The females and young males are similar as regards the white markings. The white on the head is somewhat variable in respect to purity and extent in different individuals; it is never wanting, and averages about as above described.

"A young female calf, probably not more than six weeks old, killed at Fort Conger, 18th May 1899, is nearly black throughout, except for the greyish ears, whitish nose, dingy brown feet, and a lighter, brownish, incipient saddle-mark on the back, being much darker than the adult and half-grown specimens, and with only a trace of the white face-spot of the adults."

Much attention has been bestowed on the external and internal features of the Greenland musk-ox by Dr. E. Lönnberg, of Upsala, who contributed two important papers on this subject to the *Proceedings of the Zoological Society of London* for 1900. On 17th January this gentleman wrote to the author as follows:—

"I have just seen in *Nature* that you have proposed a new name for the musk-ox from East Greenland. The large white or whitish patch on the face is developed in all the skins I have seen from East Greenland—in the highest degree in the calf—and may thus be a constant characteristic."

On 5th February Dr. Lönnberg wrote again, in the following words :—

"I have looked over a good many skins of different sexes and ages of *Ovibos* from East Greenland. In most cases the animals have a whitish patch on the forehead, but sometimes there is only the tuft between the horns white. The hairs forming the mane are often more or less distinctly light-tipped. Especially is this the case on the sides, so that a more or less conspicuous whitish or yellowish band is formed on each side of the neck running from the ear to the withers."

This streak is very conspicuous in the type female figured in Plate VI.

The following particulars regarding the largest skull obtained during the Swedish expedition to East Greenland in 1900 was likewise furnished by the same gentleman, the dimensions being in millimetres :—

"Basal length of skull	460
Greatest width across orbits	280
Greatest occipital width	187
Length of the bosses of each horn in the median plane	205

"Is not this last dimension less than in the Canadian musk-ox ?

"The horns were much worn, length of each along the upper border being only 545 mm., and the distance from tip to tip 640 mm. In other respects the dimensions of this skull are not remarkably larger than those of other specimens from the same locality, but the horns are exceedingly thick, the diameter of each below the orbits measured in the antero-posterior direction being 75 mm., and in the transverse direction 60 mm., which is a good deal more than in any other specimens that have come under my notice. The animal was very old, as is evident from the greatly worn condition of its horns and teeth, the latter being, in fact, so ground down as to be almost useless."

One of the most noticeable features about the two calves at Woburn was their movements, which recalled those of a polar bear rather than

of an ox or a sheep, the hocks being turned outwards in an altogether peculiar and distinctive manner. If this strange gait be also characteristic of the adult, it is probably adapted for progression on glacier and other ice-coated surfaces; firmness of foothold being secured by the hair which grows on the under surface of the foot.

Some degree of confusion has arisen with regard to the age of the calves at Woburn Abbey, which, as already said, were captured on Clavering Island on 16th August 1899. From the fact that a very young calf captured at Port Conger on 18th May of the same year has a black face, Dr. Allen[1] has stated that the musk-oxen at Woburn Abbey when figured in 1899 (Fig. 69, p. 315) must have been yearlings, "and hence not in the first pelage, in which there is no indication of the future white face-spot."

But a photograph of the Woburn specimens taken when on board ship shows that they were then evidently very young animals, although with white foreheads. And when they reached Woburn Abbey they had all the manners and appearance of very young animals, while they were but little superior in size to a large retriever. Hence it seems clear that they were calves of that year (1899), having been born the previous April or May. It would accordingly appear, if the newly-born calves always have black faces, that the Clavering Island specimens had already changed their coats when they were shipped. And, in view of the early date at which many ruminants assume their winter dress, there is nothing intrinsically unlikely in such a change having taken place.

When the photograph of the survivor of the pair given on page 317 was taken, the horns had only just begun to bud; and the skull of the one that died (which was presented, together with the skin, by the Duke of Bedford to the British Museum) shows that the budding horn-cores project directly

[1] *Op. cit.* p. 79, note.

outwards as two regular cones in a manner quite different from the condition presented by the same appendages in either oxen or sheep.

The photograph on page 317 was taken in April 1901, when the survivor of the pair, according to the above reckoning, must have been about two years of age. The horns, although strongly curved, are still entirely confined to the sides of the head, and show no indications of that great basal flattening and expansion on the forehead which affords one of the most striking and characteristic features of the adult bull. This indicates that the feature in question is not acquired till comparatively late in life.

In describing the growth of the horns of the Canadian race Sir John Richardson wrote as follows :—

"The horn-cores have a purely lateral origin, and do not rise at all above the facial line, but, springing from an almost cylindrical root immediately behind the orbits, stand out laterally with a moderate inclination basilad and antiniad, their axis forming with the mesial plane of the cranium an angle of 62°. These cores are moreover, in themselves, concave on their facial or coronal aspect, by which they receive a uniform upward curve in the direction of their length, in addition to their general direction of outwards, basilad, and forwards. The tips of the cores in this yearling extend farther from the sides of the skull laterally than any part of the massy core or its sheath in the four-year-old animal."

In the second of the two papers above referred to Dr. Lönnberg contributes some very interesting observations with regard to the growth of musk-ox horns.

"I think," he writes, "that the horns are chiefly enlarged during that time of the year when the animals are able to procure food in sufficient quantities not only to sustain life, but also to add to their bulk. Theoretically such an assumption does not seem too hazardous considering the circumstances under which these animals live. But the probability of this

is strengthened by the fact that on the longitudinal section of the horn are seen some lines of demarcation which are most easily interpreted as the limits between such parts as have been added during different periods of growth. . . .

"During the second period of growth (third summer) the upper side of the horn is thickened by more rapid growth than that which takes place on the under side. Through this a pressure is effected by the horny sheath on the upper side of the horn-core, and this causes a reabsorption on the upper side of the same. On the lower side, on the contrary, the pressure is diminished, and therefore the horn-core is thickened below by apposition. In such a manner the direction of the main axis of the horn is lowered. At the same time the length of the horny sheath is increased by basal growth, and it is driven out from the head in the direction of the axis of the horn-core on which it grows. In connection with this, new layers of horny substance fill up the end of the inner cavity of the horny sheath.

"Next period (fourth summer) the growth is continued mostly in the same way. The horny sheath is prolonged, and by stronger growth on the upper side the main axis of the horn-core causes reabsorption on its upper and apposition on its lower side.

"In the following period the development continues also in the same direction. The horn is lowered, the horn-core points more downwards. At the same time that these changes are going on in the distal [terminal] and middle portions of the horn, the base of the horn-core is enlarged and expanded over a great part of the frontals and parietals, on which large exostoses are developed. It is possible, although not fully proved, that the prominences which can be seen on the skull of the summer calf a little behind the first rudiments of the horn-cores, on the fronto-parietal suture, have something to do with the formation of these exostoses. . . .

"By-and-by the horny sheath encroaches in a median direction over

these exostoses, and when it has come so far that it laps over them it cannot be driven out any more or be prolonged, because its shape hinders this. . . .

"The horn is, however, not yet fully formed although its length has reached its maximum. The continued growth tends to thicken the horny sheath, especially its upper layers. The bony substance of which the exostoses consist is reabsorbed and replaced by horny layers. It may be said metaphorically that the horny sheath eats down into the bony mass, which thus gets a rugged and pitted surface. The pits and holes are filled up with horny substance."

In regard to the distribution of the present and preceding races of the musk-ox, Dr. Allen has published the following important observations :—

"The geographical relations of the two are not clear, but it seems probable that *O. wardi* is the form inhabiting the numerous islands, more or less joined by ice in winter, situated east and north of Belcher Channel and Jones Sound, while *O. moschatus* is confined mainly to the Barren Grounds, with formerly, probably, continuous distribution westward across Alaska. The eastern limit of *O. moschatus* cannot at present be accurately defined. The Melville Island specimens obtained by Parry on his first voyage in 1820 evidently represent typically the Barren-Ground form, as shown by Parry's and Gray's figures. Whether or not it crosses eastward to the adjoining islands there is apparently no certain evidence, but much of a negative character indicating its absence. It can easily reach Melville Island from Banks Land. It has been found in numbers in the region between Repulse Bay and King William Land, but is absent from Southampton Island, and Fox Channel has apparently proved a barrier to its extension to Cockburn and Baffin Lands. As *O. wardi* has not been traced south of Ellesmere Land, nor west of Ellesmere Land and Grinnell Land, there is apparently a broad interval of insular areas and steuaries where

no form of musk-ox at present exists, leaving the ranges of the two forms well separated. When musk-oxen ranged far to the southward of their present limits, they doubtless had a continuous distribution over a large part of northern North America, and have become differentiated in comparatively recent times through separation in their gradual retreat northward.

"The known range of *O. wardi* extends from the southern border of Ellesmere Land northward through Grinnell Land to the Polar Sea, and on the Greenland coast, either living or recently extinct, from about latitude 78° on the western side northward to and around the northern end of Greenland to about latitude 75° N. on the east coast."

The two calves from Clavering Island purchased in 1899 by the Duke of Bedford were first brought to Tromsoe by a Norwegian vessel. And from about that time there has been a considerable amount of literature published concerning the importation of musk-oxen into Europe, on the possibility of acclimatising them there, and on hunting them in their native country. Dr. A. J. Nathorst, for instance, published in 1899 in a Swedish sporting journal an illustrated account of his own experiences of musk-ox hunting; and Dr. W. Kobelt is responsible for a general history of the animal which appeared in the *Berichte* of the Senckenberg Society for 1900,[1] accompanied by a plate. And in the same year Dr. F. Mewius contributed to the *Zoologische Garten*[2] a paper entitled "Zur Akklimatisation des Moschusochsen."

In regard to two young specimens imported into Sweden Dr. Lönnberg has kindly furnished the following information:—

"The calves are quite tame. The bull is, however, said to butt if anybody runs away from him and appears to be frightened; but this is probably only play. They have splendid fur coats, and the wool of the winter dress, which the animals were beginning to shed in the early

[1] *Ber. Senckenberg Gesellschaft*, 1900, pp. 61-66. [2] Vol. xli. pp. 332-334.

part of April, is remarkably fine; and would certainly be not only interesting but likewise valuable if the species could be acclimatised in the north of Sweden." When these observations were made the two calves were living at Boden, in Northern Sweden.

In November 1900 a letter, under the signature of "Snowfly," appeared in *The Field* newspaper, containing the following statement :—

"Altogether fourteen musk-oxen were brought to Norway this summer, a result which, all things considered, may be regarded as satisfactory; as compared, indeed, with what the Swedish and Danish expeditions succeeded in doing, it may fairly be described as astonishing, for each of these brought away a single calf only. The success of the Norwegians was probably due to their better knowledge of the special localities and conditions, and to their having been earlier in the field. One very good specimen, a yearling male, was sent from Hammerfest to Hamburg, but unfortunately it lost a horn on the journey, and it fetched £65 only in consequence. The Antwerp Zoological Gardens bought five calves immediately on their arrival at Aalesund at £50 each, but, as three of them died before reaching their destination, the survivors cost £125 apiece. With such prices to be obtained it is probable that the musk-ox will be pursued with unabated persistency next summer, and at the hands of the hunters receive the same treatment and share the same fate as the walrus, for in order to capture the calves alive they will shoot down all the old ones they come across. The Danish Scientific Expedition under the command of Lieut. Amdrup returned a few days ago (4th Oct.) from Greenland, and there the members shot many of these creatures; in the district round and to the north of Scoresby Sound they were met with in large numbers, and the meat was found to be excellent. An attempt was made to capture an adult specimen alive, but this was found impossible; and in order to secure a single calf a whole herd of fourteen had to be first shot down. Later on a second calf was obtained by having recourse to the same somewhat

drastic method, but it died. It would be interesting to know how many of these harmless animals were shot down by the Norwegian hunters this summer to enable them to capture fourteen calves."

In another letter by the same writer which appeared in the journal last cited for 23rd February 1901, the following extracts from an account of musk-ox shooting in East Greenland by a member of the Amdrup Danish Scientific Expedition are given :—

"We set out towards evening, it being then cool for travelling, and because we must sleep during the warmest time of the day, more especially as we might encounter severe night cold on the mountains. With the exception of a few hares, we saw no game whatever during the first day's, or rather night's, march, but when going along a river's course we fell in with the fresh spoor of two wolves; the animals themselves we did not see. In the morning we halted, and with much trouble, and with only damp heather for fuel, we cooked some food. About mid-day we started again, and kept on the whole of the following night. Towards morning I observed at a considerable distance a number of black spots. 'Musk-oxen,' I said to my companion, and brought the glasses to bear upon them. There were half a score, and they were some three kilometres from us. These animals are so far from shy that once seen there is little difficulty in killing them, and being very sharp set, we determined on securing a specimen at once. We had hardly covered half the distance that intervened, however, when I observed a bull lying in a hollow; it was only a few hundred yards away, and would have been easy to kill, only I wished to shoot one where there were both heather—that is to say, fuel —and water in the immediate neighbourhood. Shortly I discovered there were three bulls in the hollow; they remained quite quiet while we passed them, but when they got our wind they at once jumped up and made slowly off down the valley. I imagine it was the scent of the dog which annoyed them, for although in stalking Arctic game it is

important to advance up wind, this is not so much the case in regard to musk-oxen.

"When we got within 150 yards of the herd the animals ran together and assumed their usual formation, ranging themselves side by side in a row, with front to the enemy. A couple of bulls which had been in the immediate neighbourhood then came and joined the ranks. We continued to advance, and the oxen remained in position until some 70 yards only separated us; then they turned round and went off at full speed. I knew what to do, and immediately slipped my dog Janette, which had previously assisted me in similar situations, and a few seconds afterwards the herd again came to a stand, still in the same order as before, and snuffing at the dog, whose barking seemed to alarm them much.

"We now went quietly forward towards the animals, which allowed us to come quite near; and at a distance of less than 30 yards we witnessed the curious spectacle of a number of big beasts—which by a sudden attack could have knocked us and the dog over without our being able to do them any mischief—collected together in order of battle to defend themselves against the latter altogether harmless little creature. While we watched the scene with interest an event occurred which ultimately brought about the end. The leading bull generally takes up a position at one of the wings, and appears to crowd the cows together, and such was the case on the present occasion; but, as often happens when there is a dog in front of the herd, he advanced alone to meet the intruder. A fine fellow he looked, as with lowered head, and every now and again tearing up the ground with his horns, he passed up and down in front of his troop a couple of times, made a rush at the dog, and returned to his position at the flank. When the dog saw him thus return, he renewed his barking with fresh energy, and then a second bull rushed and proceeded to act very much as the first had done; but his assumption of leadership the latter would not stand, and he went for his rival with his sharp horns, making

wool and hair fly. Thinking it a favourable opportunity, I gave him a ball from my little 8 mm. rifle just as he was turning away from his beaten opponent, and the herd immediately fled. Their leader kept up with the others for some 20 yards only ; then his hind-quarters seemed to collapse, he rolled over on his side, the short legs were stretched convulsively out a couple of times, and all was over. His companions stopped for an instant when he fell, but immediately resumed their flight, the largest of the remaining bulls covering the retreat. On a rising ground about half a kilometre distant they pulled up to have another look at us, then they disappeared in Indian file behind the ridge."

THE ROCKY MOUNTAIN WHITE GOAT

(*Oreamnus montanus*)

(Plate VII. Fig. 3)

Properly speaking, this very remarkable ruminant is not a goat at all, and if it possesses a euphonious native name it would be advantageous if this were substituted for the title by which it is commonly known. Rather may it be regarded as a Transatlantic representative of the serow of the Himalaya, which has assumed a pure white livery, relieved only by the jet-black horns and hoofs, to harmonise with the prevailing colour of its natural surroundings. Not that it can be regarded as a very intimate ally even of the serows, the setting-on of the horns being somewhat different, the sockets of the eyes much more prominent, and the muzzle of the skull much wider. Moreover, the cannon-bones are remarkably short and wide, and in this respect differ from those of all allied ruminants.

Very generally the white goat is described under the name of

Haploceros, but since that term is antedated ten years by *Oreamnus*, the latter title is coming into use among those who consider that priority should be our chief guide in zoological nomenclature.

In appearance the white goat is a decidedly ungainly animal, chiefly owing to the enormous hump on the withers and neck, which causes the head to be carried very low. In size it may be compared roughly to a rather small individual of the Himalayan tahr, a ram standing just under 3 feet at the withers. Were the cannon-bones of the normal length the animal would somewhat exceed the tahr in height. Its weight is stated to range between 180 and 300 lbs.

With the exception of the Alaskan bighorn, the white goat is the only ruminant which is entirely white at all seasons of the year. It cannot, therefore, be mistaken for any other animal, and its description may consequently be brief. In the winter coat the hair is long and pendant, elongated into a short beard on the sides of the lower jaw behind the chin; and it is also longer than elsewhere on the neck and the chest; at the base of the long hair is a thick growth of short and woolly under-fur. In summer the coat becomes comparatively short. The muzzle is hairy, the ears are of moderate size, and the tail is short, and partially buried among the long hair of the rump. There are no glands on the face. The horns, which are ringed in their basal portion, are comparatively short, and not unlike those of the serows in general characters, being sub-cylindrical, and curving slightly backwards. They taper, however, much more rapidly than those of the serows, and diverge much more widely from the middle line. The lateral hoofs are well developed. Although commonly described as white, the hair has a more or less decided tinge of yellow, which appears to be more marked in the summer than in the winter coat.

The white goat is an inhabitant of the higher zones of the Rocky Mountains and of the higher ranges between them and the Pacific as far

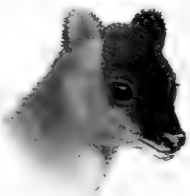
PLATE VII

1. American Bison.
2. Canadian Musk-Ox.
3. White Goat.
4. Pronghorn.
5. White-tailed Deer.
6. Mule-Deer.
7. Marsh-Deer.
8. Pampas-Deer.
9. Chilian Guemal.
10. Central American Brocket.
11. Ecuador Pudu.

8

6

5



11

10

4

1

9

2

3

7

AMERICAN TYPES.

Published by Rowland Ward Ltd

north as Alaska. It is, however, unknown in the Olympic range of mountains.

The two longest pairs of horns of this animal recorded by Mr. Rowland Ward measure, respectively, 11½ and 11 inches in length along the front curve; both are from British Columbia. In a pair of which the length is 10¼ inches, the basal girth is 5¼ inches, and the tip-to-tip interval 5½ inches.

Fig. 71.—Rocky Mountain White Goat.
Shot by Sir E. G. Loder.

Mr. Phillipps-Wolley speaks in disparaging terms of the white goat as an animal of sport, remarking that it can be approached within short range so easily that it is scarcely worth shooting; and adding that in a single day he was able to take half-a-dozen photographs of these animals from living specimens.

Writing of this species in Part 19 of the *North American Fauna*, Mr. W. H. Osgood observes that in the Yukon district "goats occur on the high granite cliffs which enclose the upper part of Lynn Canal; they are

also common on the mountains near White Pass and about the rocky walls of Lake Bennett. I was told that they had been killed recently at the upper end of Little Windy Arm on Lake Tagish, but I could obtain no reliable report of their occurrence in the interior beyond this point. At Lake Lebarge they were very doubtfully reported. Their range is known to extend north to White Pass in the coast mountains at least to Copper River, but does not reach far into the interior. Hunters from the mountains about the upper waters of the Pelly and Stewart rivers asserted positively that none had been heard of in that region."

In his article on the Rocky Mountain goat in the "Badminton Library" Mr. Phillipps-Wolley gives the following interesting account of its mode of life and habits :—

"As a rule, they live where nothing else would care to, on precipitous rock-faces overhanging a stream where no grass grows, and where there is very little even to browse upon. Just at dawn you may see them crossing a wall of rock high above your camp in single file, or wending their way slowly from their feeding grounds to the timber-patches in which they lie all day. They are very local in their distribution and very conservative in their habits, infesting one small mountain in great numbers and never seeming to stray into the neighbouring heights. Day after day they appear to seek the same grounds, and retire to the same lairs. . . . To obtain a good specimen head their haunts ought to be visited as late in the year as possible, as the coats are not so white or the beards so long in early autumn as they are in November."

The first living example of this animal which ever appears to have been brought to Europe was a young male acquired by the London Zoological Society in June 1900. It was purchased from Mr. J. La Montagne, by whom it had been captured the previous June on Mount Elfa, British Columbia.

THE COPPER RIVER WHITE GOAT

(*Oreamnus montanus kennedyi*)

The skull and scalp of a white goat obtained in the autumn of 1899 by Mr. V. S. Kennedy, of Chicago, from the mountains at the mouth of Copper River, opposite Kyak Island, have been regarded by Dr. D. G. Elliot [1] as sufficiently distinct from the ordinary form to entitle them to be described as a species apart. In addition to certain details in the conformation of the skull which need not be repeated here, this specimen is distinguished by the form and curvature of the horns. These are much more slender than in the ordinary white goat, and instead of curving regularly backwards till near their tips, bend widely outwards from their bases. Their length is nearly equal to that of the longest pair of the ordinary form hitherto recorded, while the tip-to-tip interval is nearly double that of any other known specimen.

Whether these peculiarities are constant or merely individual must be decided by the acquisition of other specimens from the same region. In any case the variation can scarcely be regarded as indicating a difference of higher than racial value.

