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FINAL

NATURAL HISTORY

ESSAYS

RENSHAW

Final Natural History
Essays

ARAB BOYS AT EL KANTARA.

June 20, 1903.

Final Natural History Essays

BY

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"NATURAL HISTORY ESSAYS,"
"MORE NATURAL HISTORY ESSAYS"

ILLUSTRATED

Sherratt & Hughes
60 Chandos Street London W.C.
34 Cross Street Manchester
1907

Nat Hist

K-QL706

R 37

Bid.
L. 5.

To
Henry Scherren, Esq.

M375497

PREFACE.

THE present volume completes a series of sixty Essays dealing with typical examples of the class Mammalia. In this work, as in its predecessors, the subject has throughout been viewed from the combined standpoint of the zoologist and the historian; the photographs are selected from a series of over five hundred negatives taken by the author.

The opportunity is here taken of thanking the Press for many long and most encouraging notices of previous studies, and the public for their kind reception of former volumes both at home and abroad.

GRAHAM RENSHAW.

October, 1907.

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THE DRILL BABOON

August 30, 1907.

DRILL BABOON.

Fully adult male, twelve years old. Note the swelling on each cheek, the immense shoulders, and the short *backwardly* directed tail.

THE DRILL BABOON.

“Dril, a stone-cutter’s tool wherewith he bores holes in marble, &c. Also a large overgrown Ape and Baboon, so-called”

Blount’s Glossographia, 5th Edition, 1681.

The study of the living mammalia of the world, as contrasted with the allied pursuits of ornithology and entomology, may well be reckoned the Cinderella of the sciences. Comparatively few workers busy themselves with the mammals, which are vertebrates of the highest importance, presenting a thousand problems yet unsolved and an endless variety of external form and psychological interest. Structure, coloration, variation, distribution, habits, and historical associations—all these concern this class of animal as much as any other: perhaps, however, the comparative difficulty of obtaining many of them has militated against the popular study of the group. The mammals of West Africa until very recent times have been practically unknown; and these remarks apply with particular emphasis to that hideous satyr of the Guinea forests—the drill baboon.

The drill (*Papio leucophæus*)—sek of the Bulu natives—is a burly powerful beast, about as big as a moderate-sized dog. The ugly head is relatively large, and is united to the body by a very short neck: the limbs are somewhat slender, and terminate in powerful hands. The shoulders are enormous, being

so sheeted in muscle that the elevated mass over the withers recalls the ruff of an Elizabethan courtier ; but the waist is well defined and almost shapely ! The tail is *not* reversed over the back as erroneously depicted in books : on the contrary it projects backwards at an angle of 45° . The face is naked, and the buttocks are almost so : in adult life a sausage-shaped swelling is developed on each cheek, caused by the inflation of the underlying maxillary bones. The eyes are situated close together and deeply set in the head ; the nostrils are slightly truncated ; the mouth is large. A slight beard—much less than one would suppose from the illustrations in books ! adorns the chin : while a semi-ruff of hair encircles the face and a semi-mane bedecks the shoulders. There is no crest of hair along the vertex, as stated in books : on the contrary, the cranium of the adult drill is remarkable for the flatness with which it slopes down to the eyebrows. To this account add the colouring : the brilliant hues of a bird of Paradise on the carcase of a baboon produce an effect grotesque and hideous in the extreme. The following is a description of the coloration of an adult male :—

Face purplish black, glossy, finely granulated, and margined throughout by a narrow edge of salmon colour which extends right up each side of the greenish black forehead. Sausage-shaped inflations on the cheek coppery brown above, purplish black below. Lower lip black, margined by a band of

brilliant carmine, which imparts a ferociously savage appearance to the already hideous physiognomy: chin white. Iris hazel. Ears purplish brown, and the fur immediately behind them white. General colour of the pelage greenish grey (*not* brown as has been erroneously stated); a dull black dorsal line extends from occiput to pelvis.¹ Buttocks crimson lake, shading into purplish lilac externally.