THE MISSOURI PRONGHORN

(*Antilocapra americana*)

(Plate VII. Fig. 4)

In America this ruminant is almost universally called an antelope; but, although it is of course possible to make any term as elastic as may be desired, the use of that name for such an aberrant creature is much to be

[1] *Field Columbian Mus.—Zool.* vol. iii. p. 1 (1900).

deprecated. For not only does *Antilocapra americana* form a genus peculiar to North America, but by the almost universal consent of naturalists it is regarded as representing a family by itself. Considering, then, that antelopes, properly so-called, constitute only a section of the family *Bovidæ* (or ruminants with hollow unbranched horns which are never shed), it is manifestly absurd to apply the same name to the single representative of another family, specially characterised by the peculiarity that the hollow horn-sheaths are forked and annually shed and renewed. Consequently it is in every way preferable to employ the designation pronghorn or prong-buck for this very singular ruminant.

Objection is sometimes taken by non-scientific writers[1] to the title *Antilocapra* as the scientific designation of the animal, on the ground that it is in no wise intermediate between a goat and an antelope. But if such objections were allowed, a very large number of the current generic titles of mammals would have to be changed,—notably, *Taurotragus* for the eland and *Hippotragus* for the roan and sable antelopes. And unless there are very strong reasons indeed for taking another course, it is generally best to regard such compound names as abstract titles of the animals for which they stand without going into the question of their etymology.

In its forked and deciduous horn-sheaths the pronghorn stands quite alone among living ruminants, and it is therefore decidedly the most peculiar member of that group found in North America. It is solely owing to this peculiarity that it is regarded as the type of a family by itself; its other features allying it closely with the *Bovidæ*, or ordinary hollow-horned ruminants.

The horns, which are rudimentary or absent in the female, are compressed at the base and conical at the tip, curving backwards and slightly inwards after giving off the flattened triangular process which projects from their front edge rather less than half-way up. The only trace of this fork

[1] *E.g.* Mr. F. C. Selous in *Sport and Travel*.

on the internal bony core of the horn is a very slight notch on the front border. With the exception of a narrow median line, the nose of the pronghorn is covered with hair; the tail is very short; and there is no trace of the small lateral pair of hoofs on either the front or the hind feet.

In size the pronghorn has been compared to a very long-limbed and long-necked sheep; its height at the withers being about 3 feet, and its weight, when cleaned, ranging from 70 to 80 lbs. The eyes are relatively large, like those of a gazelle; the face is devoid of glands below the eyes; and the back of the neck is typically surmounted by a short mane.

The hair is stiff, coarse, and brittle; and there does not appear to be any great difference between the summer and winter coats. The general colour of the upper-parts is rich yellowish brown; a band on the forehead between the eyes, together with the nose and a spot below each eye, being liver-coloured, while the sides of the head, a patch behind each ear, three transverse bars on the throat, and the whole of the rump and under-parts, are pure white. The legs are yellowish brown, and the horns, hoofs, and naked portion of the nose black.

According to Dr. D. G. Elliot, the typical locality for the pronghorn is probably either the plains to the east of the Missouri or the Black Mountains. Be this as it may, the range of the typical form of the species extends from the valley of the Saskatchewan, in latitude 53° N. (in British Columbia), southwards to the confines of Mexico, and from the Missouri River westward across the prairies to the Rocky Mountains and the Cascade Range in Washington and Oregon. In Mexico itself, as noted below, the species is represented, according to Dr. Merriam, by a distinct local race.

At the present day, according to Dr. G. B. Grinnell,[1] the range of the pronghorn is now practically limited to the cattle-ranching country. Western Dakota, Nebraska, and Kansas now form the eastern limits of its

[1] *Outing*, vol. xxxvii. p. 255 (1900).

distributional area, although the species is still met with, albeit in diminished numbers, from the Saskatchewan southwards into Mexico. It is satisfactory to learn that the pronghorn has suffered less severely from the onslaughts of the hide-hunter than is the case with most of the larger animals of the prairies, and that it is still comparatively abundant in many parts of its habitat. One reason for this comparative immunity from pursuit is the small size, and consequently low value, of its skin. Another is to be found in the keen sight and smell of the animal itself, as well as its great speed ; all these factors combining to render successful pursuit a matter of much trouble and difficulty. And the hide-hunter strongly objects to wasting his powder and lead ; with him every bullet ought most certainly to have its billet.

In Mr. Rowland Ward's *Records of Big Game* two pairs of prongbuck horns are entered as measuring 17 inches or over ; the larger of these, which came from North-Western Canada and is now in the possession of Mr. J. Whitaker, having a length of $17\frac{1}{4}$ inches, with a basal girth of $6\frac{1}{2}$ inches. The next best pair are the property of Mr. Otho Shaw.

The hunters of the Fort Union district seem to have been the first to discover that the pronghorn annually casts its horns. The horns in the case of full-grown animals are shed in October, but by immature bucks not till January. Essentially the horns are closely welded hairs, and in a prongbuck from which they have recently been shed, the summits of the bony cores on the head will be seen to be capped with small new horns, looking somewhat like extinguishers on the top of a pair of candles. These new horns appear to have partly formed beneath the old ones, before the latter were shed ; although their tips are quite hard and horny, lower down they become soft, and gradually pass by imperceptible degrees into the hair covering the lower part of the cores. As the new horn gradually projected above the core on which it grew, it appears to have loosened and carried up with it the old sheath, which, by the breaking and tearing away

of the hairs by which it was attached to the core, eventually became free from the latter and was finally dropt. The old horns appear, at any rate as a rule, to drop off by themselves, often perhaps owing to some sudden movement on the part of their owner, for prongbuck are not in the habit of rubbing their heads against tree stems to free themselves from these encumbrances after the manner in which a stag cleans the velvet from its antlers.

Although, as already mentioned, prongbuck are possessed of great speed, they can scarcely leap at all, presenting in this respect a striking contrast to the gazelles and most other antelopes approximating to their own size. Their keen scent and sight have been already mentioned. Throughout the winter months they associate in bands or herds, but about March the pregnant does separate themselves from their companions in order to drop their fawns, of which there are usually two at a birth. In the old days it is stated that herds of pronghorn included hundreds or even thousands of individuals. During the pairing-season the bucks fight among themselves ; and the does display great boldness in defending with their hoofs the helpless fawns from the attacks of the coyote and other foes.

The light bars on the throat of the pronghorn recall the type of coloration obtaining in the Indian nilgai and the lesser kudu of Africa. As in those antelopes, their object appears to be to counteract the effect of the dark shadow cast by the neck, and thus to aid in making the animal as inconspicuous as possible.

Much of the country frequented by the pronghorn consists of sage-bush desert, where the pools of water are strongly impregnated with bitter alkali. Nevertheless, the bucks drink the solution with apparent gusto.

Mr. Selous, in *Sport and Travel*, has the following interesting passage in connection with these ruminants : —

"They always reminded me," he writes, "of springbucks in South Africa, both by their general colour and appearance, and I should think

that they must resemble Sœmmerring's gazelles at a little distance even more nearly. . . . I once saw some does and fawns erect or in some way spread out the large patch of white hair on their rumps. I had left my horse and was trying to stalk a fine buck, when these animals trotted past me, all unconscious of my proximity, although evidently uneasy at the sight of the horse with a saddle on him. As they trotted slowly past me, they all seemed to have the back humped up, whilst the white hair on their hind-quarters seemed to be bristled up in such a way as to make this part of their bodies look much larger than it really was."

This eversion of the hairs of the white rump-patch is precisely similar to what occurs among the sika deer, and suggests that, as in the latter, the use of the white patch is to serve as a guide for those in the rear of the fleeing band to follow their leaders.

The autumn is the proper season for pronghorn stalking.

THE MEXICAN PRONGHORN

(*Antilocapra americana mexicana*)

A pronghorn from the Sierra en Media, Chihuahua, Mexico, was made the type of a distinct local race of the species by Dr. C. H. Merriam[1] in 1901 under the above name; and it is probable that the same form inhabits all that portion of Mexico lying within the distributional area of the species.

According to its describer, the Mexican pronghorn differs from the typical northern representative of the species by its paler colour, which in the new winter coat is drab-brown, becoming cinnamon when the tips of the hairs are worn off, as well as by the absence or small size of the mane, which, at most, is represented by a narrow line of dark hairs on the

[1] *Proc. Biol. Soc. Washington*, vol. xiv. p. 31.

nape. This mark is usually continued as a streak down the remainder of the neck, sometimes continuing as far as the shoulders. The face-markings are also stated to be more sharply defined than in the typical form; and the hinder part of the head is white or whitish, with a dark stripe in the middle line. In the skull the margins of the sockets of the eyes are stated to be less abruptly prominent below, the premaxillary bones are more slender, and there are certain small points of difference in regard to other bones.

THE VIRGINIAN WHITE-TAILED DEER

(*Mazama* [*Dorcelaphus*] *americana*)

(Plate VII. Fig. 5

In the *Deer of All Lands* the name of common American deer is taken for the present species, inclusive of its numerous local varieties; but it seems far preferable to use the term white-tailed deer in this sense, although it was originally applied to a local race other than the typical one. Another point in regard to nomenclature must also be referred to. The writer is still of opinion that all the typically American deer, exclusive of the pudus, are best included in a single generic group, for which the name *Mazama* (typified by the brockets), as the earliest, is entitled to stand. For the group to which the present species and its immediate allies belong the name *Dorcelaphus* (used in a subgeneric sense) was adopted in *Deer of All Lands*. American writers have, however, discovered that this name is antedated by *Odocoileus* (amended by Mr. G. M. Allen[1] to *Odocœlus*), which was originally applied by Rafinesque to a fossil tooth, said to belong to the present species, from a cave. This name

[1] *American Naturalist*, vol. xxxv. p. 448 (1901).

has accordingly been taken into use in America, where we find the present form alluded to as *Odocoileus americanus*, or *Odocœlus virginianus*, the mule-deer as *O. hemionus*, and so on. The present writer is, however, of opinion that a name like *Odocoileus* (or *Odocœlus*), originally applied to a tooth which ought to have been described as *Cervus* (in the sense in which that name was then employed), should not be admitted into zoological literature at all.

Neither is there unanimity with regard to the use of the name *americanus* for the present species. Till a few years ago the name *virginianus* was universally employed for the whitetail; but certain American naturalists replaced this by Erxleben's designation *americanus*, as being earlier. In 1900 Dr. J. A. Allen[1] raised an objection to this usage on the ground that the term *americanus* was not intended by Erxleben to be employed as the name of the animal, but was merely used as an adjective. And he points out that specific titles are placed by that writer in the margin of his work. It may be noted, however, that Erxleben prints *americanus* in italics, which, in the present writer's opinion, may be regarded as sufficient justification for its use. In any case, having replaced in *Deer of All Lands* the previously widely accepted *virginianus* by *americanus*, at the instance of American writers, the author feels no inclination to revert to the original usage.

The antlers of all the typically American deer differ from those of the true deer of the genus *Cervus* (which are mainly an Old World group) by lacking a brow-tine, and being, when fully developed, dichotomously forked, frequently with a sub-basal snag, and always with the lower or front prong of the main fork projected from the front edge of the beam. They have always a gland and tuft on the hock, and usually another on the cannon-bone, the position of which is very variable. Many other features are distinctive of the American deer, which will be found fully described

[1] *American Naturalist*, vol. xxxiv. p. 318.

in *Deer of All Lands*. It will suffice to say here that none of the species are spotted in the adult condition.

The white-tailed deer (inclusive of its numerous local varieties) is easily recognised by its long tail, which is dark above and white beneath, and the small size of the metatarsal gland, which is white, and placed low down on the cannon-bone. The antlers, when fully developed, are

Fig. 72.—Head of White-Tailed Hind with Antlers. Killed in British Columbia by Mr. Hyde Baker, and now in the Collection of Mr. J. Turner-Turner.

large, with a long sub-basal snag, beyond which the beam curves forward, and soon forms a regular fork, of which the lower prong again divides, the whole beam thus presenting what are practically three vertical tines rising from it.

The present and typical race of the species is a comparatively large deer, standing a little over 3 feet in height at the shoulder, and with antlers of the type described above. The maximum recorded length of

the antlers is 27⅜ inches, this being the dimension of a single antler in the British Museum.

The summer coat differs from the winter dress almost or quite as much as in the roe-buck. Although there are individual variations ranging between bay and yellowish, the general hue of the summer dress may be best described as bright rufous chestnut on the upper-parts and outer surface of the limbs, and white on the under-parts and inner side of the legs; the tail being dark brown above and white below, and the chin showing a black band. In autumn the general colour changes to bluish grey, with the throat and under-parts white. And in winter the hue of the upper-parts becomes yellowish grey speckled with brown; the band on the chin being dusky, and pure white prevailing on the throat, muzzle, and chin, round the eyes, on the inner surface of the ears, thighs, and buttocks, as well as over the entire under-parts and the lower surface of the tail.

Typically from Virginia, this race of the whitetail extends over the greater part of Eastern North America from Ontario, Canada, and Maine to Florida, and westwards as far as the Missouri River below the boundary between Canada and the United States.

Writing in *Outing* for December 1900 of the present distribution of the white-tailed deer (inclusive of its local varieties), Dr. G. B. Grinnell remarks that it is still to be met with throughout the greater part of the United States, and is found in limited numbers even in the densely populated districts of New England. It is, in fact, a species which readily adapts itself to changes, so that it flourishes in a country of which the primitive condition has long since been much altered. But by contact with man and his works the whitetail has developed a cunning and a sagacity far in advance of what is natural to the species, so that it is now acknowledged to be the most difficult of all North American mammals to stalk.

In many parts of the North-Eastern and Southern States lands once

under the plough are rapidly becoming afforested, and such districts afford covert for this deer, and tend to bring it back to tracts of country from which it had more or less completely disappeared. Where any reasonable amount of protection is accorded to it, the whitetail not only holds its own but tends to increase in numbers. The fact that these deer, in a state of semi-domestication, continue to flourish in the summer pleasure resorts of Long Island, as well as in the much-frequented districts of the Adirondacks, is of itself sufficient testimony to the adaptability of the species.

As a very rare abnormality whitetail hinds occasionally develop antlers, the head shown in Fig. 72 being an unusually fine example of this feature.

The most striking trait of the white-tailed deer is its invariable habit of elevating its tail when starting off so as to show the white under-surface. This, with the white of the buttocks, forms a large lozenge-shaped blaze, quite as conspicuous as the expanded rump-patch of the sikas, and equally well adapted to indicate to the laggards the line of flight taken by the other members of the herd. The fawns of the Virginian whitetail are usually spotted.

THE WESTERN WHITETAIL

(*Mazama americana macrura*)

This race, which inhabits the Western United States from Kansas, Nebraska, and Dakota westward to California, Oregon, and Washington, differs from the typical representative of the species chiefly by its inferior stature and paler coloration. According to Dr. D. G. Elliot, its antlers are very like those of the Virginian race, but display a marked tendency to the development of three posterior tines, and in aged individuals are prone

to become very rugged at the base. The tail is not so long as the head, and there is no black on either.

In summer the general colour of the upper-parts and the outer side of the limbs is reddish brown. In autumn the same parts are yellowish grey stippled with black ; the chin and throat being white, and each side of the chin showing a dusky spot. The throat is white, the lower surface of the neck brownish grey, the limbs pale brownish yellow, and the under-parts white. The tail is reddish brown above.

Some writers separate the whitetail of the Pacific coast-region, the *Cervus leucurus* of Douglas (1829), as a distinct race, but apparently without sufficient cause.

The original description of the present form given by Rafinesque in 1817 runs as follows :—

"P. 165, Chas. Le Raye's Journal : 'During our stay the Indians killed a deer which is called the long-tailed deer. It is longer than the red deer, of a darker colour, and with a white belly. Its horns are short, small, and somewhat flat ; its tail nearly 18 inches long. They are said to be plenty on these plains.' The plains of the Kansas River.

"Note.—This concise description is sufficiently accurate to enable us to ascertain that it belongs to a new species of deer unknown east of the Mississippi, to which I shall give the name of *Corvus* [sic] *macrourus*, which means long-tailed deer ; it may be characterised as follows :— Horns somewhat depressed, shorter than the head, body brownish above, white below, tail elongated."—C. S. R.

By hunters this race is commonly called either whitetail, bannertail, or long-tailed deer.

The whitetail inhabiting the northern districts of the United States has been separated by Mr. G. S. Miller[1] as a distinct race under the name of *Odocoileus americanus borealis*, while the Louisiana form has been dis-

[1] *Bull. New York Museum*, vol. viii. p. 83 (1900).

tinguished by Mr. G. M. Allen[1] as *Odocoileus virginianus louisianæ*. Both are larger than the typical Virginian whitetail; the latter being specially characterised by the pale colour of its winter coat, its long and slender skull, the relatively great length of the lower series of cheek-teeth, and the tall and heavy antlers. It is said to be very similar in general characters to the Florida whitetail, but is larger and slightly paler.

Neither of the two forms are here allowed definite racial rank, as the writer is by no means convinced that the characters by which they differ from the typical Virginian whitetail are sufficient to justify this. Possibly the same remark may apply to the western and Florida whitetails. In the writer's opinion many of the forms described by American naturalists as subspecies seem scarcely worthy of any kind of separation, while those regarded by the former as species appear in many instances to be no more than local races.

THE FLORIDA WHITETAIL

(*Mazama americana osceola*)

This is a small dark-coloured form of whitetail[2] inhabiting the peninsula from which it takes its name, and provisionally allowed racial distinction. The colour of the upper-parts is a mixture of dark and light brown, with a dark brown stripe running from between the ears down the middle of the neck and back. The sides and lower part of the neck, as well as the neck, are cinnamon, the throat and under-parts white, and the ears brown externally and white internally; the hairs of the upper surface of the tail being dark reddish brown with cinnamon-coloured tips.

[1] *American Naturalist*, vol. xxxv. p. 448 (1901).

[2] Named by Mr. O. Bangs, *Proc. Biol. Soc. Washington*, vol. x. p. 25 (1896).

THE SONORAN WHITETAIL

(*Mazama americana couesi*)

This small desert form of whitetail, which is named after the late Dr. Coues, is an inhabitant of the arid districts of the south-west, ranging through Arizona and the Sonoran country of Mexico. It is met with to the north in the Gila valley and as far south as the wooded districts in the neighbourhood of the city of Mexico. It is very considerably smaller than the typical race of the species, but its antlers are almost identical in shape. In the summer coat the general colour of the upper-parts is dull fawn with a tinge of ochre, passing into mouse-grey on the back, and becoming tawny or reddish brown on the sides, with the throat, the under-parts, the inner side of the limbs, and, of coûrse, the lower surface of the tail, white. There is also a little white on the toes above the hoofs. The upper surface of the tail is reddish brown with a narrow margin of white.

The type specimen was killed at Crittenden Camp, in Arizona.

THE TEXAN WHITETAIL

(*Mazama americana texana*)

The fan-tailed deer of Texas, as this form is frequently called by sportsmen, is another small race, specially characterised by the black tips and edges of the relatively small ears, its pale colour, the small size and incurvation of the antlers, and the relatively large size of the cheek-teeth.

In the winter coat the top of the head is black and the sides grey, and a black stripe runs from between the ears to the root of the tail ; the general colour of the upper-parts is a mixture of yellowish white and grey,

passing into yellowish ashy on the sides, and into a smoky tint on the chest, the rest of the under-parts, as well as the throat, being white, as is also the chin with the exception of a black bar across it. The legs are reddish fawn with a mixture of greyish black.

Fort Clark, Kinney County, Texas, is the type locality for this race of the white-tailed deer, but it also ranges over a large part of Mexico.

THE SOUTH MEXICAN WHITETAIL

(*Mazama americana mexicana*)

This is also a small race, standing 2 feet 9 inches at the withers, and inhabiting the south of Mexico. In the type specimen, which is probably in the winter coat, the colour of the upper-parts is described as rusty greyish brown, without any mixture of rufous, specked with whitish ; the hairs having their tips black and their basal halves white, between which they are banded. The chest is reddish brown, the lower portion of the legs are devoid of speckling, and the under-parts are white, the lower jaw being whitish. The upper side of the tail is yellowish brown speckled with whitish near the root, beyond which it is a more uniform rusty yellowish brown, with the tip and under side white. The metatarsal tuft is brownish bordered with white.

Of two Mexican skins in the British Museum probably belonging to this race, the one, which is in the summer coat, is speckled foxy red above, with the head and ears dark speckled grey, passing into tawny below and behind the ears, and the chin, lower jaw, throat, and under-parts white ; the upper surface of the tail being like the back. The second shows the winter dress, which is dark brownish grey, speckled with black above, but the upper side of the tail foxy. In both the metatarsal tuft is very small. Antlers measuring $11\frac{1}{2}$ and $13\frac{1}{2}$ inches along the curve have been recorded.

THE YUCATAN WHITETAIL

(*Mazama americana tolteca*)

With this form we reach the first of a number of small deer inhabiting the south of Mexico, Central America, and the northern states of South America, which may apparently be regarded as degraded representatives of the whitetail. The degradation displays itself in some cases in the antlers, which may be reduced to nearly or quite simple spikes, sloping backwards in the plane of the face; in others it takes the form of the loss or rudimentary condition of the metatarsal gland and tuft; while in yet other instances it shows itself by the absence of a seasonal change of colour. Many naturalists regard all these different forms as distinct species, but they seem to be nothing more than dwarfed and retrograde phases of a single widely spread and variable type.

In the present form (with which the *Cervus acapulcensis* of Mr. Caton is identical) there is no seasonal change in the colour of the coat, which is dark chestnut-brown on the upper-parts, with the face blackish, the under-parts white, and the tail, of which the tip is truncated, brown above and white below. The metatarsal gland and tuft on the hind cannon-bone are absent. The antlers, too, show signs of degradation, as compared with those of the Virginian whitetail, being short, upright, nearly straight, and slightly palmated, with a reduction in the number of the tines, and but little forward projection. In size this whitetail is about one-third less than the South Mexican form, but with a relatively longer tail. It inhabits Yucatan and parts of the south of Mexico, but the precise limits of its range are not yet defined.

THE COSTA RICA WHITETAIL

(*Mazama americana nemoralis*)

This form appears to be very close to the preceding, but usually has a minute metatarsal gland remaining, which shows scarcely any white and is situated about midway up the hind cannon-bone. The general colour of the coat is brown speckled with yellow. The antlers are branched, one pair measuring $7\frac{1}{2}$ inches in length. The height of the animal at the withers is about 27 inches. Two skins from Costa Rica in the British Museum show a minute metatarsal gland on the hind-leg, but in one from Honduras in the same collection, provisionally assigned to this form, the gland is wanting. The range extends from Honduras to Panama.

THE SAN CRISTOBAL WHITETAIL

(*Mazama americana nelsoni*)

This form, which was described in 1898 by Dr. Merriam[1] as *Odocoileus nelsoni*, appears to be very close to the Yucatan *tolteca*, but has apparently a more aborted type of antlers, although retaining a minute metatarsal gland and tuft. The type specimen came from San Cristobal, in the highlands of Chiapas, Mexico. It is a medium-sized form, of a dark brownish grey colour on the upper-parts, becoming blackish on the top of the head and along the middle line of the back, with the ears grizzled grey, and the tail fulvous above and white below; the under-parts being white. The metatarsal gland is reduced to a small spot surrounded with a ring of white hairs about half-way up the hind cannon-bone. In the second year, at any rate, the antlers are small, simple spikes. The skull is described as being like that of *tolteca* (*acapulcensis*), but with shorter nasal bones.

[1] *Proc. Biol. Soc. Washington*, vol. xii. p. 103 (1898).

THE HUEHUETAN WHITETAIL

(*Mazama americana thomasi*)

The *Odocoileus thomasi* of Dr. Merriam[1] is another small form of whitetail from the Chiapas district of Mexico, the type specimen being from Huehuetan. It is of rather large size, and rufous at all seasons of the year, the tail being coloured as in the Virginian whitetail, but the metatarsal gland and tuft very much reduced in size, and situated about half-way up the hind cannon-bone. The summer coat differs from the winter dress merely by the shorter hair and its uniform fulvous colour, which lacks the grizzled golden appearance so noticeable in winter. Antlers provisionally assigned to this form are of a simple type, sloping regularly backward from the face, and giving off only a sub-basal snag on the inner side; the tips curve inwards and slightly forwards. The skull is described as being very like that of the Honduras whitetail, but of somewhat larger size and width, with shorter nasal bones.

THE HONDURAS WHITETAIL

(*Mazama americana truei*)

In *Deer of All Lands* this form—the *Cariacus clavatus* of Mr. True—was allowed specific rank, although its resemblance to the Virginian whitetail was noticed. The above-mentioned modifications of the whitetail type described by Dr. Merriam seem to render it no longer possible to exclude the present form from this group, in spite of certain differences in the skull from that of the typical *M. americana*, and it is accordingly regarded as another local modification of that variable and widely ranging species.

[1] *Op. cit.* p. 102 (1898).

The Honduras whitetail, whose distributional area extends typically from Tehuantepec, in the south of Mexico, to Honduras, is a small animal very similar in general appearance and colour to the Virginian whitetail, but with the antlers reduced to the form of simple spikes inclining backwards nearly in the plane of the face, and the metatarsal gland relatively small. The marked difference in the colour of the two coats characteristic of the more typical representatives of the species is, however, retained, the general tint of the hair on the upper-parts in the summer dress being bright chestnut, tending to grey on the head, with a dusky streak down the middle of the face, and several white spots in the neighbourhood of the muzzle. In winter the general colour is speckled brownish grey. The under-parts, together with the lower side and tip of the tail, are of the usual pure white.

The Costa Rican representative of this deer has recently been separated, on account of its superior size, by Mr. G. S. Miller[1] as *Odocoileus costaricensis*; the distinction is, however, at most but trivial.

THE COLOMBIAN WHITETAIL

(*Mazama americana gymnotis*)

In South America the whitetail type is represented by at least three distinct modifications, which are here regarded as local races, although, as might have been expected, they differ more or less markedly from the typical *M. americana*. The present form, which stands about 26 inches at the shoulder, has lost the metatarsal gland and tuft, and displays no seasonal change of colour, being yellow brown speckled with grey on the upper-parts throughout the year. It is of a remarkably slender and graceful build, with a long and pointed muzzle; and the ears are unusually

[1] *Proc. Biol. Soc. Washington*, vol. xiv. p. 35 (1901).

large, drooping, and nearly naked externally. The antlers, however, retain the general type of those of the Virginian whitetail, although very slender and small; their length in the type specimen being only 7 inches. The tip and lower side of the tail, like the under-parts, are pure white. This whitetail appears to be confined to Colombia. Judging from the large size of its ears, it would seem to be more essentially a woodland form than are any of its kindred.

THE SAVANNA WHITETAIL

(*Mazama americana savannarum*)

In the Guianas, and probably throughout a large extent of the basin of the Orinoco, the white-tailed deer is represented by a small form apparently intermediate between the Virginian and Colombian races. Its colour, seemingly at all seasons of the year, is clear greyish brown speckled with white. In its small stature, short antlers, and relatively short tail it resembles the Colombian whitetail, from which it is broadly distinguished by its retention of the metatarsal gland and tuft, and the hairy backs of the ears, which are also relatively smaller. A distinctive feature is the presence of a single dark spot on each side of the lower lip.

THE PERUVIAN WHITETAIL

(*Mazama americana peruviana*)

With this type we come to the last of the small deer which can be regarded as local representatives of the whitetail;—and to those who object to this arrangement it is open to regard any or all of these small deer as species by themselves.

The present form is found in Peru and Bolivia, and is one of those which have lost the metatarsal gland and tuft, and is apparently of the same colour throughout the year. On the upper-parts the general colour of the hair is dark greyish brown speckled with whitish ; the upper surface

Fig. 73.—Outer side of left hind foot and upper and lower surface of tail of (*A*) Colombian Black-tailed Deer, (*B*) Mule-Deer, and (*C*) Virginian White-tailed Deer. (After Seton-Thompson.

of the tail being uniformly brown, and its lower surface, together with the under-parts generally, white.

It may be added that to enable the sportsman to obtain an adequate idea of the mutual relationships of these various forms of white-tailed deer it would be necessary to have a mounted series of skins of all of them exhibited in the British or some other Museum. In England, at any rate, there is very little chance that such an instructive series will ever be displayed to the public.

THE MULE-DEER

(*Mazama* [*Dorcelaphus*] *hemionus*)

(Plate VII. Fig. 6)

The peculiar form of the antlers, the large ears, the short, black-tipped tail, and the elongation of the metatarsal gland and tuft, which are situated on the upper half of the hind cannon-bone, serve at once to distinguish the mule-deer from all its kindred. Hunters frequently call it the Missouri blacktail, or Manitoba jumping deer, but the former title is liable to lead to confusion with the black-tailed deer properly so-called. If, however, it be remembered that the latter animal has a larger tail, which is wholly black above and wholly white below, and likewise a shorter metatarsal gland and tuft, all chance of confusion between the two types will be avoided (see Fig. 73).

The metatarsal gland and tuft, which are coloured like the rest of the hind-leg, measure about 5 inches in length, and are situated on the hinder border of the cannon-bone in its upper half, some distance below the hock. A triangular patch on the under surface of the base of the tail is hairless.

In size the mule-deer may be compared to a rather small Scotch red deer, the height at the withers being about $3\frac{1}{2}$ feet, and the average weight of a well-grown stag about 14 stone.

In addition to its large ears, and peculiar tail and metatarsal gland, the mule-deer is well characterised by the antlers of the stags. Normally these have a short sub-basal snag, above which the beam is projected for a short distance upwards and then forwards, beyond which it forks dichotomously, both prongs being nearly equal and again dividing, the hinder frequently into three. As a rule, therefore, the antlers have not more than

five points a side ; but there are many exceptions to this. Mr. E. Cameron, for instance, figures, in *Land and Water* for 5th January 1901, a magnificent head with no less than forty points, and a still more remarkable abnormality is presented by the head from the collection of Mr. Turner-Turner figured below.

Mr. Cameron claims his head as being the "record" ; the length of

Fig. 74.—Many-pointed Head of Mule-Deer from Quesnelle, British Columbia. In the possession of Mr. J. Turner-Turner.

the antlers along the curve being 32 inches, the girth below the main fork 6 inches, the extreme width between the points 37 inches, and between the beams 26 inches. The finest example recorded in Mr. Rowland Ward's book has a length of 30 inches, and a basal girth of $5\frac{3}{4}$ inches, with a maximum width of 41 inches between the beams ; the number of points being seventeen.

In build the mule-deer is a much heavier and clumsier-looking animal than the Virginian whitetail. *Primâ facie*, the large size of its ears, from which, by the way, it derives its name, would apparently indicate that it is more addicted to a life in the forest, but in reality this does not seem to be the case.

In summer the general colour of the hair on the upper-parts is pale dull yellowish or yellowish tawny; but in early autumn the general colour changes to bluish grey, this again growing lighter as the hairs lengthen, and bluish during winter. Very characteristic of the species is the patch of dark brown hair on the forehead between the eyes, and extending somewhat below them on to the face; the rest of the latter, together with the throat, abdomen, inner side of legs and buttocks, and the basal half of the tail, being white. The rest of the under-parts are blackish; while the tail-tip and the front border of the ears are black.

The mule-deer, in its typical form, inhabits a large tract of country to the westward of the Missouri River, extending from Fort George, in British Columbia, southwards to Texas, and westwards through Nevada to the latitude of San Francisco, thus including the States of Dakota, Nebraska, Kansas, Texas, Colorado, Wyoming, Montana, Idaho, Nevada, California, Oregon, and Washington.

From much of their range in the plain-country mule-deer have now been completely swept away by the advancing tide of civilisation; but they still hold their own in many parts of the Rocky Mountains as well as in the mountainous districts of the western and south-western states of the Union. Formerly the mule-deer was an extremely abundant species, but it has suffered heavily at the hands of the skin-hunter. Except in the breeding-season, when the old stags become fierce, it is of a gentle and inquisitive disposition.

Some account of the habits of the mule-deer will be found in *Deer of All Lands*; this may be supplemented by the following extract from

Mr. E. Cameron's account in *Land and Water*, to which allusion has been already made. After mentioning that mule-deer stags are occasionally met with which never grow antlers, and that in fully developed animals in Montana these appendages are clear of the velvet by the end of October and are shed the next March, the author proceeds as follows:—

"Another peculiarity of mule-deer is their gait—a succession of stiff-legged bounds which carry them over the ground at a surprisingly rapid pace. When mule-deer relinquish this gait for an even gallop it is a sure sign that they are becoming exhausted.

"I believe them to be among the swiftest of deer, and that the more vigorous can accomplish a mile in one minute and fifty-seven seconds; my opinion being based on a calculation that they cover fifteen yards a second in three jumps of five yards each, when badly scared, and on the fact that greyhounds seldom catch them even on ground favourable to the dogs. During the early fall the old heavy bucks, when laden with fat, become more short-winded, and in October 1892 a cowboy, named Wright, of the Hogeye ranch on Spring Creek, surprised a large buck in the open, which he roped (lassoed) round the antlers after a run of half a mile. A comrade, Marrowquin, on a slower horse was close up, and soon had his rope fast to the hind-legs of the buck, which was stretched out helpless between the two horses.

"The cowboys, after ear-marking the deer, allowed it to escape, and it was shot near my ranch, where I saw it on 6th December 1895. The running-down of the buck was considered a great feat, much talked of at the time; but such a capture is not likely to occur again, incessant persecution having rendered the deer so shy that they only venture on to the open plains at night.

"Mule-deer, when suddenly started, have an unfailing habit of stopping to look back at the cause of alarm; and although this pause is too momentary

to allow a horseman to get down and shoot, it is just long enough to secure a standing shot to the dismounted hunter. This renders them a rather easy mark to the man who can endure the hard walking and laborious climbing necessary to obtain the shot; for, as year by year they become more shy and retiring, their chase approximates more and more to that of the mountain sheep.

"The doe drops her young in May, generally producing twins; but occasionally one fawn is the result, and very rarely triplets. The fawns are at first spotted with white, but have lost their spots by the end of September, at which time the doe will be rejoined by her offspring of the previous year, and, albeit she eludes them at times, these persistent followers always manage to turn up if alive. Though without further claim upon her affection, they still retain a strong fondness for her; and should she be killed when in their company, they will return to seek her after some hours, or perhaps on the succeeding day."

THE CALIFORNIAN MULE-DEER

(*Mazama hemionus californica*)

Typically from Gaviota Pass, in the Coast Range, this race of the mule-deer seems to be found over the greater part of the Californian Coast Range to the southward of San Francisco, exclusive of the extremity of the peninsula. The ears are smaller than in the typical race, while the tail is longer, and has the middle of the upper surface of the white portion traversed by a dark line covering about one-third of its circumference. The colour is generally similar to that of the typical race, although said in some instances to be distinctly brighter.

THE CERROS MULE-DEER

(*Mazama hemionus cerrosensis*)

This form—the *Odocoileus cerrosensis* of Dr. C. H. Merriam[1]—is an inhabitant of Cerros Island, off Lower California, and appears to be chiefly distinguished from the Californian representative of the species by its inferior size. The skull is stated to have longer nasal bones and smaller cheek-teeth. It may be doubtful whether this form is entitled to rank as a distinct race.

THE LA PAZ MULE-DEER

(*Mazama hemionus peninsulæ*)

The mule-deer inhabiting the extreme south of the Californian Peninsula is a small and brightly coloured representative of the species, specially characterised by the degradation of the antlers, which take the form of simple spikes with a sub-basal snag to each. In this respect the animal is analogous to some of the southern races of the white-tailed deer. In the winter coat the general colour of the upper-parts is dark speckled iron-grey, with an irregular black stripe down the back and tail, which may be connected by a narrow streak with the black tip of the latter, or separated from the same by a ring of straw-coloured hair. The legs are chestnut, as is a patch on each flank dividing the speckled grey of the back from the uniformly blackish of the under-parts.

[1] *Proc. Biol. Soc. Washington*, vol. xii. p. 101 (1898).

THE WESTERN DESERT MULE-DEER

(*Mazama hemionus eremica*)

This is a pale-coloured form of mule-deer inhabiting the arid south-western tract on the Mexican border of the United States; the type specimen having been taken in the Sierra Seri, Sonora. It is sometimes known as the Burro deer.

THE BLACK-TAILED DEER

(*Mazama* [*Dorcelaphus*] *columbiana*)

The black-tailed deer, as typified by the British Columbian form, is a near relative of the mule-deer, characterised by its inferior size, the shorter metatarsal gland and tuft of the hind-leg, and also by the tail being wholly black above and wholly white beneath[1] (Fig. 73). The ears are likewise somewhat smaller than those of the mule-deer; but the antlers of the two species are of essentially the same type. The length of the metatarsal gland and tuft on the outer side of the lower portion of the upper half of the hind cannon-bone is about two inches in the present species.

The true blacktail, as typified by specimens from the mouth of the Columbia River, is a north-western form inhabiting British Columbia, Vancouver Island, and a tract west of the Cascade Range in the States of Washington, Oregon, and California.

In winter the general colour of the coat is brownish grey mottled or speckled with black, with a darker streak extending from the hinder part of the head to the tail. The crown of the head is mingled chestnut

[1] Owing to the lack of specimens in English collections, the description of the colour of the tail in *Deer of All Lands* is incorrect.

and black ; a black stripe above each eye meets its fellow on the forehead, and there is a black patch behind the chin, the face being grey. The chin, the upper part of the throat, and the abdomen, as well as the under side of the tail and the inner side of the upper portion of the limbs, are white. The chest is sooty, but the under-parts in the neighbourhood of the fore-legs are mottled like the back, the legs being dark cinnamon-colour. The base of the black upper surface of the tail gradually shades off into the mottled hue of the back. In summer the general colour of the coat is red or reddish yellow.

The blacktail resembles the mule-deer in its habit of starting off when alarmed in a series of long bounds. It is, however, a much more forest-haunting form ; and, except in the pairing-season, which takes place in October, when the old stags retire to higher ground, it is extremely partial to marshy and swampy districts, taking to the water with as much readiness as the whitetail. The spotted fawns, of which there are usually two at a birth, are dropped in May.

THE SITKA BLACKTAIL

(*Mazama columbiana sitkensis*)

The black-tailed deer of Sitka Island, Alaska, has been described by Dr. Merriam [1] as a distinct local race on account of its inferior stature and relatively smaller ears. The general colour of the upper-parts, as well as of the under-parts in front, is fulvous in the summer dress, the face being grizzled grey, with a dusky patch extending from the eyes midway to the nose. The long hair covering the tarsal gland on the inner side of the hock is tawny with a border of black.

[1] *Proc. Biol. Soc. Washington*, vol. xii. p. 100 (1898).

THE CALIFORNIAN BLACKTAIL

(*Mazama columbiana scaphiotus*)

This local modification of the blacktail was likewise described by Dr. Merriam,[1] and is a large-eared and pale-coloured form inhabiting the mountains of California. The type specimen was obtained on Laguna Ranch, in the Gabilan Range.

THE NEW MEXICAN BLACKTAIL

(*Mazama columbiana crooki*)

The blacktail of New Mexico, described on the evidence of a female which still appears to be its only known representative, was permitted in *Deer of All Lands* to stand as a species by itself, on account of certain alleged resemblances to the whitetail. It seems, however, to be nothing more than a local form of blacktail. The colour of the type female in the summer dress is described as being reddish fawn above, darker on the back than elsewhere, with the neck greyish drab, the sides greyish cinnamon, and the legs creamy ; the hairs on the metatarsal gland being sooty at the base with white tips. The black of the upper surface of the tail extends on to the under side of the tip. The Dog Mountains, in Grant County, New Mexico, are the type locality for this form.

[1] *Op. cit.* p. 101.

THE MARSH-DEER

(*Mazama* [*Blastoceros*] *dichotoma*)

(Plate VII. Fig. 7)

The marsh-deer, which must not, on account of the similarity of its name, be confounded with the Indian swamp-deer, is one of two South American species which differ from the members of the preceding group by the want of a sub-basal snag to the antlers, the constant absence of the metatarsal gland and tuft from the outer side of the lower portion of the hind-leg, and the reversal of the direction of the hair on the withers, which points forwards instead of backwards. In both species the tail is relatively short.

The marsh-deer is by far the larger animal of the two, approaching the size of a rather small red deer. It is of a light and graceful build, with a remarkably long and slender muzzle, and rather large and pointed ears. Apart from its being the largest living South American deer, and without taking into consideration the characters of its antlers, it is a species easily recognised by its striking coloration, which in the summer coat is bright rufous chestnut on the upper-parts, with a band round the muzzle and the legs from the knees and hocks downwards black. The under surface of the tail is likewise black, as is also the hair covering the tarsal gland on the inner side of the hock. Above the black band on the muzzle is a white band, and there is also white above or all round the eyes, as well as on part of the sides of the face; while the ears are almost filled internally with soft white hair. At all times of year the coat is rough and long, but it is especially so in winter, when the general colour of the hair on the upper-parts changes to brownish red.

The antlers divide in a regular dichotomous manner a short distance

above the burr ; and each prong of the main fork again divides after a short course, the upper prong being usually the larger. Five a side is the general number of points ; but specimens with a much larger number of tines are by no means unusual. The largest pair of antlers of this species recorded by Mr. Rowland Ward measure 24½ inches along the

Fig. 75.—Young Marsh-Deer at Woburn Abbey. Photographed by the Duchess of Bedford.

outer curve, with a basal girth of 5 inches, and a tip-to-tip interval of 16 inches ; the widest span between the beams being 18 inches.

When *Deer of All Lands* was written no mounted specimen of the marsh-deer was exhibited in the British Museum ; and the author was not then aware that the hair on the withers is reversed. A handsome male, with good antlers, now forms a part of the fine series of deer exhibited to the public in the Museum.

The marsh-deer has an extensive range in South America, occurring, where the country is suitable to its mode of life, all over Brazil, and thence southwards to Paraguay, Entre Rios, Uruguay, and the wooded Chaco country of Argentina. Not improbably it also ranges northward into the Guianas. It is still abundant in the Matto-Grosso district of Brazil, but is rare in Uruguay and Entre Rios. In Uruguay the best localities for this deer are in the *monte*, or wooded districts bordering the Rio Uruguay, and in the neighbourhood of Olinar. It also occurs in the forest districts of Salto.

As is the case with most South American deer, information is very meagre with regard to the habits of this handsome species. It generally associates in small bands of from three to five, and passes the day in the thick covert of the river valleys, whence it issues forth towards evening to feed during the night on sedge and other water-plants. The fawns, of which one is produced at a birth, are without spots.