Young drill differ from adults in lacking the swellings on the cheeks, the carmine on the lower lip, and the vivid coloration of the buttock. An immature male examined by the writer on January 12, 1906, had the general hue of the fur dull blackish brown, though the green tinge of maturity had already begun to appear on the outside of the forelimbs.¹ The face was black and glossy, shining like leather, and each cheek was slightly inflated; the lower lip was black, and a salmon-coloured area on the lower jaw heralded the carmine of maturity; the chin was greenish grey. The abdomen was but thinly haired, showing the bluish skin underneath; the toes and nails of all four limbs were purplish black. The drill in its immature stages is of special interest, on account of its close resemblance to the young of the yet more hideous mandrill.

The mandrill (*Papio mormon*)—perhaps the hog ape or chæropithecus of Aristotle—is the largest of

1. The green hue of the fur in monkeys is produced by a mixture of golden yellow and black rings on the individual hairs, much as a greenish powder is obtained by mixing sulphur with iron filings.

all the baboons. Ugly, powerful, and ferocious, it differs from its cousin in the greater inflation of the cheeks, which are elevated into a series of rib-like sculptures: in the adult these are brilliant with ultramarine, and separated by grooves of deep purple. The pig-like snout is truncated in shape and scarlet in colour, and the middle area of the face is also of this hue. The beard and whiskers are orange yellow, the ears bluish black, and the body fur blackish olive. Female specimens have the face blue only, without any purple, and even the males do not assume the scarlet on the face till they have cut their permanent teeth. In very young males the face is merely dull purple like a dried raisin, and the whiskers and beard are brownish yellow. A long series—twenty living specimens—was recently examined by the writer. Carefully worked out, the chief differences between the two appear to be:—

DRILL.

MANDRILL.

1. Prominences on cheek fusiform, smooth.	Prominences ribbed and deeply grooved.
2. No distinct beard.	Beard distinct and pointed.
3. Colour of face purplish black.	Colour ultramarine with purple grooves.
4. Whiskers greenish grey like adjacent fur.	Whiskers orange yellow.
5. Fur on chest greenish black.	Fur dull white.

In addition, the salmon-coloured line bordering the face and the carmine of the lower lip are peculiar to the drill. The above table refers to adults of both species: the young, though superficially alike, may also be distinguished with a little practice. Thus young drill have the upper eyelids blackish brown—in mandrill they are whitish (as in mangabey monkeys)—and the face and ears of drill are deep black, *not* purplish as in their cousins.

Owing to the confusion formerly existing in the minds of naturalists with regard to these baboons, the date of the actual discovery of the drill by Europeans will probably never be known. The early zoologists (small blame to them with their lesser opportunities!) supposed that the various stages of growth and colouring indicated as many different species. Thus Thomas Pennant, who in 1781 described the mammals in the famous museum of Sir Ashton Lever, figures a “wood baboon” as plate 95 of his “History of Quadrupeds.” This beast had a long dog-like face covered with small (? smooth) glossy black skin: a coat mottled with black and tawny, white nails, and a very short tail—surely a recognisable portrait of the present species. Similarly, his “cinereous” and “yellow” baboons appear to have been merely immature drill: Pennant himself seems to have had some suspicion of this, for he notes that the yellow differed from the wood baboon merely in size and its hairy hands, adding,

pertinently enough "Their place, age, and history obscure."

About this time, unfortunately, the chaotic state of simian nomenclature was increased by the importation into Europe of the mandrill—also a West African form; confusion was thus "worse confounded," and the drill put down merely as an immature mandrill which lacked the brilliant ultramarine cheeks of the adult.¹ In 1809, however, the industrious and gifted *savant* Geoffroy St. Hilaire saw established in Paris the famous menagerie attached to the museum of the Jardin des Plantes, the parent of all modern Zoos, antedating by many years the splendid establishments of Regent's Park and Amsterdam, of Cologne and Antwerp, of Hamburg and Berlin. Eminent scientists studied in the new vivarium animals brought from every quarter of the globe, and prominent amongst these naturalists was Frédéric Cuvier, who discovered the essential distinctness of the drill, and described it in 1807 under the name of *Simia leucophaea*. Since Cuvier's day many drill have been imported alive into Europe, and together with the mandrill can always be seen in collections of any size.

A veteran drill—a male which has lived for over twelve years in captivity—is still exhibited in the

1. In October, 1799, a mandrill was exhibited alive at Chester. It is interesting to note that although these baboons have for many years been brought alive to Europe, no full-grown mandrill was exhibited in the London Zoological Gardens until November 20, 1906.