THE PAMPAS DEER

(*Mazama* [*Blastoceros*] *bezoartica*)

(Plate VII. Fig. 8)

Unlike its larger relative the marsh-deer, the present species avoids the neighbourhood of swamps and rivers and frequents the open plains of Argentina, which, although much flatter, present many similarities in regard to climate and physical features generally to the veldt of South Africa. In place, however, of the countless swarms of big game which formerly covered the African veldt, the only large animals to be found on the pampas, even before the invasion of settlers, were these deer, together with guanaco, vicugna, and rheas, or American ostriches. The contrast between the two areas as regards their animal inhabitants is thus very

striking; and at an earlier epoch of the earth's history, when gigantic ground-sloths, huge solid-shelled armadillos, and other monsters abounded on the pampas, the contrast must have been even more remarkable.

The pampas deer is distinguished from all its kindred by the strong musky odour exhaled by the full-grown bucks, which may be a provision to enable these animals to ascertain the whereabouts of their fellows on the trackless pampas. The scent is perceptible for a very long distance; and the horseman riding across the pampas will frequently be made aware by this means of the neighbourhood of this deer when none are within sight.

The guazuti, as this deer is called in some parts of South America, is found on open plains from Brazil to Northern Patagonia, inhabiting all the pampas of the Argentine, and extending even into the Chaco country in the neighbourhood of Santa Fé, as well as into Paraguay and Uruguay. From many districts of the Argentine it has, however, now more or less completely disappeared, and the same is the case with regard to Uruguay. Mr. O. V. Aplin, writing in the *Proceedings of the Zoological Society of London* for March 1894, has the following remarks on this deer in Uruguay:—

"In the neighbourhood of Santa Elena this species—the gama, as it is here called—has been exterminated, with the exception of a small herd preserved in a distant part of the camp [open country] belonging to that estancia [estate], in the neighbourhood of the Arroyos de Monzon and Grande. The herd in 1892-93 consisted, so far as was known, of about a dozen does and seven bucks. On that part of the Rio Negro which I visited it is also rare, but in some parts of Florida [Uruguay] it is still numerous. One day at the end of January I rode up pretty close to a buck with a nice head, and two does, which had been feeding in a low green pajonale. They were then of a warm tawny, with large and conspicuous light-coloured stern-marks. The peculiar strong musky odour (rather like cat) was apparent after they had cleared out."

In size the pampas deer is a comparatively small species, standing only about $2\frac{1}{2}$ feet at the shoulder. The general colour of the hair of the upper-parts is light rufous fawn ; the inner sides of the ears, a ring round each eye, the chin, lower jaw, and throat, as well as the under-parts generally, the inner side of the upper half of the legs and buttocks, and the lower surface of the tail being white. Except at the tip, the tail is black above, the black extending to a very small extent on to the rump. When running it is probable that the tail is raised after the manner of the white-tailed deer, so as to expose a large white area.

The antlers of the pampas deer are almost invariably three-pointed, the upper prong only of the main fork subdividing. At the main fork the antler is much flattened and expanded, so that the base of the fork itself forms a sharp edge. In old specimens the surface of the antler becomes very rugose and knotted below and for some distance above the fork, thus recalling roe-antlers, with which those of the present species agree in being three-pointed. The largest pair of antlers recorded by Mr. Rowland Ward is in the collection of the British Museum ; they measure $14\frac{5}{8}$ inches along the outer curve, $2\frac{5}{8}$ in basal girth, and $13\frac{1}{4}$ inches between the tips. Out of ten specimens recorded only one has more than the normal three points a side ; in that example, which is from Uruguay, there are no less than twelve points on one side and eleven on the other.

THE PERUVIAN GUEMAL

(*Mazama* [*Xenelaphus*] *antisiensis*)

Two closely-allied species of South American deer form a group readily distinguished, among other characters, from the foregoing kinds by their comparatively simple antlers, which form a single dichotomous fork, of which the hinder prong is the longer and stronger. Among other features

may be noticed the coarse, pithy, and brittle nature of the hair, the absence of the metatarsal gland and tuft on the outer side of the lower segment of the hind-limb ; and the rather short and bushy tail. Another peculiarity is the absence of spotting in the fawns. Both species are now represented in the British Museum by mounted specimens.

The Peruvian species is an animal somewhat inferior in size to the Virginian white-tailed deer. It inhabits the Andes of Peru, Ecuador, Bolivia, and the northern districts of Chili, usually at elevations between 14,000 and 16,000 feet, but sometimes considerably lower. It is stated to be abundant on the wooded flanks of the volcanic peaks of Chimborazo, Pechincha, and Cotopaxi, in Ecuador. The maximum recorded length for the antlers is $9\frac{1}{2}$ inches. The distinctive characteristics of this species may be best gathered by comparison with those of the next.

THE CHILIAN GUEMAL

(*Mazama* [*Xenelaphus*] *bisulca*)

(Plate VII. Fig. 9)

The Chilian guemal is a considerably larger animal than the Peruvian species, the shoulder-height in the mounted specimens of the two species in the British Museum being respectively $39\frac{1}{2}$ and $33\frac{1}{2}$ inches. It is also much more uniformly coloured than its northern relative, the greater portion of the under-parts, limbs, and buttocks being of the same tint as the back, instead of very much lighter. The faded condition of the Museum specimen of the Peruvian species does not admit of the original tint of the hair being precisely determined ; but it was evidently speckled after the manner of the Chilian form. In the latter the general colour of the head and upper-parts is bright greyish yellow speckled with black. A broad black band

runs up the middle of the face from the muzzle to terminate in a fork between the eyes; the sides of the muzzle being brown, and the extremity of the chin whitish. The upper surface of the tail is coloured like the back, but the under surface is white; there is no trace of the brown patch on the rump and the brown upper surface of the root of the tail characteristic of the Peruvian species. The under-parts and limbs, with the exception of the inguinal region, the front and upper part of the inner surface of the thighs, and a streak on the postero-internal surface of the fore-legs (which are greyish white), are also coloured like the back; thus presenting a very striking difference from the Peruvian animal, in which they are very much lighter. The tarsal tuft on the inner side of the hock, instead of being dark umber-brown on a whitish ground, is likewise of the same speckled hue as the upper-parts.

In regard to the antlers, they are distinguished from those of the Peruvian species by the forking taking place at a considerably greater distance above the burr, so that between the latter and the upper surface of the fork there is an interval of nearly 2 inches instead of less than 1 inch.

The antlers of the mounted specimen in the Museum, which came from Patagonia, are comparatively thin and smooth. In a head from Ultima Esperanza, Patagonia, also in the Museum, which forms the subject of Plate VII. Fig. 9, the antlers are, however, much stouter and more rugose, perhaps indicating an older animal. Moreover, in that specimen the general tone of the hair is greyer and less rufous, while the black mark on the face is narrower and less deep in colour. Now this specimen is said to have been killed in June, that is to say, in the middle of the southern winter. And it would accordingly seem that the guemals, like so many deer, exhibit a reddish phase in summer, and a more greyish (blue) tint in winter.

The Chilian guemal was originally named from specimens obtained in

the Andes of the country from which it takes its popular title ; probably on the east side of the main range. There appear to be no reasons for separating the Patagonian animal, even racially. At first sight it might seem likely that the Peruvian and Chilian guemals would be nothing more than local forms of one widely-spread species ; but the important points of difference indicated above leave little doubt as to the propriety of regarding them in the light of separate species.

This species appears to range throughout Patagonia, where it is much more common than in the Chilian Andes ; the western side of the country being the part where it is most abundant. Very little is known with regard to the habits of either species. In the Andes they are stated to frequent the forest-clad mountain valleys during summer, whence they descend in winter to the plains, where, however, they never depart far from the outskirts of the range.

THE RED BROCKET

(*Mazama rufa*)

The so-called brockets of Central and South America, which form the typical representatives of the genus *Mazama*, and to which indeed that term is restricted by American naturalists, are all deer of small size, with the antlers of the bucks still simpler than those of the guemels. These appendages are, in fact, as shown in Plate VII. Fig. 10, mere unbranched spikes, like the first antlers of a red deer ; and it is for this reason that the term brocket has been applied to these small American *Cervidæ*. They are further characterised by the invariable absence of the metatarsal gland and tuft from the outer side of the lower segment of the hind-limb, and in two of their representatives the tarsal gland and tuft are also wanting from the inner side of the hock. All brockets have highly

arched backs and short, bushy tails. But their most characteristic feature is the downward direction of the hair of the lower part of the face, which points towards the muzzle instead of towards the forehead as in other deer; a whorl in the hair of the face below the line of the eye makes this arrangement possible; there is also a second whorl on the crown of the head, where the hair is so lengthened as to form a tuft. Another feature by which these deer may always be recognised is the presence of a pair of white spots on each upper lip behind the nose, and of a single larger spot of the same colour in the middle line of the lower lip. The fawns differ from those of the guemals in being spotted.

These deer are restricted to the tropical forests of Central and South America. There is still some degree of uncertainty as to the number of species. Their small size and insignificant antlers render these deer but little attractive to the sportsman, and they are consequently noticed very briefly on this occasion. A fuller account will be found in *Deer of All Lands*.

The red brocket is a relatively large and strongly-built species, standing about 27 inches at the withers. The general colour of the upper-parts is brownish red at all seasons, with the neck and flanks reddish grey, and the throat, part of the under surface of the neck, and the inner side of the thighs whitish grey; the tail being white below and at the tip. Its distributional area extends from the Guianas through Brazil into Paraguay.

THE STREAK-EYED BROCKET

(*Mazama superciliaris*)

It is doubtful whether this form, which is probably from Brazil, is specifically distinct from the last. The general colour is brownish red, with the head, neck, hocks, and the front of the fore-legs pale whitish grey, the forehead blackish, and a distinct light streak above each eye.

THE BLACK-FACED BROCKET

(*Mazama tema*)

This is a smaller animal than the red brocket, standing about 25½ inches at the withers. The general colour is bright brownish red, with the throat, neck, under-parts, and the front of the lower portion of the fore-legs blackish red; thus differing markedly from the red brocket, in which these parts are much lighter than the back. This is a mountain form, inhabiting the highlands of Ecuador at elevations of 12,000 feet or more.

THE CENTRAL AMERICAN BROCKET

(*Mazama sartorii*)

(Plate VII. Fig. 10)

In Central America the red brocket is represented by a smaller form, standing about 20½ inches at the shoulder, and distinguished by the light fawn-coloured throat, neck, and chest, and the white abdomen. The dark shading of the hair of the upper-parts appears on the lower part of the face, the front of the fore-legs, and the outer side of the hinder pair.

THE WOOD-BROCKET

(*Mazama nemorivaga*)

The speckled brown, greyish, or whitish coat, as well as its small size (19 inches at the shoulder), serves at once to distinguish this species from both the red and the black-faced brocket. There is also a light streak on the forehead below the eyes; and the tarsal gland and tuft are

stated to be absent. The range of this brocket extends from the Guianas and Colombia to Bolivia and Brazil ; and it is also found in the island of Trinidad. Avoiding the dense forests of the coast, in Brazil this brocket frequents the open plains and thin forest of the interior.

THE PERUVIAN BROCKET

(*Mazama tschudii*)

The highlands on the western side of the Peruvian Cordillera are the home of a representative of the present group distinguished from the last by its somewhat smaller size, smoother antlers, darker back, and certain other slight details of coloration.

THE PIGMY BROCKET

(*Mazama nana*)

The smallest representative of the group is the still imperfectly known pigmy brocket of the forests of Matto-Grosso and perhaps other parts of Brazil. Its colour is dark brown, with a tinge of reddish, above ; and it is reported to differ from the Peruvian brocket by the presence of a small tarsal gland and tuft on the inner side of the hock, as well as by the larger relative size of the face-glands.

THE CHILIAN PUDU

(*Pudua pudu*)

If the brockets offer but little attraction to the sportsman, this is still more markedly the case with the two small South American deer known as pudus, since their antlers are still shorter and more insignificant than

those of most of the former. They differ from the brockets by the very short or rudimentary tail, and the uniformly upward direction of the hair of the face. But these differences are scarcely of generic value; and were it not that two of the bones of the ankle-joint, or tarsus, which remain separate from one another in the brockets, are fused together in the pudus, both might be included in the genus *Mazama*. Even as it is, there may be some doubt as to the propriety of assigning the pudus to a genus apart.

The Chilian pudu, which inhabits the Andes of Chili and extends as far south as the island of Chiloe, stands about $13\frac{1}{2}$ inches at the withers, and possesses a distinct, although small, tail. Its general colour is uniform reddish brown speckled with fawn. Beyond the fact that during winter it descends, in the southern part of its habitat, to the plains, nothing seems to have been recorded with regard to the life-history of this little deer.

THE ECUADOR PUDU

(*Pudua mephistopheles*)

(Plate VII. Fig. 11)

Although the Chilian pudu was described so long ago as the year 1782, the present species was only named in 1896; the type specimen being an immature doe from Paramo of Papallacta, Ecuador. The height at the shoulder of this specimen is about $12\frac{1}{2}$ inches, but full-grown examples probably exceed the Chilian species in stature. The distinctive features of this pudu are the total absence of a tail, the blackish brown fur speckled with bright rufous, and the nearly black face and limbs. The ears are also smaller and more hairy; the long hair filling their interior being white.

THE GUANACO

(*Lama huanacus*)

(Plate VIII. Fig. 1)

South America is the home of two peculiar mammals which are the western representatives of the camels of the Old World, although, owing to the absence of the characteristic dorsal hump or humps, there is nothing particularly camel-like in their general appearance. In common language they are usually spoken of as llamas, although the name llama is properly restricted to one of the two domesticated breeds of the larger species, whose proper title is guanaco—pronounced huanaco. The second and smaller wild species is the vicugna. Both the guanaco and the vicugna are long-limbed and long-necked animals, with well-formed, game-looking heads, surmounted with long and pointed ears, and carrying themselves in a stately manner. They are clothed with a long coat of thick woolly hair, which is of a pale reddish fawn-colour on the upper-parts, shading off into nearly white on the under surface of the body and the inner side of the limbs; the hair being longest on the under-parts. In both animals the eyes are unusually large and beautiful; and the tail is short and bushy. The feet are of the same cushion-like type as in the camels, the sole of each of the two toes having a soft elastic pad. On the face and legs the hair is comparatively short. As regards the structure of the skeleton and the anatomy of their soft internal parts, as well as in their dentition, the guanaco and vicugna conform essentially to the camel type; but for such details the reader may be referred to works written on more scientific lines than is the present volume. Both species indulge in the unpleasant habit of spitting at intruders, this being apparently their only means of aggressive defence; their chief security from enemies being their speed of foot.

As already mentioned, the guanaco and vicugna are two of the most characteristic of the few large herbivorous mammals now inhabiting South America. They do not, however, properly belong to the original indigenous South American fauna, but, like the deer and the tapirs, are comparatively recent immigrants into the country from the north. This is attested by the occurrence of the fossilised remains of numerous allied extinct forms in the Tertiary formations of North America and the absence of such from the corresponding deposits of Patagonia.

The guanaco is considerably the larger of the two species, standing about 4 feet in height at the shoulder, and measuring from 7 to 8 feet in total length. An average-sized specimen will weigh between 180 and 200 pounds. In some specimens the face is nearly black, instead of the usual grey. The most characteristic feature by which this species can be distinguished from the vicugna is, however, the presence of bare pads, or callosities, on the hocks. The head is, moreover, longer, and the skull proportionately larger than in its smaller relative.

The geographical range of the guanaco extends from the storm-swept island of Tierra del Fuego and the adjacent islets, northwards through the desolate wastes of Patagonia into Southern Argentina (where the animal is almost exterminated), and also along the chain of the Andes into the highlands of Peru and Bolivia. In spite of the fact that guanaco were seen by Darwin swimming in the sea from islet to islet in the neighbourhood of Port Valdez, in the Gulf of San Matias, it seems improbable that they would be able to cross the stormy Strait of Magellan. And if this be so, these animals must have reached South America from the north at a time when Tierra del Fuego was still united with the mainland.

Accounts of the habits of the wild guanaco and of guanaco-hunting have been given by several writers. Among these may be mentioned Darwin in *A Naturalist's Voyage*; Dr. R. O. Cunningham in his work entitled *Natural History of the Strait of Magellan* (1871); Lady Florence

PLATE VIII

1. Guanaco.
2. Vicugna.
3. Collared Peccary.
4. Roulin's Tapir.
5. Common Tapir.
6. Jaguar.
7. Puma.
8. Ocelot.
9. Tiger-Cat.
10. Red Lynx.
11. Coyote.
12. Maned Wolf.
13. American Black Bear.
14. Spectacled Bear.

11

1

6

9

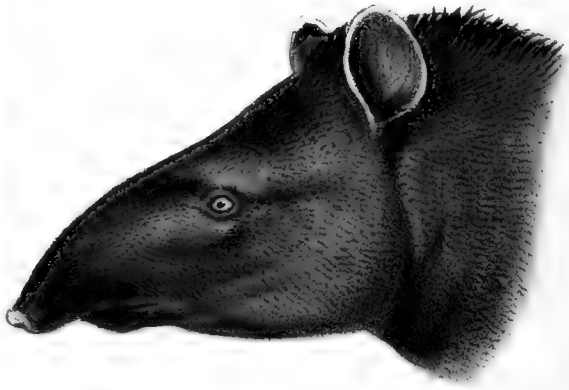
3

2

10

4

12



5

13

14

8

7

AMERICAN TYPES.

Published by Rowland Ward Ltd.

Dixie in *Across Patagonia* (1880); and Mr. W. H. Hudson in *The Naturalist in La Plata* (1892). Unfortunately neither the guanaco nor the vicugna possess anything in the way of trophies to attract the sportsman, so that the main inducement to their pursuit is the excitement of the chase itself. It should, however, be added that the skins of both species make beautiful rugs, and that guanaco-meat is of excellent quality; a favourite *bonne-bouche*, accordingly to Lady Florence Dixie, being the fat behind the eye.

Guanaco are diurnal and gregarious, usually found in small troops, but on the stony plateaux of the southern districts of Patagonia occasionally collecting in herds, whose members may be numbered by hundreds. Barren to all appearance as are the districts where these animals are most numerous, yet guanaco always manage to obtain sufficient food, and are almost invariably in good condition. They are excessively shy and wary, and at the alarm-scream of the sentinel which is always posted at the feeding-grounds the whole herd dashes off at headlong speed. Writing of the first guanaco killed by her party, after a long chase, Lady Florence Dixie makes the following observations:—"Looking at his frame, his long, powerful legs, his deep chest, and body as fine-drawn almost as a greyhound's, we no longer wondered that guanacos run as swiftly as they do. Indeed, this one would have laughed at us had he not been closed in as he was."

They are, moreover, quite as inquisitive and full of curiosity as deer, and will, according to Mr. Hudson, not only approach a single horseman to inspect him, but will sometimes follow him for miles. Darwin bears witness also to their excitable disposition and the strange antics in which they indulge at times, neighing and squealing when approached, and prancing and curvetting in an almost comical fashion. On one occasion a guanaco was seen chasing a fox, apparently in mere sport.

A very remarkable trait displayed by guanaco in the south of Patagonia

is their habit of resorting to one particular spot at the approach of death ; one of these dying-places being situated on the Santa Cruz River where the valley is overgrown with dense thicket, beneath which the moribund animals crawl to expire. In such situations the ground is covered with the bones of countless numbers of individuals. The origin and object of this singular habit is difficult in the extreme to conceive.

Guanaco are generally hunted with dogs by mounted men, but they may also be stalked. Lady Florence Dixie, who also bears witness to the tenacity of life displayed by these animals when wounded, gives the following account of some of the difficulties encountered in guanaco-stalking. "We had not gone far," writes her ladyship, "when we heard a shrill neigh close by, and looking round we saw a guanaco standing on the crest of a hill overlooking the valley. He had scarcely uttered his cry when it was repeated at a little distance off by another watchful sentinel, and then they both slowly cantered off, looking back at us as they went along, and neighing loudly at intervals. The herd meanwhile, warned of the approach of danger, leisurely trotted up the escarpment on the other side of the valley, and as leisurely disappeared over the plain."

THE VICUGNA

(*Lama vicugna*)

(Plate VIII. Fig. 2)

This smaller relative of the guanaco was named by Molina in his *Natural History of Chili*, published in the year 1782. The leading features by which the vicugna is distinguished from the guanaco having been already referred to, they need not be mentioned a second time. The present animal is exclusively an inhabitant of the high Cordillera, where it is restricted to the south of Ecuador, Peru, and Northern and Central

Bolivia. It has been said to resemble the Alpine chamois in its habits, but since, on account of the softness of its feet, it avoids bare rocky crests, and, above all, glaciers and snow-fields, resorting in preference to grassy patches, the comparison scarcely seems a true one. During the rainy months vicugna ascend as high as possible up the mountains, descending to the higher valleys at the commencement of the dry season. Their habits appear to be essentially similar to those of their larger relative the guanaco, and therefore need no special mention. The fawns, of which there is but one at a birth, are dropped in February, and are almost immediately able to follow the herd. Large numbers of vicugnas are captured by Indians, who drive them into enclosures made with stakes and ropes.

THE COLLARED PECCARY

(*Dicotyles tajacu*)

(Plate VIII. Fig. 3)

As the camels of the Old World are represented in South America by the llamas, so the place of the pigs of Europe, Asia, and Africa is occupied in the New World by the very distinct hog-like creatures known as peccaries. Whereas, however, the llamas are exclusively South American at the present day, the peccaries range northwards into the United States as far as Arizona, Texas, and the Red River of Arkansas. Southward their range appears to be limited by the Rio Negro in Patagonia. The native name of the present species in the Tupi language is Tajacutiragua, but by the Brazilians it is called Queixada or Queixo, while among the Guarani Indians of Rio Grande do Sul it is known as Tagnicati.

Although presenting a considerable superficial resemblance to a small

and delicately built hairy pig in external appearance, peccaries are broadly distinguished by the rudimentary condition of the tail, which is reduced to a mere tubercle, as they also are by the presence of a gland on the middle of the back. Another important feature is that the upper tusks, or canine teeth, are directed downwards in the ordinary manner, instead of being curved upwards as in the swine of the Old World. The lower tusks bite into notches in the upper jaw. In the hind-feet there are but three toes, in place of the four of the true swine. There are also certain internal anatomical differences between swine and peccaries—notably the complex structure of the stomach in the latter. The ears of the peccaries are small in comparison with the size of the head; and the skin is covered with coarse bristly hairs, which are elongated to form a crest, or mane, along the back of the head and neck, and likewise a fringe on the throat and hind-quarters. In their naked mobile snouts peccaries show their essentially swine-like nature. They are, however, unlike the Old World swine in that they never give birth to more than a pair of young at a time; these being uniformly coloured, and not striped and spotted with yellowish like those of the great majority of wild swine.

The collared peccary measures about 3 feet in total length, and is of a dark grey colour, with a white or greyish white gorget passing across the chest and extending upwards on each side to the shoulders.

Inclusive of the various geographical races into which it has been divided, the range of this peccary extends from the Red River of Arkansas, in latitude 34° N., southwards through Mexico and Central and South America to the Rio Negro in Patagonia. The typical form of the species is from the south of Brazil.

In common with its fellow species, this peccary affords to the sportsman practically nothing in the way of trophies, and very little in the way of sport. Like all its kindred, it is a forest-dwelling animal, but it differs from the white-lipped species in going about singly or

in pairs, or, at most, in small family parties of from eight to ten head each.

It is also a harmless and inoffensive creature, keeping to the densest portions of the forest and shunning encounters with human beings. Its dwelling-place may be a hollow tree, a clump of bushes, a tussock of long grass, or the deserted hole of some burrowing animal. Either this or the next species ascends in some parts of South America to a height of 3000 or 4000 feet above sea-level. In search of food peccaries may be abroad at any hour of the day or night; their chief food consisting of roots, fruits, and hard palm-nuts, which their strong jaws enable them to crack with facility. Peccary pork is by no means of a high class, and unless the gland on the back has been removed immediately after the death of the animal is absolutely uneatable.

THE TEXAN COLLARED PECCARY

(*Dicotyles tajacu angulatus*)

The collared peccary of Eastern Texas, on the evidence of the skull, was described by the late Professor E. D. Cope[1] as a distinct species, although there can be little hesitation in regarding it merely as a local variety. Among other characteristic features of the skull are the angulated nasal bones and the quadrituberculate last upper premolar; that tooth being tritubercular in the typical race. The colour of the hair is very dark. This peccary is also found in North-Eastern Mexico.

[1] *American Naturalist*, vol. xxiii. p. 147 (1889).

THE SONORAN COLLARED PECCARY

(*Dicotyles tajacu sonoriensis*)

The collared peccary inhabiting Arizona and the Sonoran district of Mexico was described in 1897 by Dr. E. A. Mearns as a variety of Cope's *D. angulatus*.[1] From the latter it differs by its superior size, relatively larger ears and feet, and paler coloration. In place of being blackish, its colour is greyish, with a sharply contrasting dark dorsal streak. There is also said to be a certain difference in the form of the lower cheek-teeth. It is added that the young are pale reddish brown, with a black dorsal stripe.

THE COLOMBIAN COLLARED PECCARY

(*Dicotyles tajacu torvus*)

This variety of the collared peccary was named *Tayassu torvus* in 1898 by Mr. O. Bangs,[2] who regards it as a distinct species. The colour and external characters are the same as in the typical *tajacu* and its variety *angulatus*, but the skull is smaller and otherwise different. Among its peculiarities, the skull is characterised by its depression, shortness, and width, and by the evenly rounded and flattened nasal bones. The type specimens were obtained from the Santa Marta district of Colombia. The characters by which this and the preceding races are distinguished appear very trivial.

[1] *Proceedings U.S. National Museum*, vol. xx. p. 469.

[2] *Proc. Biol. Soc. Washington*, vol. xii. p. 164.

THE WHITE-LIPPED PECCARY

(*Dicotyles labiatus*)

This species has a much more restricted range than the collared kind, extending only from British Honduras to the south of Paraguay. In addition to being a larger animal (length 40 inches), it is distinguished from the collared peccary by its black colour and white lips and lower jaw.

In habits it is also markedly different from the latter, associating in large herds, sometimes containing as many as a hundred individuals, under the leadership of an old boar. It is likewise of a pugnacious disposition, and can inflict serious wounds with its sharp tusks. A herd should therefore be given a wide berth by an unarmed man.

THE COMMON TAPIR

(*Tapirus terrestris*)

(Plate VIII. Fig. 5)

Shy and inoffensive animals, frequenting the most dense tropical and subtropical jungles, and unprovided with either horns, antlers, or long tusks, the tapirs offer very little attraction to the European sportsman, by whom they are but seldom hunted. Nevertheless they undoubtedly come under the designation of big game, and must therefore receive mention in the present work.

Although often supposed to be related to the pig tribe, tapirs are really distant cousins of the horses and the rhinoceroses, but they are decidedly of a more primitive type than the latter, and therefore infinitely more so than the former. Indeed, they approach much more nearly, especially as regards the form of their teeth, to certain extinct odd-toed,

hoofed animals than is the case with any of their living kindred. That they are an extremely ancient group is testified by their very remarkable geographical distribution, one species, the Malay tapir,[1] being found in the Malay Peninsula and adjacent territories, while the other four existing representatives of the group are restricted to Central and South America. These animals are, however, comparatively modern immigrants into South America (as is proved by the absence of fossil remains of tapirs in the Tertiary deposits of Patagonia) from the north, and in former times were widely spread over Europe and Asia, where there were numerous species now extinct. It is evident, therefore, that the Malay and South American tapirs are the survivors of an ancient and once widely spread group of ungulates which has disappeared from the rest of the globe.

But it is time to say something with regard to the general appearance and leading characteristics of these very old-fashioned animals, all of which are as much alike in external form as they are in anatomical structure. Tapirs, then, are somewhat heavily built and thick-set animals, with short and stout limbs, moderate-sized, pointed ears, an elongated and trunk-like muzzle, and a very short tail. Their toes are protected by hoofs, of which there are four on the front feet, but only three to each of the hind limbs. Instead, however, of the four front toes forming a central symmetrical pair flanked by a smaller but likewise symmetrical lateral pair, the hoof corresponding to the nail of the middle human finger is larger than either of the others and symmetrical in itself. On either side of this are the hoofs corresponding to the nails of the index and ring fingers of man, which are symmetrical to one another, while the hoof corresponding to the nail of the little finger is unsymmetrical and has nothing to balance it on the opposite side of the foot. In the hind-foot, where there are only three hoofs, there is a perfect symmetry, the large central hoof being symmetrical in itself, while the smaller lateral pair are symmetrical to one another. It is this

[1] See the companion volume, *Great and Small Game of India, etc.*

symmetry to the middle line of the foot which, among other characters, shows that the tapirs belong to the group of odd-toed ungulate, or hoofed, mammals, of which the rhinoceroses and horses are the only other living representatives. The ancestors of this group must, of course, once have possessed five toes to each foot, and the retention of four toes in the fore-foot of the tapirs serves to show how the change from a five-toed to a three-toed type has been gradually effected. The modern horses represent the extreme modification of this type of foot-structure, in which the hoofs are reduced to a single large and symmetrical one on each foot.

To revert to the special characteristics of the tapirs, it may be added that the nostrils are situated at the extremity of the short and mobile proboscis ; and that the eyes are rather small and pig-like. The thick and smooth hide is more or less thinly covered with short hair, which in some species may become very scanty indeed as age advances. The adults of all the four American species are more or less completely uniform dark brown or blackish in colour ; but the young of at least three are striped and spotted with yellowish white, which was probably the original type of coloration of the group at all stages of life. Into the structure of the skull and other portions of the skeleton it will be unnecessary to enter on this occasion. But it may be mentioned that the cheek-teeth are of a comparatively simple type of structure, with low crowns ; those of the lower jaw carrying a pair of transverse ridges, while in those of the upper jaw a nearly similar pair of ridges, or cross crests, are connected by a longitudinal wall on the outer side of the crown. The canines, or tusks, are of moderate size. The total number of teeth is forty-two, there being one pair less of cheek-teeth in the lower than in the upper jaw.

The common American tapir was described in 1766 by the Swedish naturalist Linnæus as a species of land hippopotamus, with the title of *Hippopotamus terrestris*. When assigned to a separate genus—*Tapirus*—of which all the members are land animals, it was felt that the name

terrestris was unsuitable, as not being distinctive of any particular species, and the name was changed to *americanus*—a title which is likewise not distinctive. Naturalists, however, now refuse to admit objections of this nature, and the creature is accordingly called *Tapirus terrestris*.

This species is an inhabitant of the forests and lowlands of a considerable portion of tropical South America, including Venezuela, Guiana, Eastern Peru, the greater part of Brazil, Paraguay, and the Gran Chaco and Corrientes districts of North-Western Argentina. Compared with the Malay species, it differs not only by its more or less completely uniform dark coloration, but also by its somewhat inferior bodily size, as well as by the relatively shorter proboscis, the greater elevation of the hinder region of the head, and the presence of a short, stiff, upright mane extending from the latter down the neck to the withers. The ears are always margined with white.

The latter feature is well shown in a coloured plate published by Dr. Sclater in the *Proceedings of the Zoological Society of London* for 1882. The animal figured in that plate (No. xxiii.) was referred to *Tapirus dowi*, but in a later note[1] its describer came to the conclusion that it was really a somewhat abnormally coloured individual of the present species. It was obtained from Venezuela, and exhibits a large white patch on the side of the face at the angle of the mouth, which is continuous with a white area on the chin and throat. Other specimens are of darker tint than ordinary.

It is not improbable that these variations indicate the existence of distinct local races of this wide-ranging species. And it is noteworthy that in the presence of white on the sides of the face the above-mentioned Venezuelan specimen approximates to the next species.

By the natives of Brazil this tapir is known as the Anta; but in the Tupi language its designation is Tapira-caapoara, while by the Guarani Indians of Rio Grande do Sul it is called Mborevi. According to

[1] *Proc. Zool. Soc.*, 1885, p. 718.

Schomburgk its title in British Guiana is Maipuri. Although by no means the tallest, tapirs are some of the largest wild South American mammals.

All the five existing species of tapir appear to be very similar to one another in their general habits, so that one account will serve for all. As already mentioned, they are shy, retiring creatures, haunting the most sequestered depths of the tropical forests ; and since they are likewise mainly nocturnal, it follows that they are but seldom seen, unless when drinking, when accidentally disturbed from their lairs, or when driven from the same by hounds. Their food varies to a certain extent in different districts and according to the time of year, consisting in some cases of palm-leaves, in others of fallen fruits, and in others of water-plants ; while in cultivated districts toll is taken of sugar-cane and other crops. The comparatively simple structure of the cheek-teeth of tapirs is adapted to the mastication of a mixed vegetable diet like the above rather than for chewing grass ; grazing animals, such as horses, oxen, and antelopes, having a more complicated type of molar dentition. Among the wild fruits most commonly eaten by tapirs are those of the passion-plant and of various members of the cucumber family.

The immediate neighbourhood of a large body of water, in which they can disport themselves, seems absolutely essential to the existence of these animals ; and in localities where they are more or less abundant regular beaten tracks lead down from the heart of the forest to the rivers along which they pass and repass on their daily journeys to and from their drinking-places. It is at these spots that the traveller by canoe or boat on the great South American rivers is most likely to obtain a glimpse of these animals as they come to the bank at early dawn. The feeding-time of tapirs usually commences about sunset, and probably continues throughout the night. As a rule not more than three individuals are to be met with in company ; and, except in the pairing-season, the old males lead a solitary existence.

In their fondness for water tapirs probably retain a habit possessed by their primitive ancestors the palæotheria of the Tertiary deposits of the Paris basin ; for it seems that all the primitive hoofed mammals, whether belonging to the odd-toed or the even-toed group, were more or less aquatic in their habits ; the grazing animals, such as horses and antelopes, only having come into existence contemporaneously with the appearance of extensive grassy plains. The tapirs and rhinoceroses in the odd-toed group, and the swine and hippopotamuses in the even-toed section, are some of the modern ungulates in which this ancestral habit is conspicuously displayed. As regards tapirs, not only are they most expert swimmers, crossing large and rapid rivers, even when in flood, with facility, but also diving below the surface, and perhaps at times walking on the river-bed itself. Occasionally tapirs are seen in arid districts, but only in passage from one forest tract to another. Places where there is a salt efflorescence in the soil are frequently visited by these animals for the sake of the saline matter.

The senses of smell and hearing are strongly developed in tapirs, enabling them to recognise the approach of danger at a considerable distance. When frightened by such danger these animals, owing to their great muscular strength, are able to rush headlong through the forest, in spite of the density of the vegetation. At other times they are slow and almost sluggish in their movements, generally walking along with the muzzle raised but little above the ground. Although on ordinary occasions timid and harmless creatures, a female tapir whose young one has been killed or captured will frequently rush impetuously on the hunters or their hounds, knocking them over and then trampling upon and biting them. A shrill whistle is the characteristic sound uttered by tapirs, but, according to Dr. Goeldi, this is emitted only by the female. Both sexes when frightened give vent to a loud snort as they rush off.

The flesh and hide of the tapir are much valued by the aborigines of

South America, who display much skill in hunting and tracking these animals. The usual plan is to hunt them with dogs from their forest retreats into the water, where other members of the party await their arrival in the concealment afforded by the rank vegetation on the bank of the river or lagoon. In cases where the extent of water is not very large the unfortunate animal is generally soon dispatched by the knives or clubs of the hunters; but when the lagoon is more extensive the tapir not unfrequently succeeds in regaining covert, when the chase has to be recommenced. Some tribes, on the other hand, track the animal to its place of repose and dispatch it before it has time to awake and make its escape. A large number of tapirs are likewise killed by the jaguar, which appears to be particularly partial to the flesh of these animals.

Many of the Indian tribes living on the borders of rivers and lakes are in the habit of taming tapirs, which go about the villages much in the same manner as domesticated swine in other parts of the world. Whether, however, these tame tapirs breed in captivity does not appear to be ascertained. They are tame enough to take food from the hands of their masters, and become as omnivorous in their tastes as the domesticated hog.

This species of tapir is very generally represented in the menagerie of the Zoological Society of London, where it thrives well.

ROULIN'S TAPIR

(*Tapirus roulini*)

(Plate VIII. Fig. 4)

In the Andes of Quito and other parts of Ecuador, as well as of Colombia and Peru, the place of the common tapir is taken by the present species, which is often known as the mountain tapir, while by the natives

it is termed the Pinchaque. It is generally found at an elevation of between 7000 and 8000 feet above sea-level. In addition to the presence of a large whitish patch on each cheek, it differs from the tapir of the plains by the less vaulted skull and rounder neck, as well as by the slighter development of the mane of hair in the latter region. This tapir was described by Roulin so long ago as the year 1829. In correlation with its mountain habitat, the hair is coarse and long; the general colour being blackish brown both above and below as well as on the limbs. On the sides and under surface of the head and neck the colour changes to speckled brownish grey, becoming still lighter on the cheeks. The lips are bordered with a broad band of white. Nothing, apparently, has been recorded of the habits of this tapir in the wild state. At the present time it is represented in the exhibition series of the British Museum by a specimen obtained many years ago from Ecuador.

BAIRD'S TAPIR

(*Tapirus bairdi*)

From the two tapirs described above the present and the next species differ in regard to the nasal region of the skull; this difference being regarded by many naturalists as of sufficient importance to justify their reference to a distinct genus, *Elasmognathus*. In the common tapir, as well as in Roulin's tapir, the partition, or septum, between the two nostrils in the skull remains cartilaginous throughout life, as in the great majority of mammals. In Baird's tapir and Dow's tapir, on the other hand, this partition becomes bony in adult animals, thus forming in the dry skull a solid longitudinal and vertical wall of bone dividing the nasal chamber into two halves. A precisely similar bony partition is found in the extinct woolly rhinoceros (*Rhinoceros antiquitatis*) of Northern Europe and Asia.

For a long time it was supposed that the partition in the later animal was developed in order to aid in supporting the long front horn, but the fact that the white rhinoceros, which carries an equally heavy front horn, has no such partition, coupled with the presence of a partition in two species of hornless tapirs, renders it doubtful whether this is the true reason for the ossification of the central cartilage of the nasal chamber.

Baird's tapir was described by Dr. Gill[1] in the year 1865, and is an inhabitant of Mexico, Honduras, Nicaragua, Costa Rica, and Panama, thus being the most northerly representative of the group in America.

DOW'S TAPIR

(*Tapirus dowi*)

The fourth and last American representative of the group agrees, as already mentioned, with the preceding in the ossification of the nasal partition, and is exclusively confined to Central America, where it is found in the republics of Guatemala, Nicaragua, and Costa Rica. The specimen from Venezuela figured under this name in Plate xxiii. of the *Proceedings of the Zoological Society of London* for 1882 has been shown to belong to *Tapirus terrestris* (see page 386). Dow's tapir was first recognised as a distinct species in 1870, when it was described by Dr. Gill[2] on the evidence of the skull. This is distinguished from the skull of *T. bairdi* by the very small nasal bones; these being very thin and separated by an anterior prolongation of the frontals, to which they become united. As regards the scanty information we possess of the external characters of this species and *T. bairdi*, the late Mr. R. Alston (*Biologia Centrali Americana*—"Mammalia," p. 101) wrote as follows:—

"The young of *T. bairdi* is reddish brown, with irregular white spots

[1] *Proceedings Philadelphia Academy*, 1865, p. 183.

[2] *American Journal of Science*, ser. 2, vol. ii. p. 142.

and stripes; that of *T. dowi* is *said* to be unspotted. A half-grown specimen of the former is dark reddish brown, with chestnut cheeks and a pure white chest; a similar individual of the latter is blackish brown, with a dirty white chest. The adult of *T. bairdi* is still undescribed; that of *T. dowi* is blackish brown, the head being paler."

THE JAGUAR

(*Felis onca*)

(Plate VIII. Fig. 6)

In England we are accustomed to pronounce the name of the largest American cat as though it were an English word. The real native pronunciation is, however, quite different; as thus pronounced, the name should be written in English as *hawa*.

The jaguar is a large and heavy animal, fully equalling in size the largest Indian and African leopards, and in some instances apparently exceeding them in this respect. Like the leopard, the jaguar is a spotted species; the black spots on the head, neck, and shoulders being dotted about in an irregular manner, but those on the body arranged so as to form large rosettes, or sometimes (by coalescence) imperfect rings; two or three spots usually occupying the central area of the rosettes. Although subject to a considerable degree of local (and perhaps individual) variation, the general ground-colour of the fur of the upper-parts is some shade of brownish yellow, which is not darker within the black rosettes than elsewhere. The rosettes on the body are ranged in from five to seven longitudinal rows. At each angle of the mouth is a round black spot; and the ears are likewise black externally, with a buff patch near the tip. The tail is ornamented with black rings. Its lower surface, like the under-parts of the body, is pure white, as are also the lips and throat; these white

areas of the body being marked with solid black spots. Exact measurements of freshly killed jaguars are still much wanted; but it appears that the length of the animal usually varies between 6 and 8 feet, the length of the tail being somewhat less than half that of the head and body.

There are, however, probably great local differences in the size of jaguars, those from Matto-Grosso, Brazil, as exemplified by a mounted specimen in the British Museum (of which the head is shown in the plate) being remarkable for their large dimensions. And it is probable that these differences, together with those of colour, will eventually render it practicable to divide the species into several local races. One such local race is, indeed, apparently indicated by the form from Mexico described in 1857 by Dr. Gray as *Leopardus hernandesi*, and at a much earlier date by Hernandez himself as *Felis mexicana*. In this form the small spots on the body are placed so far apart from one another that it is only here and there that they can be said to be aggregated into rosettes at all. Long ago it was noticed by Humboldt that the jaguars of the dense forests of the Orinoco have much darker skins than ordinary, the ground-colour being of so dark a brown that the black spots and rosettes show upon it only very indistinctly; some individuals from this locality being completely black. On the other hand, jaguars from the open plains of the countries forming the southern portion of the habitat of the animal are much lighter coloured than the ordinary form.

Inclusive of its local varieties, the jaguar has a range extending from the Red River of Louisiana southwards to the Rio Negro on the northern frontier of Patagonia in latitude 40° S.

In the tropical forest districts of Central and South America the jaguar is to a great extent an arboreal cat, hunting monkeys, tree-porcupines, and sloths with the stealthiness and agility characteristic of its tribe in general. In Uruguay and Argentina, where it is now nearly exterminated, its hiding-places are the scrub jungles which fringe many of the river valleys, or the

reed-beds bordering the numerous lagunas (lakes). Both in Uruguay and Paraguay these animals prey largely upon the great aquatic rodent the carpincho, or capibara. Water is everywhere essential to their existence, and they never wander far from its vicinity. On some parts of the Rio de la Plata they are even said to capture fish, and on the Orinoco they prey upon freshwater terrapins and their eggs. Occasionally, it is reported, they attack and kill crocodiles and caimans ; and even the tapir is not safe from them, many of these animals showing the marks of the jaguar's claws on their hides. Peccaries also form, in certain districts, no inconsiderable portion of the food of the jaguar, although only solitary individuals are attacked, a herd of these small swine being a match even for the large spotted cat.