Zoological Gardens at Manchester. Imported when six months old, and received at the Gardens in May, 1895, this Nestor has become almost a classical specimen; he has been repeatedly photographed, and was figured with some very interesting letterpress in the "Field" for March 18, 1905. The present writer has repeatedly studied this individual, probably by far the finest specimen that has ever been seen in captivity. The beast has long ago become completely acclimatised, and on January 12, 1906, was walking about his open-air cage regardless of the cold east wind. When he shook himself his ample shoulders quivered in their sheeting of muscle. He was fond of perching on a branch with all four feet approximated in chamois fashion, his minute eyes jerking under their ample brows with a quick movement as if worked by a spring. He ran well though jerkily on all fours—baboon fashion—his silly little tail wagging to and fro as he did so, and traversed a branch with a remarkable lightness hardly to be expected of such an animal. At the time of writing (July 15, 1907) this veteran continues in splendid health, a living triumph of the open-air treatment, twelve years old. Some few years ago there was another remarkably large drill in the same collection. So much for examples in captivity; the home life of the drill may now be considered.

Scene: An outlying spur of a range of mountains composed of red conglomerate, watered at the base

by a small river, and overlooking a dark tangle of forest. The heavy tropical night has given place to a grey uncomfortable dawn; the river, sheeted in mist, flows sluggishly through the forest, which here and there shows open spaces and on its outer edge merges into a wide plain thinly covered with straggling bush. One or two buck stand at the edge of the covert, wary and motionless before beginning to feed: further out on the plain a troop of tiang hartebeest are already grazing, and loom through the haze as large as carthorses. Perched aloft on the craggy escarpments are several troops of drill baboons, huddled miserably together and occasionally shivering in the biting air: the old males, burly and grizzled, have already posted themselves as sentinels to guard the safety of the others. Leopards infest these rocky ledges, and the grim old fellows know it, as they stand on duty with all four feet close together like the hoofs of a chamois, and their tiny eyes scowling out from under their heavy brows. Gradually the mist rises: with the growing brightness the vapour, once a foggy curtain, rolls up the beetling precipices till at last it hangs in feathery streamers about the summits of the crags. The hot sunshine begins to warm the chilly hillsides: the baboons rouse to activity in the welcome rays. The cries of various birds are heard: far below in the valley an immense flock of glossy starlings, a lovely cloud of violet and purple, wheels through the mellow-

ing air and settles on the fig trees, which suddenly seem laden with jewelled fruit. A troop of hornbills flap heavily across the river and begin to scramble along the boughs of the thicket; touracos and plantain-eaters are already shrieking and playing amongst the branches.

Uttering now and then a surly bark, the drill begin to descend the precipitous cliffs and, arrived on the level ground, search industriously for breakfast, walking on all fours like hideous dogs. Stones are overturned for the sake of the scorpions or the lizards they may conceal; tubers are carefully sought out, and grubbed up by sable hands. Two or three of the older animals continue to mount guard, perching on a fallen-tree trunk or any similar object; infant drill are seen clinging under their devoted if ugly mothers, or perched on their backs. A small buck trips along; suddenly with a snort and a stamp of its taper foot it stands motionless, and in another instant has dived into the bush, like a penguin into the breakers, saving its life by the quickness of its flight. The drill gradually traverse the thicket, and continue to explore the bare ground far away from cover; the youngsters can be plainly seen scampering about their elders and playing a thousand pranks. Far in the baking heavens swings a solitary vulture, a sable speck against the blue.

Evening. The drill are retiring to their rocky dormitories. Shadowy in the fast-falling darkness

erie bats flit to and fro, squeaking in a shrill monotone. The voice of a serval cat, calling in the reed-beds, grates harshly in the velvety night; knee deep in the stream a great herd of waterbuck splash and snort, and a strong tarry odour pervades the breeze. A troop of roan antelope—magnificent beasts with the stature of horses and stout curved horns—wander about the foot of the mountains occasionally neighing to each other; fearing neither lion nor leopard, glorious in their giant strength, they seem in their stalwart persons to realise the fable of the horned horse. High up on the hillside the baboons are chattering among themselves. A dark shadow creeps out among the rocks; a stalk! a spring! and one of the young drill is shrieking in the grasp of a leopard. A terrible commotion takes place, the troop leaders barking furiously as the whole ungainly crowd bounds upwards in full flight, running along the rocky ledges like simian chamois. The excited clamour of the drill resounds through the mountains, now again dimming with mist; then answers the savage skirring growl of the leopard as with heaving flanks and lashing tail he tears at his prey. Far below in the valley rises the roaring bellow of a hippopotamus; another and another answers it, till the very cliffs seem to shake with the tremendous volume of sound.

Then for a moment, with the last rays of the setting sun, there is silence.

THE RING-TAILED LEMUR.

In these days of extended zoological knowledge, when Science announces the discovery of some new animal almost every week, one may well draw attention to certain interesting species which, by no means rare in their own country, are often imported alive into this one. The bush baby or Maholi galago, with its big eyes and ears; the serval cat, long-legged and short-headed; the fennec fox, tiny and timid; the Prévost squirrel, smartly tricoloured in red, white, and black; the quaint jerboa, and many others, merit far more attention than they have hitherto received. From the quaintness of its exterior and the gentleness of its disposition these remarks apply especially to the pretty ring-tailed lemur of Central Madagascar.

The ring-tailed lemur or Madagascar cat (*Lemur catta*) is about the size of a domestic tabby—to which animal, however, it bears no real relationship. The nose is sharply pointed; the eyes and ears are moderately large; the face lacks the rough fringe of hair found in certain of its congeners. The delicately formed hands and feet are shod with leathery skin, and adapted, like those of monkeys, for grasping branches; the somewhat bushy tail is long, though not prehensile. The general colour of this beautiful lemur is ashy or reddish grey, darker

above and shading into snow-white below. The muzzle and lower jaw are black, while the cheeks and vertex are iron grey, and a circle of purest white sweeps round each ear to join its fellow across the forehead. The eyes are ringed with black circles, recalling the tawny "spectacles" of the Peruvian bear;¹ the tail, banded with alternate black and white, recall that of the pretty *bassar* "cat" of Mexico. The palms of the hands and the soles of the feet are black, as in most lemurs; the present species is, however, the only one in which the tail is not uniformly coloured.

Both sexes of the ring-tailed lemur have a remarkable gland situated on the inside of the forearm, a little distance above the wrist. Oval in shape, soft and compressible in consistence, this gland is raised about one eighth of an inch above the surface of the limb; it is striated in fine lines like those of the palm of the hand, with which indeed it is continuous by a narrow strip of hairless skin. Structurally, it consists of a congeries of follicles resembling sweat glands, discharging by hundreds of microscopic orifices; a blunt spur (perhaps hardened secretion) projects in old animals across the organ from its inner edge. A tuft of long hair, like the whisker of a cat, is situated at a little distance above the gland; it may actually, as in cats, exert some

1. The spectacled bear (*Ursus ornatus*) is a rare species inhabiting the Peruvian Andes.

tactile function. These glands occur in certain other lemurs; Garnett's galago has one situated on the ankle instead of the forearm, consisting of a tuft of spiny outgrowths. The function of these curious structures is as yet unknown, though it has been suggested that they may act as climbing irons, just as the scales under the tail of the African flying squirrels assist them to swarm up tree-trunks.

It has been stated that the range of the ring-tailed lemur is limited to the central table land of Madagascar, on the south and south-western borders of the Betsileo province; the Leyden Museum, however, contains a male specimen which Pollen and Van Dam's expedition obtained in 1865 at St. Augustine's Bay, on the west coast of the island. The province of Betsileo is remarkable for its magnificent scenery of bold mountain ranges; there are also many isolated peaks, lofty and precipitous, which serve as landmarks. Several fine rivers flow from east to west to empty into the Mozambique Channel; although some of them are encumbered by rapids, others are broad magnificent waterways. Many of the valleys are adorned with the famous *ravinàla* (traveller's tree) or tangled with bamboo thickets; and so dense is the undergrowth in these places that two travellers cannot march abreast. Some of the hill-sides are volcanic, littered with lumps of dark brown rock (slag or scoria?) and full of bubble-holes: hard ridges of stratified sandstone occur here and there, and