When driven from its "kill," the jaguar seldom returns to finish its meal. At night, and more especially, it is said, during wet or stormy weather, the jaguar is a noisy animal, making the forests resound with its hoarse roar. As is the case with other large cats, the presence of jaguars in a district is always indicated on the tree stems, the bark of which is scored as high as the animals can reach. Jaguars, like pumas, are not unfrequently carried down the large South American rivers on natural rafts, or floating islands ; and since jaguars are still common in the forest districts of Tucuman and Cordova, a solitary individual, transported in this manner down the Parana or La Plata River, may occasionally make its appearance in parts of Argentina or Uruguay where the species has long since disappeared as an indigenous animal.

Excellent accounts of the life-history of the jaguar are given by the Spanish naturalist Azara, by Humboldt, by Darwin in a *Naturalist's Voyage round the World*, and by Mr. W. H. Hudson in the *Naturalist in La Plata*.

THE PUMA

(*Felis concolor*)

(Plate VIII. Fig. 7)

When the early Spanish *conquistadores* of South America met with a large tawny-coloured cat they gave it the name of *leon*, and were much surprised that they only encountered (as they thought) females. Hence the title of American lion is in common use for this species. In Europe, however, it is almost universally known by its Peruvian title, puma, or pooma, which is likewise largely used in South America. There are, however, several other South American names for this cat, among them being cuguacu-ara, or cuguacuarana, from which the French naturalist Buffon formed the abbreviation couguar, now in common use in the States. On the other hand, by the Guarani Indians of Paraguay the name güazuara is applied to this cat ; while by other tribes it is called either yagüa-pita (red dog) or yagüati (white dog). In Brazil it is known as suçuarana and onça vermetha. Its most unfortunate title is, however, "painter," a corruption of panther, by which it is commonly known in the States, for if there is one cat that the puma does not resemble it is the spotted leopard, or panther, of the Old World.

As the puma is the only large uniformly coloured true cat inhabiting America, there is no possibility of its being confounded with any other member of its tribe. From the lion of the Old World it is broadly distinguished by the absence of a mane in the male ; and in size it is generally inferior to the jaguar. The general colour of the fur on the upper parts is some shade of tawny, varying locally from fawn to rufous brown, and being darker on the middle line of the back, and often also on the tail, than elsewhere ; the tail-tip being dusky brown or black. Externally the ears are blackish, with a light central area ; the upper lip,

from the nostrils to the middle of the mouth, is white; a black patch marking the former point, while the nostrils themselves are flesh-coloured. Inferiorly a larger or smaller area is whitish, and this light area may extend on to the inner sides of the limbs and the under surface of the tail, becoming, however, grey on the latter appendage. In some cases, although apparently not in all, the summer coat is reddish and the winter greyish. In this respect the puma resembles the white-tailed deer, thereby indicating in all probability that there must be some deep-seated cause, at present unknown, connected with this seasonal change of colour.

Puma cubs when first born show large irregular blackish brown spots on the upper-parts and outer surface of the limbs; these spots usually disappearing more or less completely when the cubs are about six months old. It is said that photographs of adult pumas sometimes show spotting, although this is invisible in the animal itself. White pumas have been reported, and blackish brown individuals are known to occur, although but rarely.

As might be expected in the case of an animal with such an enormous geographical range, the puma exhibits great local variation in size and colour; North American pumas being frequently, or invariably, much larger than those from Central and South America. According to Mr. F. W. True, the average length of the puma in North America is 7 feet 1 inch, of which 2½ feet are taken up by the tail.

From these local variations in size, colour, and the conformation of the skull American naturalists have split up the puma into several distinct species. The conferring of specific rank upon what are essentially nothing more than local races or phases of one and the same animal seems to the present writer a totally erroneous view, and one that tends to obscure the all-important feature of the enormous geographical range of a single type. Accordingly, such local phases, although recognised and named, are here regarded in the light of subspecies of *Felis concolor*.

The puma is unknown in Alaska, but occasionally ranges as far north as latitude 60° in the Stickeen district. More commonly, however, its northern limit on the western side of the continent is approximately formed by the 55th degree of latitude, or, roughly speaking, by the northern boundary of British Columbia. From this point the northern limit of the species sweeps obliquely across the continent to Maine in about latitude 45° or 46°. Southwards, with the exception of a few small areas, the distributional area extends uninterruptedly to the straits of Magellan. No other American mammal has anything like this enormous geographical range, so that the puma may be called, *par excellence*, the characteristic American animal. With the exception of New Hampshire, Rhode Island, New Jersey, Delaware, Michigan, Indiana, and possibly, although not probably, Nevada, the species was formerly found throughout the United States. From Ohio it was, however, exterminated as early as the year 1834, and in more recent times it has disappeared from Illinois and Minnesota; the last individual having been killed in the latter territory in 1875. A carnivorous animal of the size of the present species is indeed bound to be exterminated with the advance of civilisation; and in the more cultivated and settled districts of the majority of the United States it is probable that not even stragglers are now to be met with. In the Rocky Mountains pumas ascend as high as the pasture-grounds of the wild bighorn sheep, and in California they have been observed at an elevation of about 3000 feet above sea-level. In the Chilian Andes, however, they are known to climb to much greater heights, evidences of their presence at an elevation of at least 10,000 feet having been detected.

Throughout the forest-clad districts of Central and South America the puma still appears to be a comparatively common creature, although in parts where the country is open its numbers have been greatly reduced. Mr. Aplin,[1] for instance, observes that in the State of Uruguay it is

[1] *Proceedings Zoological Society of London*, 1894.

practically exterminated from the open plains, although still lingering in the thickets (*monte*) along the river valleys. When the great rivers are in flood, pumas, like jaguars, may not unfrequently be seen carried down on natural timber rafts from the forest districts of the interior. On the Argentine pampas they are quite as scarce as on the plains of Uruguay, although more common in the wooded Chaco country of Tucuman and neighbouring districts. A few years ago they were still sufficiently numerous in the Rio Negro district of Patagonia to cause serious losses to the settlers, and in Southern Patagonia they are probably still abundant.

Three excellent accounts of the habits and mode of life of the puma have been published in recent years, two of these dealing with the animal in North America, and the third taking up the story in Argentina and Patagonia. The first of these will be found in Dr. C. H. Merriam's *Mammals of the Adirondack Region, North-Eastern New York*, published at New York in 1884. The second, by Mr. F. W. True, is published in the *Report of the U.S. National Museum* for the years 1888-89, which appeared in 1891. The third is in that delightful book *The Naturalist in La Plata*, by Mr. W. H. Hudson (1892).

With such an extensive range both in latitude and altitude, the puma has to adapt its mode of life to climates of all descriptions : in one region, as in the Adirondacks during winter, tracking its prey across the pathless snow, and in others capturing it among the luxuriant growth of tropical vegetation. It is found alike on barren mountain crests, among the leafy glades of Florida, and on the open plains of Texas and Argentina. Whatever may be the nature of the country it inhabits, the puma always selects sequestered and sheltered situations for its lair, but in general it frequents thick bushes and copses rather than the great forests. In San Francisco, according to Dr. Merriam, it is chiefly found in the pine zone on the mountains, although occasionally descending to the deserts. Here it is much dreaded by shepherds, who lose many members of their flocks—

both young and old—by reason of its depredations. Like other large cats, pumas are chiefly nocturnal in their movements, the twilight hours being their favourite times for hunting; occasionally, however, they may be seen wandering about in broad daylight. In the wilder districts of North America the various kinds of deer form its favourite prey, but it will also devour, especially when hard pressed, many smaller mammals, such as raccoons, skunks, and even porcupines, together with any birds it may succeed in taking by surprise. In Brazil, according to Dr. E. Goeldi, much of its food is formed by cutias, pacas, coatis, and other small animals. But in Argentina and Patagonia it is a terrible foe to the few species of larger mammals inhabiting those districts, preying indiscriminately on deer, guanacos, vicugnas, and the rhea, or American ostrich. Small mammals, such as the viscacha, are, however, by no means neglected; and even the bony armour of the armadillo forms no protection to its owner, whose soft parts are scooped out by the agile paw of the tawny cat. In a word, nothing comes amiss to the all-devouring maw of this unscrupulous marauder. Nor is even a meal of carrion rejected when occasion occurs. Wherever pumas abound it is practically impossible to rear horses, this being true alike for North and South America. In 1887 Mr. C. H. Townsend wrote as follows in regard to the depredations of pumas in the Shasta range of California:—"It is practically impossible to raise colts in the Shasta County hills on account of these pests. They destroy many hogs and young cattle also, but do not present so serious an impediment to the keeping of these animals as in the case of horses. Mr. J. B. Campbell, who trapped two panthers for me in 1883, told me that he had actually never seen more than two or three of the numerous colts on his stock-range, as they had been killed and devoured by panthers soon after birth." Mr. Hudson gives testimony of a similar nature in regard to Patagonia.

The one redeeming trait in the character of the puma is the rarity of its attacks on human beings, this seldom, if ever, taking place except when

the creature is famished by hunger, or when driven to bay by the hunter. Numerous writers bear witness to this fact in North America, and Dr. Goeldi has done the same in regard to Brazil. From accounts given him by the Gauchos in Argentina, Mr. Hudson goes even further, stating that pumas have been known to defend men from the attacks of the jaguar, to which this animal appears to have an innate antipathy, but this is probably a mere legend.

The situation of the breeding-place of the puma varies with the nature of the country it inhabits. In the Adirondacks a cave opening into the face of a scarped cliff may serve the purpose, but in the more southern States some dense coppice or cane-brake is the favourite resort, and on the pampas of Argentina a tussock of tall grass affords the required shelter. Equally marked differences occur in the season of the year at which the cubs come into the world ; the usual time in the United States being early spring or late winter, but in Argentina during the southern summer, that is to say, about the close of December. From two to five is the usual number of cubs in a litter when the animal is living in the wild condition ; and in North America, at any rate, it is believed that the female breeds only once in two years.

Except when hunted with dogs, or to aid themselves in ascending steep cliffs, pumas in the United States seldom climb trees, and when they do resort to this they usually leap straight up into the boughs instead of scaling the trunk. It is true that the trunks of trees are frequently scored by their claws, but this is due to the animals rearing themselves up against the stem and scratching the bark after the manner of the tiger in India. In the densely wooded districts of Paraguay pumas are, however, reported to become more or less arboreal in their habits, chasing monkeys from bough to bough like the jaguar.

As a rule, it appears that the puma is a silent animal ; but hunters and explorers bear testimony to the fact that it occasionally gives utterance to

piercing screams, probably in most cases only during the pairing-season.[1] This cry, which is repeated several times, is generally uttered in the early evening, and discontinued as the shades of night increase in intensity. On one occasion, at least, it has been heard when the animal was attacked by dogs.

Having said thus much with regard to the puma in general, its various local races may be briefly passed in review.

The puma inhabiting Colombia and Central America may be taken as the typical representative of the *Felis concolor* of Linnæus[2]; this form extending about as far as lat. 25° S. As compared with the undermentioned North American forms, the typical puma is remarkable for its small bodily size, thus conforming to the general rule that the representatives of a widely spread species gradually diminish in stature as we pass from North to South America.

The general colour of the upper-parts is some shade of reddish fawn. In addition to its small dimensions, the skull of this race is characterised by the flat and unswollen frontal region, the slight downward curvature of the processes forming the hinder border of the sockets of the eyes, and the low median (sagittal) crest. All the teeth, too, are relatively small and weak; the development of the tubercle on the inner side of the upper carnassial being slight. Mr. Bangs observes that, roughly speaking, the skull of this race resembles that of a large ocelot more than it does the skulls of the North American pumas.

[1] See P. Fountain, *The Great Deserts and Forests of North America* (1901).

[2] See O. Bangs, *Proceedings Biological Society of Washington*, vol. xiii. p. 15 (1899).

THE ARGENTINE PUMA

(*Felis concolor puma*)

South of about latitude 25° the typical red puma is replaced by a silver-grey form—the *Felis puma* of the old Chilian naturalist Molina—which extends into Northern Patagonia. According to Dr. P. Matschie,[1] the boundary between the rufous and grey forms is not sharply defined, as the two are sometimes found together.

THE PATAGONIAN PUMA

(*Felis concolor pearsoni*)

This very distinct form was described by O. Thomas[2] in 1901 on the evidence of a skin in the winter coat brought home from the Santa Cruz district of Patagonia by Mr. C. A. Pearson, who went to that country in quest of any possible survivors of the ground-sloth whose skin and hair were discovered a few years ago in a cave at Ultima Esperanza Cove. This form of puma is specially distinguished by its shaggy coat, short tail, extremely pale coloration, and, above all, by the light-coloured outer surface of the ears—a feature in which it differs from nearly all the members of the cat tribe. The general hue of the fur is described as clay-coloured, whereas that of the Argentine puma is drab-grey. The backs of the ears are whitish-fawn.

[1] *S.B. Ges. naturfor. Berlin*, 1892, p. 220; and 1894, p. 58.

[2] *Ann. and Mag. Nat. Hist.*, series 7, vol. viii. p. 188.

THE ROCKY MOUNTAIN PUMA

(*Felis concolor hippolestes*)

The distinctive features of this race, says its describer, Dr. C. H. Merriam,[1] are its relatively enormous size, reddish brown colour, and large and massive skull and teeth. In the skull the frontal region is elevated and swollen, the processes defining the hinder border of the sockets of the eyes are much curved downwards and inflated, and the tubercle on the inner side of the upper carnassial tooth is well developed. The nasal bones likewise differ somewhat in form from those of the typical race.

The general colour of the fur of the upper-parts is dull pale rufous brown, darker along the middle line of the back and on the tail than elsewhere, the tip of the tail being black. From the nose to the eyes the hue is greyish brown; there is a pale patch above each eye; the outer sides of the limbs are pale dull greyish fulvous; the chin, lips, throat, chest, the inner sides of the fore-legs, and the abdomen are dirty white; the lower surface of the tail being greyish white. Such, at least, is the description of the type specimen (an adult male), from the Wind River Mountains, Wyoming, given by Dr. Merriam in the paper cited above. The basal length of the skull is $7\frac{1}{8}$ inches, as contrasted with $6\frac{1}{4}$ inches in a specimen of the typical race.

The complete geographical range of this form of the puma has yet to be worked out; and it would appear that the variety (or varieties) inhabiting the Eastern United States has not yet received a distinct racial name.

[1] *Proceedings Biological Society of Washington*, vol. xi. p. 219 (1897), where it is regarded as a distinct species.

THE PACIFIC PUMA

(*Felis concolor oregonensis*)

The puma inhabiting the Olympic Mountains, Washington, and neighbouring districts was named *F. hippolestes olympus* by Dr. Merriam[1] in 1897. It was, however, subsequently shown by Mr. W. Stone[2] that Rafinesque had applied the name *F. oregonensis* to this form in 1832, and his title is therefore entitled to stand.

This is a decidedly smaller animal than the Rocky Mountain puma, much darker in colour, with the tail uniformly coloured up to the black tip instead of greyish white below. The light area on the under surface of the body is likewise smaller, and less white. The basal length of the skull of the specimen described by Dr. Merriam is just under $6\frac{1}{2}$ inches.

THE FLORIDA PUMA

(*Felis concolor coryi*)

In his work entitled *Hunting and Fishing in Florida*, which appeared in 1896, Mr. C. B. Cory separated the Florida puma as a distinct local race under the name of *Felis concolor floridana*. Unfortunately, however, the name *Felis floridana* had been used at a much earlier date for the Florida red lynx, and is, therefore, according to modern rules of nomenclature, ineligible for the present animal. Mr. O. Bangs, who, on account of its apparent isolation, regards it as a distinct species, has therefore renamed[3] it *Felis coryi*—a title which may be further amended as above.

Slightly smaller than the Rocky Mountain puma, this race is stated to

[1] *Proc. Biol. Soc. of Washington*, vol. xi. p. 219 (1897).

[2] *Science*, series 2, vol. ix. p. 34 (1899).

[3] *Proc. Biol. Soc. of Washington*, vol. xiii. p. 15 (1899).

be best distinguished from the other representatives of the species found in North America by its long limbs, small feet, and rich ferruginous colour. From the typical race it is so different as to stand in need of no detailed comparison. Apparently there is no seasonal change in the colour of the coat, which on the back is ferruginous, finely lined with blackish, while on the flanks it becomes paler and of a more fawn tint. The skull presents the general character of that of the Rocky Mountain race, although it appears to be slightly narrower. A three-quarter-grown kitten was marked on the back with irregular dusky spots.

Mr. Bangs is of opinion that this race is now restricted to the peninsula of Florida, where at present, at least, it is isolated from all the other forms of the species.

THE OCELOT

(*Felis pardalis*)

(Plate VIII. Fig. 8)

The next largest of the true cats of America is the ocelot, which is exceedingly variable in its coloration, and is mainly a southern form, although it was originally described by Linnæus on the evidence of a Mexican specimen, and ranges as far north as the Red River in Texas. On the east of the Andes its range extends southwards as far as Buenos Aires. With such a wide range in latitude, it might naturally be expected that the species would be represented by several local races, and such is undoubtedly the case, several of these local forms having received distinct names. The distribution, number, and characteristics of these local races still remain, however, to be worked out (and there is not sufficient material for this to be done properly in England), and accordingly they are not given separate headings in the present work.

Inclusive of these local varieties and colour-phases, the ocelot may be described as a variable blotched cat, inferior in size to the common lynx, with a tail less than half the length of the head and body. Typically the coloration of the upper-parts may be described as consisting of a rufous ground marked with black lines and spots, some of which enclose irregular blotches of a darker shade of rufous than the general ground-colour. On the flanks and hind-quarters the general hue changes to yellowish white blotched with black-margined patches of rufous; the legs being pale buff spotted with black, and the feet buffish white. The two black streaks so common among the smaller cats are seen on the cheeks; the chin and throat, as well as the black-spotted breast and under-parts, are white; and the tail has a ground-colour of deep buff, banded and spotted with black, and its tip wholly sable. The length of the head and body varies between 26 and 33 inches, and that of the tail between 11 and 15 inches. The typical form of the species comes, as already said, from Mexico. The Guatemala ocelot (*F. pardalis grisea*) has the ground-colour of the fur grey, tending in some instances to whitish on the flanks. Several examples of this grey phase of the species are known, which display variations in the spotting similar to those found in the typical fulvous form. Another grey phase, from some part of tropical America, has been described as *Felis pardoides*. It is one of the smaller forms of the species, the head and body measuring 26 and the tail 13 inches in length. It differs from *grisea* in the less ring-like form of the spots on the flanks, the shorter and less distinct neck-stripes, and the more rufous ground-colour of the fur on the neck. The painted ocelot (*F. pardalis picta*) is a large Central American form coloured less brilliantly than in the typical race, with the spots placed further apart, and less difference between the central areas of the latter and the general ground-colour. Another variety, of which the locality appears to be unknown, has been described as *F. melanura*; it is characterised by its brilliant coloration, the ground-colour being

bright fulvous, the black markings numerous and intense, and the white under-parts forming a brilliant contrast to the dark area above. Yet another phase has received the name *F. catenata*.

THE TIGER-CAT

(*Felis tigrina*)

(PLATE VIII. FIG. 9)

The last of the smaller true cats of America that will be noticed here is the tiger-cat, which appears to vary locally as much as the last. Sportsmen who desire to become acquainted with the distinctive features of the other species must refer to special works. The present species ranges from Mexico southwards on the east of the Andes as far as Paraguay and the forest districts of the interior of Argentina; it is thus essentially a tropical forest animal.

Inclusive of its local races, the tiger-cat differs from the ocelot by the shorter form of the spots, which are often quite solid, and are not aggregated into oblique chains. In the typical South American form, often known as the margay, the fur is of a somewhat harsh nature, with a dull grizzled grey ground-colour marked with long black spots and rings; the cheek having three black bars. The upper surface of the tail is ornamented with black spots, which frequently unite into bars, although never forming complete rings. The head and body measure about 20 inches and the tail 11 inches in length.

In the variety known as the chati, or *F. mitis*, the bodily size is somewhat greater, and the fur typically soft and bright fulvous in colour, with short black-bordered spots of variable dimensions, whose centres are not unfrequently of a pale tint. Dr. Matschie,[1] who adopts the name

[1] *S.B. Ges. naturfor. Berlin*, 1894, p. 59.

mitis for the species, states, however, that rufous and grey specimens may be found together. It appears to be uncertain whether this race is native to Mexico or to Paraguay. The so-called kuichua of Brazil, the *Felis macrura* of Prince Maximilian of Wied, is a yellow phase of the species taking its name from the great relative length of its tail. Both in this form and the chati the length of the head and body may be nearly 27 inches; that of the tail varying between 14 and 19 inches. Generally speaking, the tiger-cat is a more southern form than the ocelot.

THE RED, OR BAY LYNX

(*Felis* [*Lynx*] *rufa*)

(Plate VIII. Fig. 10)

For accurate information regarding this lynx (which was first named by the German naturalist Güldenstadt in the year 1777) and its numerous local races we are entirely dependent upon the writings of modern American naturalists, there being no series of specimens in England sufficiently large to admit of an independent opinion being formed with regard to certain disputed points. By some English writers, notably the late Professor St. George Mivart,[1] the red lynx was regarded as nothing more than a local phase of the common lynx; but this view has been shown by Mr. Outram Bangs[2] to be quite untenable, the skulls of the common and the red lynx being easily distinguishable by certain characters of the hinder part of the palate. To point out the details of this difference in a work of the present nature would obviously be out of place, and the reader must accordingly be content with the fact that such differences do exist. So important, indeed, are these differences considered by the gentle-

[1] *The Cat*, p. 425 (1881).