reefs of granite or gneiss. This remarkable country is the metropolis of the ring-tailed lemur: it avoids the dense forest, keeping to the rocky precipices, its leathery hands gripping the wet surfaces as a school-boy's sucker grips a stone. Its food consists of bananas, figs, prickly pears, &c.: the latter fruit is shorn of its spiny envelope by means of the upper canine teeth, which serve as rough and ready dessert knives. The soil of Betsileo is poor: but rice, manioc, haricot, sugar-cane, and potatoes are all cultivated, and the prickly pear is abundant. Plenty of food; numerous springs of good water in nearly every little valley; no lions, leopards, or wolves, nor even porcupines or squirrels; Madagascar is a paradise for the lemurs, which, enjoying abundant food and free from molestation from large carnivora or from competition with other aboreal forms, have developed into many species in the course of ages.¹ Grey, black, black-headed, broad-nosed, diademed, and many other lemurs are now familiar to naturalists; so abundant is the material for study of these prosimians that the number of true species is by no means definitely known. The ring-tailed lemurs go in large troops of from thirty to forty individuals; most lively and noisy at sunrise and sunset, they are said to sleep during the heat of the day and at night.

1. Even the natives from superstitious reasons are loth to molest the lemurs.

The prosimian race has, however, one enemy to fear; deep in the brake lurks the terrible fossa (*Cryptoprocta ferox*), a long lanky beast about twice as big as a cat, with a tawny coat and a long cylindrical tail. The only carnivore of any size inhabiting Madagascar, it is most interesting evolutionally, being related both to the true cats and to the civets, having retractile claws like the former, but plantigrade feet like the latter, animals. Lurid stories current regarding its ferocity, even towards man, are perhaps tinged with a little French vivacity of imagination; but its bloodthirstiness towards its prey can well be credited. The fossa was described and figured by Mr. Bennett in Vol. I. of the Transactions of the Zoological Society, and the actual specimen was long preserved in the museum at Bruton Street; since Mr. Bennett published notes on its anatomy this animal was probably sent over in alcohol. It had been obtained from the interior of Southern Madagascar by Mr. Telfair, the President of the Natural History Society of Mauritius. The animal was a young female; Mr. Telfair kept it alive for some months, and on its death presented it to the Zoological Society. In recent years a writer has vividly described how in travelling by railway through Madagascar he had a brief view of a fossa standing on the metals; as the train approached it bounded off into the jungle. But little is known about this animal, though a specimen was living in the

Jardin des Plantes in 1900; nothing at all is known of the newly-born young.

The first example received at the London Zoological Gardens was purchased on November 12, 1890, and was figured in the *Illustrated London News*; it died on January 24, 1905, having lived for the amazing period of fourteen years in the collection, and the present writer inspected it on many occasions. This individual showed none of the ferocity usually assigned to the species, and was tame enough to come right up to the bars, though it would probably have severely bitten a careless bystander. The fossa is an amazingly interesting beast; its zoological position and geographical distribution (Madagascar only), its reputed ferocity, its rarity and its possible descent from a line of long-extinct creodont ancestors—the “last of the Mohicans”—render it a most suitable subject for a special monograph, or a learned article in some zoological magazine.¹

The ring-tailed lemur appears to have been discovered by M. de Flacourt, the Director General of the French East India Company; his interesting “*Histoire de la grande Isle Madagascar*” was published at Paris in 1661, and mentions the animal as the “maki vari.” The present species is the *Lemur catta* of Linnæus, who in 1766 included it under this name in the twelfth edition of his

1. The isolated geographical position of the Madagascar fossa renders it comparable to the thylacine—the only large predaceous mammal of Tasmania, and about the same size.

"Systema Naturæ;" a specimen appears to have been preserved in the famous museum of Sir Ashton Lever, which was sold by auction in 1806.

Soon after the foundation of the menagerie in connection with the Jardin des Plantes, there was added to the collection a ring-tailed lemur which had already lived *nineteen years* in Europe! Still active and intelligent—being, doubtless, "old-fashioned" enough from its long contact with civilisation—this patriarch was allowed the free run of Cuvier's laboratory,¹ where it pried into everything with monkey-like inquisitiveness, turning over the skins of the animals which were being prepared to enrich the museum. Unlike a monkey, which becomes soured and savage with increasing years, it was amiable enough with its human companions, climbing upon their shoulders and even reposing in their laps. This lemur disliked cold, basking in the sun or the heat of the fire according to the season; in winter it solemnly warmed its hands before the blaze like a human being, and burnt its face and whiskers rather than retire from the welcome glow. It ate eggs, bread, carrots, and fruit, and drank spirits; perfectly "at home from home," it used to sleep on a shelf placed over the door, having previously taken a good half-hour's exercise by leaping about the room.

One of the most attractive installations now

1. In an English work, the word "*laboratoire*" is translated "conservatory," giving the reader quite a wrong impression. Cuvier's original account, which I have consulted, renders its meaning plain enough.

exhibited under the new management of the London Zoological Gardens is the lemur apartment in the anteater house—a building strangely enough almost entirely devoted to prosimians. Here are the ring-tailed lemur, the grey lemur, the black lemur, the black-headed lemur, the broad-nosed lemur; the ruffed lemur in black and white, a mammalian magpie, largest of all the prosimian race; the slow loris from India, and the Garnett galago from Zanzibar. Strangely fond of sunshine, like their forerunner of Cuvier's day, the ring-tails often sit bolt upright, like kangaroos or suricates, stretching out their hands to the warmth. Sometimes they grasp the wires with their powerful hind feet, and loll back at ease; or crouch on the cage floor with paws extended, head raised and tail stretched out behind them. At dusk a continual chorus of grunts and growls rises from the furry crowd behind the wires. The galago flits along its perch like a shadow; the slow loris climbs clumsily, its pink nose and hands almost human, and its rotund body resembling that of a tiny bear. The black lemurs sit one behind another on a branch, as if about to take part in a tug of war; the ringtail lemurs mew like cats and come to the wires to be caressed. One could, indeed, listening to the chorus in the fast-gathering twilight, picture the thickets of Madagascar alive with dusky forms twittering in the darkness, the harmless ghosts of the primæval forest.

The young ring-tailed lemur is very much darker than its parents. A very small male specimen (No. 3755A) preserved in the Royal College of Surgeons' Museum is blackish brown all over, even the future pale areas (such as the rings encircling the eyes) being but little lighter than the rest; the grey on the face is, however, recognisable, and the rings on the tail have appeared. For the first two months the youngster clings underneath its mother; it then transfers itself to her back, but at four months begins to leave its parent for short excursions, returning to her if disturbed. At about five months old it is half grown and is partly weaned; the fur is then noticeably lighter than at birth. The ring-tailed lemur has bred in this country, a young one having been born on September 26th, 1905, of parents which had been allowed some degree of semi-liberty. A second example, which the writer has seen, was born in May, 1907, in the Manchester Zoological Gardens.

THE OCELOT CAT

"I have wisht them farther off, when I have met them in the woods ; because their aspect appears so very stately and fierce."

Capt. William Dampier on the Ocelot, A.D. 1729.

Clever and cunning, strong-limbed and handsome, the beautiful ocelot of Central and South America occupies a place amongst its furred brethren comparable only to that held by the sable antelope amongst ungulates, or by the Prévost squirrel amongst the rodentia. As the clouded tiger is the smallest of the big cats, so is the ocelot the biggest of the small cats; and is indeed by no means an animal to be lightly tackled, some individuals being as large as a small leopard. It varies in size with its geographical distribution, being small near the Equator, and attaining its largest dimensions north and south of that line. The small ocelots are about as large as a European wild cat : as regards markings, there are no two the same, and in addition each individual, like the Cape hunting-dog, is differently patterned on either side of the body.

The ocelot (*Felis pardalis*), though resembling a leopard, has the legs and tail of variable length; the latter, however, always measures less than the head and body combined. Some specimens are stoutly built, with broad heads and short legs; others are "lanky, long, and lean." Wonderfully instable in

OCELOT.

May 1905.

Note the black-edged longitudinal blotches on the body, enclosing areas of darker colour than the general hue of the fur. A typical American cat. The American cats are connected with the Asiatic species through Fontanier's Ocelot of Central Asia. See "More Natural History Essays," pp. 62-63.

coloration, a good series of museum skins exhibits every gradation of hue and pattern, and quite a number of sub-species might be made of this one animal—already quite enough of a zoological puzzle. All forms have the head and limbs dotted over with small spots, two black stripes on each cheek, and a band on the inside of the foreleg; the body is marked more or less distinctly with longitudinally arranged blotches, and the tail is semi-ringed. The typical ocelot is tawny yellow or reddish grey in ground colour, handsomely streaked and blotched with longitudinal chains of darker hue. The blotches are margined with black, and enclose an area darker than the general tint of the fur; the under parts are whitish. Note now the variations from this, the typical form:—