[2] *Proceedings Biol. Soc. Washington*, vol. xi. p. 47 (1897).

man mentioned, that he refers the common lynx to one subgenus, under the name of *Lynx*, while he separates the red lynx as a distinct subgeneric group with the title of *Cervaria*. Mr. Bangs[1] also considers that the red lynxes of eastern North America are specifically distinct from those of the western side of the continent, regarding the former as the true *Lynx rufa* (or *L. ruffus*, as, perpetuating an original typographical error, he prefers to spell it), while the latter are assigned to *Lynx fasciatus* of Rafinesque. He also separates the Florida and the Texas red lynxes as a third species of *Cervaria*, and the Nova Scotian representative of this type as a fourth. The differences relied upon seem to be chiefly connected with the skull and bodily form. But the possibility of intergradation between these three groups is suggested; and even if this prove not to be the case, they are evidently so closely allied that, in the opinion of the present writer, they seem best regarded as local races, or phases, of a single widely spread and variable specific type. This is indeed the view of Mr. F. W. True,[2] who writes as follows :—"The spotted form of the bay lynx, found in Texas, and the banded form, found in Oregon and Washington, have been described as separate species, under the names *Lynx maculatus* and *Lynx fasciatus*. They are now generally regarded as geographical races of the bay lynx."

According to Mr. Bangs, the red lynx, in addition to the peculiarities of the palatal aspect of the skull already referred to, differs from the common lynx by the smaller relative size of the feet (which is most marked in the Florida race), the larger area of the bare pads on the soles of the feet, the somewhat longer tail, and the shorter pencils of hair surmounting the tips of the ears. The fur, too, is shorter and closer. In the skull the upper jaw-bone, or maxilla, forms a junction of considerable length with the nasal on each side, instead of being nearly or completely cut off from the latter; the auditory bulla on the lower surface of the

[1] *Proceedings New England Zool. Club*, vol. i. p. 23 (1899).
[2] *Report of U.S. National Museum*, 1889, p. 591.

skull is deeper and longer; and the whole skull is narrower, especially in the region of the muzzle. As regards the teeth, the tusks are said to be stouter and the lower molar smaller than in the common lynx.

As is indicated by its scientific and popular names, this lynx, in the summer coat, is redder than the common species; this red tinge, which in winter is restricted to the flanks, making its appearance in the typical race about February. The backs of the ears are black, with a larger or smaller greyish triangular patch; the upper lip has a more or less conspicuous black mark, and the tip of the tail may be white, with several half-rings of black above, but in other cases is black. The amount of dark spotting and striping on the back varies in the different races.

In the proportionately longer tail, the shorter ear-pencils, and the relations of the maxillæ to the nasal bones, the red lynx departs less widely from more typical representatives of the genus *Felis*, such as the jungle-cat, than does the common lynx. The present species is a more southerly type than the latter, ranging as far south as Mexico.

In habits this lynx is doubtless nearly if not precisely similar to the common species. By American sportsmen it is usually termed the wild cat. In severe weather, according to Mr. Herrick, it is often compelled to prey upon porcupines in order to secure a living, and not unfrequently pays for its rashness with its life, examples having been killed in which the head and throat were transfixed with porcupine-quills.

THE EASTERN RED LYNX

(*Felis rufa typica*)

This, the typical, representative of the species ranges over the whole of the eastern and central parts of the United States, from about the latitude

of North Georgia to the coast of Maine. By American writers it is generally known as *Lynx rufus rufus*.

Its colour in Minnesota, when in the winter coat, is described by Mr. L. C. Herrick[1] as follows :—The hairs are tawny black at the base, buffy yellow in the middle, and white, or white ending in black, at the tip ; the ear-pencils being black. The tail is tipped with white ; and the neck-ruff is of moderate length, with stiff harsh hairs. On their outer surface the thighs are lighter than the back and spotted, while on the inner side they are indistinctly barred. Obscure dark bars are also apparent on the outer surface of the upper part of the fore-leg, on the inner side of which are several distinct black bars. The general hue of the whole of the upper-parts is the usual isabelline fawn, which is replaced by the red of the summer coat about February. It may be remarked that this summer change from fawn to red is precisely paralleled in the case of the white-tailed deer. The length of the head and body is 30 inches, and that of the tail 6 inches.

THE FLORIDA RED LYNX

(*Felis rufa floridana*)

This form was originally described by Rafinesque in 1817 as a distinct species, and inhabits the whole of the peninsula of Florida, extending west along the Gulf coast to Louisiana, and northwards on the Atlantic coast at least as far as South Georgia. Writing in 1897, when he classed it as a subspecies of *rufa* (or *ruffus*), Mr. Bangs[2] made the following remarks on this race :—" It is so strongly marked a form that I think it will prove a distinct species when specimens are procured at points where it meets the

[1] *Mammals of Minnesota*, p. 73 (1892).

[2] *Proceedings Biological Society of Washington*, vol. xi. p. 49.

range of *rufus*. It is large, but lightly built, with very small feet and hands, and darker than *rufus*, from which it differs in colour-pattern also, being much spotted and having black waved streaks on the back." The skull has the narrow form of the typical *rufa* in an exaggerated degree.

In 1899 the same writer[1] observed that this lynx, together with the Texan race (which undoubtedly intergrades with it somewhere in Western Louisiana or Eastern Texas), probably belongs to a group distinct from both the eastern red lynx and the western red lynxes (which are regarded by him as distinct species). "They have many peculiarities," he adds, "in common, differing from each other chiefly in colour. They are long-legged, small-footed, large-sized, lightly-built lynxes, with very long, narrow, high skull, with much 'pinched in' rostrum [muzzle], and rather light dentition."

THE TEXAN RED LYNX

(*Felis rufa texensis*)

As mentioned above, this form is closely allied to the last, with which it doubtless intergrades in Western Louisiana or Eastern Texas. It was described many years ago by Audubon and Bachman under the name of *Felis rufus maculatus*, but was renamed *Lynx texensis* in 1895 by Dr. J. A. Allen,[2] who regarded it as a distinct species. Details appear to be lacking as to the exact tone of colouring by which this race is distinguished from the preceding form, but it is specially characterised by the full spotting of the coat.

[1] *Proceedings New England Zool. Club*, vol. i. p. 25.

[2] *Bulletin of American Museum of Natural History*, vol. vii. p. 188; see also vol. viii. p. 78 (1896).

THE NORTH-WESTERN RED LYNX

(*Felis rufa fasciata*)

The *Lynx fasciatus* of Rafinesque (1817) is, as already mentioned, regarded by Mr. Bangs as so distinct from the typical eastern red lynx as (with the under-mentioned forms) to constitute a distinct species, but reasons have already been given for dissenting from this view. In all, or most, of these western representatives of the red lynx the skull differs from that of the typical eastern red lynx by its more rounded general form, wider and more inflated brain-case, differently shaped auditory bulla, and certain other structural details. It is a handsome form, met with in the coast regions of British Columbia, Washington, and Northern Oregon; the general colour of the fur being rusty red, but the back of the ears nearly wholly black, with only faint indications of a grey triangular patch. Its specific name refers to the fact that the dark markings take the form of indistinct bands or streaks, instead of spots.

THE PLATEAU RED LXNX

(*Felis rufa baileyi*)

The red lynx of the great Colorado plateau in Colorado, Utah, and Arizona was described in 1890 by Dr. C. H. Merriam[1] as a distinct species, with the title of *Lynx baileyi*, but was subsequently shown by Mr. Bangs[2] to be closely allied to the variety *fasciata*. Its describer observes that this animal differs from the typical red lynx of the east coast of the United States by its shorter tail and softer fur. The upper-parts are everywhere suffused with a buffish tint, and the dark markings of the

[1] *North American Fauna*, No. 3, p. 79 (1890).

[2] *Proceedings New England Zool. Club*, vol. i. p. 24 (1899).

former are either reduced in size or altogether wanting. The blackish markings on the face and forehead of the typical *rufa* are, for instance, obsolete, while the black half-ring at the end of the tail is reduced to one-half the width. The front margin of the ear, on the other hand, is whitish, and thus markedly different from the black behind; the corresponding border in the eastern race being tawny. The white so conspicuous on the hind toes of the typical *rufa* is absent. The skull is of the same rounded type as in the preceding race.

THE CALIFORNIAN COAST RED LYNX

(*Felis rufa oculea*)

According to its describer, Mr. O. Bangs,[1] by whom it was called *Lynx fasciatus oculeus*, this representative of the red lynx differs from the north-western race chiefly in colour, being more dusky on the back, and lacking the general rusty hue of that form. The back of the ear has a large and distinct grey triangular patch. The skull is like that of the north-western race. The type specimen was in the autumn coat; its colour is described as follows:—"On the upper-parts the under-fur is grey at base, cinnamon to ochraceous buff at ends; long hairs ringed with black and greyish brown and often black-tipped; the black predominating along the back, giving a dark grizzled appearance, but without any definite spotting or striping; sides much greyer, with the ochraceous buff of the under-fur showing through; top of head and face grizzled grey, lined and spotted with black; a large black mark at corner of mouth; ear black, with the aforesaid grey patch, a small black pencil, and soiled whitish inside; fore-legs dull greyish brown above, the ochraceous buff under-fur showing through, conspicuously spotted with brownish black; below

[1] *Proceedings New England Zool. Club*, vol. i. p. 23 (1899).

white, broadly banded with black ; hind-legs greyish brown, much shaded with dull ferruginous whitish on inside near body, spotted and banded with black and blackish brown ; under side of feet black ; tail rusty brown above, with a broad black subapical semicircle and five other less distinct black semicircles, below and at tip white. Under-parts white, pale cinnamon on lower sides bordering belly, spotted and barred with black ; a broad collar of ochraceous buff, also barred with black, across under side of neck."

The specimen from which the above description was taken was a subadult male from Nicasio, Maria County, California.

THE COLORADO DESERT RED LYNX

(*Felis rufa eremica*)

This phase of the species, which was described by Dr. E. A. Mearns[1] on the evidence of an adult male from the Colorado Desert in San Diego County, California, is regarded by Mr. Bangs as nearly allied to the last. It was in the winter coat, and is described as follows :—"Above pale yellowish brown, mixed with grey and black, obscurely spotted and striped with brown and blackish from the nape to the root of the tail. Legs ochraceous buff, mixed with greyish. Under side of body and of tail white. Chest, belly, and inner side of limbs spotted or banded with black. The sides and outside of limbs are spotted with yellowish brown. Tail reddish brown above, white below, with a subterminal spot of black. Ears pale grey, with a blackish spot at base, and black on apex and terminal pencil ; the usual grey spot, in this form, extends as a band clear across the convexity of the ear ; inner surface of ear white. Under side of hind-foot with a narrow longitudinal line of black, bordered by

[1] *Proceedings U.S. National Museum*, vol. xx. p. 457 (1897).

sooty. Crown and cheeks with obsolete rusty stripes. Sides of upper lip with four lines of small black spots; edges of lip black posteriorly. Tail with about seven transverse dorsal bars of black, which become obsolete towards the base."

This race is stated to inhabit the eastern and western desert tracts on the Mexican line; in the eastern desert tract it has shorter ears, and apparently a redder summer coat. As with desert animals generally, its most distinctive feature seems to be its pale coloration.

THE CALIFORNIAN RED LYNX

(*Felis rufa californica*)

This race, which was also named by Dr. Mearns,[1] is likewise regarded by Mr. Bangs as belonging to the same group as the last, although at the time of writing he had not seen a skull.

The type specimen, which was in the winter coat, is said by its describer to be very similar to the Texan race, but browner, less spotted, and with larger ears, the general colour being dark. On the upper-parts the hue is reddish brown, much mixed with grey and black, and becoming decidedly dusky in the middle line, with two interrupted dark stripes extending from the shoulders to the root of the tail. The flanks and outer sides of the limbs are ochery buff, mingled with grey and spotted with yellowish buff; the under-parts, inner sides of limbs, and the under surface and tip of the tail being white, spotted and banded (except the latter) with black. The chest bears a broad rusty greyish gorget, conspicuously spotted with black. As regards the large ears, these are marked very much as in the eastern race; the triangular patch of grey on the hinder surface

[1] *Op. cit.* p. 458 (1897).

being relatively small. The range of this race includes the Pacific coast tract of California, and was said by its describer to extend into Lower California, but this may be doubtful.

THE LOWER CALIFORNIAN LYNX

(*Felis rufa peninsularis*)

Mr. O. Thomas, by whom this race was named,[1] states that it differs from all the other forms of the species by its inferior size, a feature in which it agrees with several other mammals inhabiting the Californian peninsula. The general colour of the fur of the upper-parts is pale rufous tipped with grey, a few of the hairs on the middle line of the back being tipped with black. There is, however, no trace of the longitudinal black markings which form such a conspicuous feature of the pelage in the Californian race. But the markings on the face and ears appear however to be very much the same as in the latter, although the black spot on the upper lip is nearly obsolete and the grey patch on the back of the ear does not extend to its front border.

The above description is taken from specimens in the summer coat. The range of this race, which may be regarded as a dwarfed representative of the last, seems to be confined to Lower California.

THE MOUNT SHASTA RED LYNX

(*Felis rufa pallescens*)

Even the preceding does not exhaust the varieties of the red lynx recognised by naturalists in California, Dr. C. H. Merriam[2] having described yet another, from Mount Shasta in that State, under the name of

[1] *Annals and Magazine of Natural History*, ser. 7, vol. i. p. 42 (1898).

[2] *North American Fauna*, No. 16, p. 104 (1899).

Lynx fasciatus pallescens. It is described as generally similar to the north-western race (*fasciata*), but slightly smaller and much paler coloured, the pallor being especially noticeable on the head and face. The black at the base of the back of the ears is very indistinct in the winter coat, but the grey triangular patch is well marked. The general colour of the fur is hoary grey, contrasting remarkably with the rufous of the north-western race. Although slightly smaller, the skull is generally similar to that of the latter, but the carnassial teeth are usually smaller. Specimens from Mount Shasta itself are, however, stated to differ slightly from those described above (which came from the neighbourhood of Trout Lake, Washington), being less spotted and having rather larger carnassial teeth.

THE NOVA SCOTIA RED LYNX

(*Felis rufa gigas*)

The long list of local phases of the red lynx ends with one from Nova Scotia described by Mr. Bangs[1] in 1897 as a distinct species, under the name of *Lynx gigas*. It is apparently isolated from all the other races; and is a larger and more powerful animal than the typical eastern *rufa*, with a brighter and deeper colour, and a larger skull characterised by its flattened auditory bullæ and massive teeth, especially the tusks. There is much black on the upper-parts, and the triangular grey patch on the back of the ears is unusually small and dark.

The following is the description of the type specimen, which was in the winter coat :—

"Under-fur cinnamon-rufous, paling off on sides and becoming more intense on back and on inner sides of flanks; long hairs cinnamon and black, the black irregularly mixed in spots and streaks, which are most conspicuous

[1] *Proceedings of the Biological Society of Washington*, vol. xi. p. 50.

along the middle of the back ; ears with short pencil of black hairs ; upper surface of ear black with small triangular spots of dark grey ; tail above dull cinnamon, somewhat mixed with black, below white, tip black ; under-parts dull white spotted with black ; a pectoral collar of cinnamon ; under surface of feet black."

THE COYOTE, OR PRAIRIE WOLF

(*Canis latrans*)

(Plate VIII. Fig. 11)

The lithe and slender type of wolf inhabiting western North America from the plains of the Saskatchewan to the southern extremity of the Mexican table-land, and from the prairies of the Mississippi to the Pacific sea-coast, was recognised as a distinct species by Say [1] in 1823, and named *Canis latrans*. Some years later (1839) it was made the type of a distinct genus—*Lyciscus*—by Major Hamilton Smith in Sir William Jardine's *Naturalist's Library*, but zoologists have now reverted to the original nomenclature. Although a few of its local representatives have from time to time received distinct names, till recent years it has been very generally believed that there was but a single form of coyote. In 1897 Dr. C. H. Merriam [2] was, however, enabled to show that no less than eleven modifications of the coyote type were recognisable. These modifications he regarded as distinct species, remarking that "the name coyote has not been applied to a single animal, but to an assemblage of species comprising three well-marked subordinate groups and a considerable number of distinct geographic forms." He adds that "the results of this and similar studies should serve as a word of caution to those who are in the habit of citing the

[1] In Long's *Expedition to the Rocky Mountains*, vol. i. p. 168.

[2] *Proceedings Biological Society of Washington*, vol. xi. p. 19.

wolves, cats, weasels, and other groups as 'species' whose range violates the laws of geographic distribution."

To this it may be replied that the so-called laws of geographical distribution must fit themselves to the facts, and not the facts be made to accord with the "laws." And it seems preferable from every point of view to regard the various local modifications of the coyote type as so many phases of a single animal rather than as distinct animals, or species. This, however, is of course merely a matter of individual opinion.

Compared with the various modifications of the common wolf, the coyote is a slender, lithe, graceful, and smaller animal. The general plan of coloration has been so well described by Dr. Merriam that a paraphrase of his diagnosis may be quoted. Except in the pallid desert forms, in which the fulvous tints are replaced by buff, the muzzle, back of the ears, outer side, and in some cases the whole, of the limbs, and the terminal half of the lower side of the tail, are fulvous. The ground-colour of the back likewise varies from buff, or even from buffish white, in the desert forms, to dull fulvous in the South Mexican race; the relative preponderance of black-tipped hairs being usually dependent upon the intensity of the ground-colour. The upper surface of the tail is coloured like the back, but shows at about one-third the length from the root an elongated black spot, marking the position of the gland situated here in all members of the dog tribe. The tail-tip is always black, although occasionally it may contain a tuft of white hair. In all cases the dog coyote is superior in size to his partner.

As the coyote is only admitted on sufferance among "game animals," a very brief reference to its habits must suffice. These are generally similar to those of the larger wolves, although the coyote much more frequently constructs a burrow for itself. Its cry is a howl, differing markedly in tone from that of the common wolf. The speed of the coyote is great. Its food consists chiefly in ordinary seasons of various kinds of hares, but

chipmunks and other small mammals are likewise consumed, as well as reptiles, birds, and insects, while under the impulse of extreme hunger carrion is not disdained. Fruit also forms a portion of the diet of the coyote.

The typical Mississippi representative of the coyote, which inhabits Iowa and probably some of the neighbouring districts, is the largest of its kind, specially distinguished by its pale coloration and the relatively large size and stoutness of its cheek-teeth. The general colour of the fur of the upper-parts, from the ears to the tail, is described by Dr. Merriam as a mixture of buffish grey and black, that of the under-parts and upper lip being whitish, and the long hairs of the throat sparsely tipped with blackish so as to give the gorget a grizzled appearance. The basal length of a male skull is $7\frac{1}{2}$ inches.

THE NEBRASKA COYOTE

(*Canis latrans nebrascensis*)

Originally called *Canis pallidus* by Dr. Merriam, this race of the coyote was renamed by its describer in 1898 on account of a previous use of its first title. It is a paler representative of the typical race, with the backs of the ears buff instead of fulvous, and the skull and teeth slightly smaller. The pale coloration of this race is suited to the arid nature of the district it inhabits. The type specimen came from Nebraska, but the range of this form includes the Great Plains from Eastern Colorado northwards into Canada, as well as Montana, with the exception of the mountains. Southwards from Eastern Colorado it is replaced on the plains by another form; both occurring together in one part of Colorado. The basal length of a male skull is 7 inches.

THE NEVADA COYOTE

(*Canis latrans lestes*)

In size this race comes next to the typical one, with which it agrees closely in coloration, but its skull is described as being more like that of the Nebraska coyote, although of somewhat larger size, as are also the teeth. The ears and tail are relatively large. On the present occasion it is impossible to give the details in skull-structure and coloration by which it is said to be distinguished from the other forms.

Typically from Nevada, this race, according to Dr. Merriam, ranges "from the Rocky Mountains westward, and from the arid interior of British Columbia southward over Washington and Oregon, and the mountains farther south to the plateau region of Northern Arizona and New Mexico, and thence southward along the continental divide to the Mexican boundary." In California it is found both in the Coast Ranges and the Sierra Nevada, wandering in winter far out into the deserts, and thus invading the area of the Utah race.

Together with the two preceding forms, the present race constitutes the first geographical group of the species, all the members of which have large teeth. The next three races constitute a second group, and the remaining five a third group in which the cheek-teeth are small.

THE FORT GIBSON COYOTE

(*Canis latrans frustor*)

This coyote was described in 1851 as a distinct species by Waterhouse on the evidence of a specimen obtained near Fort Gibson, in Indian Territory. It also ranges into Arkansas and Texas. Dr. Merriam states

that it differs chiefly from the under-mentioned Lower Californian race in its somewhat superior dimensions, paler coloration, shorter ears, the larger extent of black on the lower part of the fore-legs, and the more elongated muzzle.

THE RIO FRIO COYOTE

(*Canis latrans cagottis*)

A coyote from the Rio Frio, Mexico, was described as long ago as 1839 by Major Hamilton Smith, and specimens from the same locality have been identified with it by Dr. Merriam. It is stated to be generally similar to the Lower Californian race, but slightly larger, somewhat redder in colour, with relatively shorter ears, larger teeth, and a wider muzzle.