(a) INTENSIFICATION OF COLOUR. The so-called *Felis melanura* is the fulvous variety of the ocelot; in the brightness and clear-cut intensity of its markings it recalls the normal female form of the silver-washed fritillary butterfly. The fur of the fulvous ocelot, itself richly coloured, is so crowded over with intense black markings as to cause the white underparts to stand out in brilliant contrast; the tail is, likewise, intense black. The present form was first described in 1844 by Mr. Bell from a specimen living in the London Zoological Gardens, and Louis Fraser, the collector for Lord Derby's museum, also figured it in his work "Zoologia

Typica." It is significant of the great instability of these animals, that the very individual figured altered a good deal in its markings before its death; hence the ocelot, if not the leopard, changes its spots!

(*b*) DIMINUTION OF COLOUR is similarly illustrated by the var. *picta*—the "painted ocelot" of natural history books—which is a large Central American form. In this phase the spots are placed relatively further apart, and the ground tint is not so brilliant as in the typical race. The grey ocelots may perhaps be included under this heading; of these, the best known is the var. *grisea*, which sometimes tends to whitish on the flanks, and is found in Guatemala.

The difficulty of sorting these various cats is not lessened by the presence, in the actual distributional area of the ocelot, of a similar though distinct species, the tiger cat (*Felis tigrina*). This animal also varies greatly, having a bright fulvous variety (the chati) with soft fur, and a dull grey one (the margay) with harsh fur; the Brazilian kuichua (var. *macroura* of Prince Maximilian of Wied) is a yellow phase with a relatively long tail. In the writer's opinion the term "tiger-cat" is most unfortunate as applied to the *Felis tigrina*, a fine beast enough but in beauty far inferior to the handsome ocelot, especially the fulvous variety striking in its rich coat and sable lituræ. *Felis tigrina* might have suitably been styled the "leopard cat" had not that term

been already conferred on the *Felis bengalensis* of South Eastern Asia. The tiger cat always has its spots shorter than the ocelot; they are often solid, and never aggregated into chains.

A fine coloured plate of four ocelots, delineated by the master hand of Joseph Wolf, will be found in Elliott's "Monograph of the *Felidæ*." A handsome specimen of the typical race has sprung upon a wild turkey which lies, a dishevelled bundle of red bronze and metallic green, in the strong grip of the wild cat. Hard by a *melanura* ocelot is seen, standing with uplifted paw as if about to dispute possession of the prey; the captor, however, with snarling lip and lashing tail asserts the right of conquest. A third ocelot (var. *grisea*) stands reared up against a tree, prying with cat-like curiosity to ascertain the cause of the disturbance; a fourth animal (grey and striped) stands knee-deep in the long grass, its beautiful head posed in a manner suggesting a waterbuck amid the sedges of an African river. The foreground is littered with feathers shaken from the luckless turkey; a background of waving grasses, plumed and luxuriant, completes a wonderfully vivid picture of animal life.¹

The ocelot ranges from Paraguay northwards into Mexico and the south-western border of the United States. Mainly nocturnal, it resembles the great

1. This plate might well have been styled "La Rixe" (the quarrel) after the famous picture.

anteater in being exclusively a forest dweller ; it chases its prey nimbly from tree to tree like a miniature jaguar, and in the neighbourhoods of the settlements makes havoc amongst the poultry. No instance of even the large wild individuals attacking man appears to have been recorded ; it is, however, savage enough for its size, and children have been severely mauled by “tame” ocelots. Moreover, if two individuals are caged together the weaker one is very liable to become the victim, and even the repast of his cagemate ! These animals are said to be daring enough to carry off game shot by a hunter before his very eyes ; they seem to range with impunity through very uncomfortable thickets, since a specimen was obtained on the Rio Bravo whose skin was fairly lined with cactus thorns, lying flat and apparently setting up no inflammation.