THE LOWER CALIFORNIAN COYOTE

(*Canis latrans peninsulæ*)

Dr. Merriam describes this race of the coyote as resembling the Californian animal mentioned below in size, as well as in its large ears and its rich coloration, but differing by the colours being darker and redder, by the blacker under-surface of the tail, the presence of black-tipped hairs on the under-parts, and the broader muzzle.

THE TAMAULIPAN COYOTE

(*Canis latrans microdon*)

The small coyote from the neighbourhood of Tamaulipas, Mexico, is stated by its describer, Dr. Merriam, to be so markedly different from all the other forms that it does not need close comparison with any. It is of

small size and dark coloration, with the upper surface of the hind-feet whitish, the under-parts sprinkled with black-tipped hairs, and the cheek-teeth unusually small. The basal length of a male skull is $6\frac{7}{8}$ inches.

Its nearest relative is the Arizona coyote, coming next in the series, from which it is distinguishable by its shorter muzzle and smaller upper carnassial tooth, as well as by the form of the first upper molar. The coloration of the upper-parts is also darker, and the fulvous tints deeper, duller, and less extensive; the whole of the limbs being bright orange fulvous in the Arizona animal. Some approximation is also made by this form to the Colima race, from which it is, however, readily distinguished by several important differences.

THE ARIZONA COYOTE

(*Canis latrans mearnsi*)

Dr. Merriam describes this as a small coyote with medium-sized ears and a rich and bright coloration, the fulvous tints being exceedingly bright and extending over the whole limbs. The skull and cheek-teeth are relatively small, although somewhat larger than those of the preceding race.

THE UTAH COYOTE

(*Canis latrans estor*)

This form is the pale representative of the small-toothed group, the bodily size being small, the coloration pale, although somewhat less so than in the Nebraska race, and the cheek-teeth small and weak. Regarding this and the last-mentioned race, Dr. Merriam remarks that both the large-toothed (typical) and the small-toothed group "have each a

pallid representative, and that these representatives (*nebrascensis* and *estor*) resemble one another externally so closely that they are hardly distinguishable except by size, while a glance at their teeth shows that they belong to opposite extremes of the whole series."

THE CALIFORNIAN COYOTE

(*Canis latrans ochropus*)

This form was described by Eschscholtz as far back as 1829 from a Californian specimen ; examples obtained in recent years from San Joaquin County in that State being assumed to be typical. It is said to be externally very similar to the typical and Nevada races, but of smaller size, darker colour, and richer tints, with very much larger ears and very much smaller and lighter cheek-teeth. The basal length of a male skull is 7 inches.

THE COLIMA COYOTE

(*Canis latrans vigilis*)

The last local phase of the coyote takes its name from the arid tropical coast region of Colima in Western Mexico. It is described as similar to the Lower Californian race, but darker and more highly coloured, with more black on the lower part of the fore-legs, no black on the under side of the tail, except at the tip, and the upper carnassial and first molar teeth much smaller.

THE ANTARCTIC WOLF

(*Canis antarcticus*)

A very few lines will suffice for this isolated representative of the true wolves, in the first place, because its native country—the Falkland Islands—is visited by very few sportsmen ; and secondly, because even there the creature is very scarce, having of late years been well-nigh exterminated.

It is a somewhat smaller animal than the larger varieties of the coyote, with shorter fur and a thinner tail ; the general colour being yellowish speckled with black above, and whitish below. The basal third of the tail, or thereabouts, is coloured like the back, the middle third is black, and the tip white, as are also the inner margins of the ears, the lips, chin, and throat.

Formerly, when they were comparatively numerous, these wolves were remarkable for their total absence of fear at the presence of man, being absolutely tame. Their food consisted in the old days mainly of penguins and Magellanic geese. Unlike the common wolf, they are solitary, and to a large extent diurnal, and they resemble foxes in their habit of burrowing in the ground. Although the dogs bark during the pairing-season, these animals are for the most part silent.

THE MANED WOLF

(*Canis jubatus*)

(Plate VIII. Fig. 12)

The so-called red, or maned, wolf of South America—the aguara guazu of the natives—is a large, long-limbed, long-eared, and rough-haired representative of the dog family, widely different from all its kindred of

the same approximate size, and remarkable for its curious resemblance in point of coloration to the swamp-deer of the same regions.

In size the species may be compared to a long-legged individual of the common wolf. It takes one of its names from the lengthening of the hair on the back of the neck, and the other from its bright yellowish red colour. This prevailing hue is relieved by black on the under side of the lower jaw, on the back of the neck, and the legs below the knees and hocks; the upper part of the throat, the inside of the ears, and the tail-tip being white.

The maned wolf is found, in suitable districts, over a large part of Brazil, Paraguay, and the north of Argentina. Mainly nocturnal, it lies concealed during the daytime in covert, and prefers damp to dry situations. It is a shy and solitary creature, which never ventures to attack or otherwise molest human beings, and feeds chiefly upon rodents, although sometimes killing deer and, in settled districts, occasionally sheep. Such birds, reptiles, and the larger kinds of insects as it can catch also contribute to the diet of the maned wolf; and fruit is said to be sometimes consumed by this animal.

South America is the home of numerous smaller representatives of the dog family presenting a considerable superficial resemblance to foxes, by which name they are universally known to English settlers and travellers. Strictly speaking, however, they are not foxes at all, in the scientific sense of that term, as is shown by the structure of their skulls, which differ in several important respects from that of the common fox and its immediate relatives. Inclusive, apparently, of the maned wolf, these South American species form a peculiar group of the dog tribe, with no near kindred either in North America or in the Old World. None of the smaller kinds can be legitimately regarded as game animals.

THE AMERICAN BLACK BEAR

(*Ursus americanus*)

(Plate VIII. Fig. 13)

From the various representatives of *Ursus arctus* it might be thought that the present species would be sufficiently distinguished by its colour. But although in the great majority of instances this is black, it is by no means invariably so, and there are cinnamon-coloured or "yellow black bears" of this species. Other characters have, therefore, to be sought in order to distinguish this well-marked species, which is very widely different from all the bears here grouped under the name of *Ursus arctus*, whether they be regarded as species or as local races.

From all the brown bears the present species, in addition to its typically black colour, is distinguished externally by its shorter, smoother, and more glossy fur, by the moderate size of the front claws, which do not much exceed those of the hind-feet in length, and especially by the relative shortness of the hind-feet. The head also seems to be proportionately smaller, and the profile of the face is said to be more regularly convex. Again, the species never attains anything like the dimensions of some of the brown bears, seldom exceeding 5 feet in total length.

Even more important are the characters afforded by the cheek-teeth, which are relatively small. Among these may be mentioned the last lower premolar, which is much smaller in proportion to the others than in *U. arctus*, and also lacks the two tubercles on the inner side which are so characteristic of that species. Equally important are the characters afforded by the tooth immediately behind the one just mentioned, that is to say, the lower carnassial. But as it is difficult to explain these without the aid of figures, the reader who desires further information on

the subject may refer to the excellent paper on North American bears by Dr. Merriam in vol. x. of the *Proceedings of the Biological Society of Washington* (1896).

There are several local forms of black bear in America which are regarded by the writer last mentioned and most other American zoologists as entitled to rank as distinct species. Here, however, they are classed as local phases of a single widely-spread species.

Regarded in this manner, *Ursus americanus* has a much more extensive geographical range in its native country than *U. arctus*, having originally been found all over North America from Labrador and Canada to the Gulf of Mexico, and from the Atlantic to the Pacific coast. By the advance of civilisation this vast range has, however, been greatly curtailed, and the black bear has been exterminated from many districts where it was once a common animal. Among the districts where it is still to be met with more or less abundantly are the mountains south of the St. Lawrence, the Great Lakes, the country east of the Mississippi, and the less settled parts of the valley of that river and its tributaries. Some likewise linger in the thickets of the valleys of the Colorado, Trinity, and Brazor rivers. On the Yukon they are still abundant, as they also seem to be in some parts of Labrador. In Minnesota, according to Mr. C. L. Herrick,[1] the species is likewise abundant at the present day, and is often offered for sale in Minneapolis, where the value of a skin varies from ten to fifteen dollars ; all from this locality appear to belong to the typical black variety. It may be added that the males of this species largely exceed the females in point of size.

So far as can be ascertained, the American black bear is nearly allied to the Himalayan black bear (*U. torquatus*) and the Japanese black bear (*U. japonicus*), from the former of which it differs by the absence of the white crescent-shaped gorget on the chest. If this be so, it was probably

[1] *Mammals of Minnesota*, p. 146 (1892).

an earlier immigrant into America than the brown bear, which would account for its more extensive geographical range.

The habitat of the typical race of the black bear (*U. americanus typicus*) extends over the forest-covered districts of North America to the northward of Florida, Louisiana, and Texas. Normally the fur of this race is uniformly black throughout, except on the muzzle, where it is tawny yellow. It is a comparatively small bear, with a short and wide skull, of which the frontal region is usually moderately elevated, and with relatively small cheek-teeth. The cinnamon bear (*Ursus cinnamomeus*) of Audubon and Bachman was based on an animal from the northern Rocky Mountains which, according to Dr. Merriam,[1] has small molars like the common black bear of the United States, of which it would accordingly seem to be merely a light-coloured "sport."

THE LOUISIANA BLACK BEAR

(*Ursus americanus luteolus*)

The yellow bear (*U. luteolus*) of Louisiana, named by Griffith in 1821, was based primarily upon a specimen from that State figured by Major Hamilton Smith, which was of a uniform cinnamon, or yellowish, colour. Dr. Merriam[2] is, however, of opinion that this is not the normal coloration of the southern race of the black bear. "If I were to hazard a conjecture," he writes, "in view of what little is known on the subject, it would be to the effect that the normal colour is black."

But there are other characters serving to differentiate this race, which

[1] *Proceedings Biological Society of Washington*, vol. viii. p. 151 (1893).

[2] *Ibid.* p. 152. In this communication the author refers to a yellow bear then living in the Philadelphia Zoological Gardens as referable to the present form; later on, however (*op. cit.* vol. x. p. 80, 1896), he came to the conclusion that the specimen in question was probably not of American origin. It is, however, alluded to on p. 314 of Elliot's *Synopsis of Mammals of N. America* as referable to the present form.

is of larger size than the typical form, with a longer, narrower, and more flattened skull, and proportionately larger cheek-teeth. Dr. Merriam states that "the Louisiana bear resembles the Florida bear in the elongation and narrowness of the skull, but differs in having the frontal region of the skull remarkably flattened, instead of highly arched, and in having the upper molars much larger."

In the bear referred to above as living in the Zoological Gardens at Philadelphia in 1892-93 the colour was a rich reddish brown, almost bay. When, however, the coat became worn and bleached the colour faded to a pale yellowish brown.

THE FLORIDA BLACK BEAR

(*Ursus americanus floridanus*)

The black bear inhabiting the everglades and probably other parts of the peninsula of Florida was described in 1896 by Dr. Merriam as a separate species, on the evidence of the skull alone. Although the skull resembles that of the Louisiana bear in its great length and slenderness, it differs, especially in the case of old males, in the form of the palate, and by the highly-arched frontal region. The cheek-teeth are also smaller. The colour of the fur is black.

THE ALASKAN BLACK BEAR

(*Ursus americanus emmonsi*)

The black bear from the glacier region of the St. Elias range of Alaska and the neighbouring districts was first described by Dr. Dall[1] as a variety of *U. americanus*, but was subsequently raised by Dr. Merriam[2] to the rank

[1] *Science*, series 2, vol. ii. p. 86 (1895).

[2] *Proceedings Biol. Soc. Washington*, vol. x. p. 82 (1896).

of a species. It appears to be a very well marked variety, distinguished by its small size, short and highly curved claws, and light coloration. Its skull has not yet been described. Dr. Dall's original description is as follows :—

"The general colour of the animal resembles that of a silver fox. The fur is not very long, but remarkably soft, and with a rich under-fur of a bluish black shade, numbers of the longer hairs being white or having the distal [terminal] half white and the basal part slaty. The dorsal line, from the tip of the nose to the rump, the back of the very short ears, and the outer sides of the limbs are jet black. Numerous long white hairs issue from the ears ; black and silver is the prevalent colour of the sides, neck, and rump ; the under surface of the belly and the hollows behind the limbs are greyish white, or even pure white, I am told, in some cases. The sides of the muzzle and the lower anterior part of the cheeks are of a bright tan-colour, a character I have not seen in any other American bear ; and this character is said to be invariable. There is no tint of brown elsewhere in the pelage. There is no tail visible on the pelts. The claws are small, very much curved, sharp, black above and lighter below ; the animal evidently can climb trees, which the brown bear cannot do."

THE LABRADOR BLACK BEAR

(*Ursus americanus sornborgeri*)

This variety was described in 1898 by Mr. O. Bangs in the *American Naturalist*,[1] on the evidence of skulls from Labrador. These are described as being smaller, shorter, and relatively wider than in the typical race of the species, with the nasal bones remarkably short, the palate very short and wide, and the cheek-teeth unusually large. No skins were known when this description was written.

[1] Vol. xxxii. p. 500.

THE SPECTACLED BEAR

(*Ursus ornatus*)

(Plate VIII. Fig. 14)

As the North American black bear appears to be the Transatlantic representative of the black bears of the Himalaya and Japan, so the South American black, or spectacled bear seems to correspond with the Malay bear of the more southern districts of Eastern Asia. The resemblance of the present species to the Malay bear is shown by its short and stiff fur, the short and broad head and arched profile, and the small bodily size. In both the anterior cheek-teeth are crowded together in a similar manner, and the structure of the true molars is likewise practically identical. One of the first to compare the skulls of these two widely separated bears was the French naturalist De Blainville, who found them so alike that he at first believed them to belong to the same species. A closer comparison showed, however, that the nasal bones are rather broader, as are also the cheek (zygomatic) arches in the American species; and there are likewise certain differences between some of the bones of the base of the two skulls.

The present species apparently attains a length of only between 3 and 4 feet. Its general colour is deep black, but there is a characteristic tawny crescent above each eye, and the lips, cheeks, chin, throat, and chest are white.

Typically this bear is from the Peruvian Andes, but its range is commonly given as extending down the chain of the Andes from Colombia to Chili and Bolivia. In 1868 Mr. P. L. Sclater[1] briefly described and figured a South American bear at that time living in the menagerie of the Zoological Society, and proposed for it the name *Ursus nasutus*. Thirty years later the same gentleman[2] published the following remarks on

[1] *Proceedings Zool. Soc. London*, 1868, p. 73, pl. viii.

[2] *Ibid.*, 1898, p. 2.

another bear from South America which had been in the Society's Gardens :—

"A young bear, presented by Mr. William Crosley on the 28th December, which I have not been able to determine satisfactorily. As will be seen by its skin, which I now exhibit, it does not show the characteristic markings of *Ursus ornatus*, the generally known bear of the South American Andes, being of a uniform black with a slight greyish white patch on the throat. It may possibly be the young of a different species from the Colombian Andes, and in such case may be referable to that which I shortly described before this Society in 1868 as *Ursus nasutus*. Mr. Crosley has kindly supplied me with the following note on the exact locality of this specimen, which it is proposed to deposit in the British Museum :—

"'The little bear I sent to you came from the banks of the Simitara, an affluent of the Magdalena on the western side. You will see that this is on the eastern slope of the central chain of the Andes in their northern extremity. Approximately you may fix the position as 7° 30′ north latitude and 74° west of Greenwich long., on the meridian of Bogota, more or less.'"

The distinctness or otherwise of the Colombian bear from the typical *U. ornatus* must remain for the present undecided. If, however, it be separable, it is much more likely to be a local phase of that animal than a distinct species.

It is but seldom that examples of the spectacled bear are to be seen in the London Zoological Gardens, very few being brought to Europe. Its habits are doubtless similar to those of bears in general, but no account of these appears ever to have been published, at least in England ; and the writer is unacquainted with the name of any British sportsman who has ever shot one of these bears.

It is said to differ from all other bears by the presence of a perforation in the lower end of the humerus, or upper bone of the fore-limb.

THE RACCOON

(*Procyon lotor*)

This sharp-nosed and ring-tailed greyish brown little mammal is perhaps best known in Europe by its skin, which used to be so commonly used for foot-warmers. It may be a question whether it is really entitled to figure among game animals, but since it is the typical representative of a family—the *Procyonidæ*—mainly restricted to the American continent (the only outlying forms now existing being the two pandas of the Himalaya and Tibet) its claim has been admitted. It will be unnecessary on this occasion to refer to the characters by which the family *Procyonidæ* is distinguished from other groups of Carnivora, although it may be mentioned that in certain features connected with the skull these animals approach the weasel tribe (*Mustelidæ*).

Roughly speaking, a raccoon may be compared in size to a cat, the length of the head and body ranging between 22 and 26 inches, and that of the tail being about 10 inches. The sharply-pointed, although somewhat short nose, and the large triangular black patch occupying the face on either side of this, together with the rather short, thick, and five-ringed tail, form characteristics by which this animal can be recognised at the first glance. The general colour of the thick and somewhat coarse fur is dark brown, but the hairs are tipped with grey. A well-fed raccoon will scale from about fifteen to twenty-five pounds, the autumn being the season when these animals are generally in the best condition. The raccoon ranges over the whole area of the United States, extending northwards as far as Alaska, and southwards through Mexico into Costa Rica. The common raccoon, as it should properly be called, is by no means the solitary representative of its genus, although it will be unnecessary to make further reference here to the allied species. The

ordinary species is divisible into several local races, such as *P. lotor elucus* of Florida, and the pale-coloured *P. lotor insularis* from Tres Marias Islands, off Western Mexico. To these, however, any fuller reference would be superfluous in this volume.

The best account of the habits of the raccoon is one given by Dr. C. H. Merriam in his work on the *Mammals of the Adirondack Region, North-Eastern New York*. Although they had already become scarce in many other parts of the States, raccoons at the date of writing (1884) were still abundant in those mountains, where, however, they are absent from the dense evergreen forests of the interior. In the main they are strictly nocturnal in their habits, and are practically omnivorous in their diet, feeding upon any animals (including fish and insects) they are able to capture and kill, and likewise devouring large numbers of birds' eggs, as well as nuts, fruits, and corn. They are fond of the water, being expert swimmers, but only capture such fish as may be stranded, although they scoop up freshwater mussels from the shallows. They breed and take refuge in trees, although they are by no means to be regarded as typically arboreal animals, since they hunt their prey upon the ground, where they likewise pick up such fruits and nuts as they may devour. Buds and young shoots form a portion of their diet. In the Adirondacks raccoons hibernate during the winter, reappearing in February or March, according to the mildness or otherwise of the season. In Mexico and Central America they are, however, doubtless abroad at all times of the year. They usually associate in family parties, and are prone to wanderings, frequently not returning to their hiding-places for several days together, and on such excursions making use of any shelter that may be at hand. Hollow limbs of trees form their favourite places of retreat, but they are sometimes content with a hollow fallen log. The nest is always placed high up in a tree, and the young, which in the Adirondacks are usually born in April, are in most cases from four to six in number.

Raccoons are usually hunted with specially trained foxhounds at night, by whom they are "treed," there to await the arrival of the sportsman with his gun. About half a million raccoon skins are annually sold in London, at prices varying between sixpence and ten shillings each.

Nearly allied to the raccoons are the coatis (*Nasua*) of South and Central America and their relatives the cacomistles and kinkajous, but these can scarcely be regarded as coming under the designation of game animals.

Hares, it is true, are reckoned as game in Europe, and the species inhabiting India and Tibet are noticed in the volume of this series dealing with the game animals of those countries. But the number of American hares is very large, and their description would occupy a very considerable space. Moreover, if these were included it would be difficult to refuse places in the present volume to many others of the larger American rodents, such as the carpincho or capibara, the coypu or nutria, the viscacha, the paca, the mara or Patagonian cavy, the agutis, the beaver, etc. Consequently it has been decided to exclude all these numerous groups, and to bring the work to a conclusion with the foregoing brief account of the raccoon.

INDEX

Printed by R. & R. Clark, Limited, *Edinburgh.*

Medium 4to, 330 pp. Price £5 : 5s. net

THE DEER OF ALL LANDS

A HISTORY OF THE FAMILY CERVIDÆ LIVING AND EXTINCT

By R. LYDEKKER

Illustrated with Twenty-four Coloured Plates by J. Smit, and numerous Figures (many from life) in the Text

Uniform with above, 318 pp. Price £5 : 5s. net

WILD OXEN, SHEEP, & GOATS OF ALL LANDS

LIVING AND EXTINCT

By R. LYDEKKER

Illustrated with Twenty-eight Coloured Plates by J. Smit and Joseph Wolf and numerous Text Figures

Uniform with above, 632 pp. Price £5 : 5s. net

THE GREAT AND SMALL GAME OF AFRICA

A FULL ACCOUNT OF THEIR DISTRIBUTION, HABITS, AND NATURAL HISTORY WITH EXPERIENCES OF THEIR PURSUIT IN THE FIELD

With Fifteen Coloured Plates and numerous other Illustrations

WRITTEN BY A NUMBER OF SPORTSMEN, UNDER THE EDITORSHIP OF H. A. BRYDEN

Uniform with above, 416 pp. Price £4 : 4s. net

THE GREAT AND SMALL GAME OF INDIA BURMA, AND TIBET

By R. LYDEKKER

WITH CONTRIBUTIONS BY SPORTSMEN

Illustrated with Nine Coloured Plates, and a large number of Text Figures, many of them being Reproductions of Photographs of Living Animals

LONDON: ROWLAND WARD, LIMITED
"THE JUNGLE," 166 PICCADILLY