The ocelot appears to have been first mentioned by the Spaniard Hernandez, who styled it the “catus pardus Mexicanus.” He gives tlacoozelotl and thalocelotl as the Mexican name, of which the word “ocelot” is said to be a corruption ; in some parts of America this cat is known as the zorillero. The first specimens all seem to have been observed in Central America ; Linnæus described the animal in the 12th edition of his “Systema Naturæ” under the name of *Felis pardalis*, and notices a Mexican example. Since then the ocelot has often been imported alive into this country ; indeed, one or two

are now received by the wild beast merchants almost every month, as may be seen by scanning their advertisements in the *Field*. The first example in captivity in Europe appears to have been an old and savage specimen—savage perhaps because it was old, since young animals are quite amenable to kindness ; it was exhibited at Newcastle in 1788 and is mentioned by Bewick. The first ocelots received at the London Zoological Gardens seem to have been the pair living in a temporary building in the grounds in 1829.

In the Antwerp collection, some years ago, the writer noticed a fine healthy ocelot which was kept in the open air : it had a roomy yard for exercise, and plainly demonstrated that even tropical animals can stand, with considerable impunity, continual exposure to the climate of Europe, and that the practice of such "open air treatment" is far better than the old unnatural method of cooping up animals in stuffy, heated houses. The ocelot has twice bred in the New York Zoological Park.

An ocelot once lived for about nine years in the Calcutta Zoological Gardens. This result was probably due to the care taken of it, the diet being largely a natural one, including as it did a live rabbit or guinea pig about once a week. The animal was very tame, active, and playful, purring like a cat ; it once, however, had an illness which in less experienced hands might have proved fatal. It began with slight

cough and sneezing, and refused its food entirely for three days; at the end of that time, however, it began to take milk and chicken soup. One portion of this concealed half an ounce of castor oil; the ocelot soon began to mend, and at the end of a fortnight was quite well.

Wilson, the American ornithologist, had a very tame and playful ocelot in his possession; indeed sometimes too playful, and rough in her play. On one occasion she seized a chamois leather glove in romping, tore it to pieces and instantly swallowed it, the owner of the glove being unable to rescue it even with both hands! She was accustomed to sleep on the back of a certain horse; but having on one occasion clawed her steed in settling down on his hindquarters, was dislodged after a struggle, and received a kick she never forgot. She occasionally escaped and worked havoc amongst the poultry; it was noticed that when fed on milk and farinaceous food her temper was better than when dieted on flesh.

This animal (or another of Wilson's) when on board the U.S. "Vandalia" developed an abscess about the root of her milk teeth; she allowed herself to be taken into a person's lap while the ship's doctor extracted the tooth. This individual was most useful in ridding the ship of rats; leaping ten feet at a single bound, she would kill her prey so quickly that it had no time to squeak. When in the warm

seas of the West Indies the "Vandalia" encountered troops of flying fish, skimming along in the moonlight like silvery birds. The ocelot was seen intently watching them : one day she was missing, and it was surmised that she had jumped after them and been drowned.

A female individual about six months old was imported into England in 1900. The little creature was as a rule tame and playful as a kitten, dashing about her very roomy cage at nightfall, and inviting attention by a characteristic cry ; she soon learnt to come when called " Puss ! Puss ! " She delighted to play with a broom, grasping it and allowing herself to be dragged along the floor of the cage, her talons still firmly fixed in her bristly plaything. This animal was fed on fowls' heads, with an occasional herring. One head sufficed her for the daily meal ; more seemed to make her cross-tempered. From the roughness and immaturity of her coat it seemed impossible to say whether this animal was an ocelot or a tiger-cat ; but it may here be mentioned that in captivity the two animals behave much alike.

A tiger-cat kept many years ago at Paris delighted to be stroked, and, like the individual mentioned above, solicited attention by a short cry. Another kept in South America by a priest named Nosedá was so tame as to be allowed its liberty ; it went loose about the house, and slept on the skirts of his clerical gown ; the neighbours eventually killed it

because it raided their hen roosts. So abundant were these tiger-cats that in two years Nosedá took no less than eighteen within a couple of leagues of his pueblo. The animals soon become used to captivity, and slept all day ; they were fed on live fowls, which they quickly killed, seizing them by the head and neck. The tiger-cats were dainty feeders, carefully plucking the bodies before devouring them ; when given cat's flesh they soon contracted mange, which proved fatal. When wild, each pair of tiger-cats seem to patrol a special area, like policemen on beat ; for it was found that when two had been taken, no more would be trapped in that particular district.

WASTED ELOQUENCE.

A pair of caracal lynxes. Note the expression on the face of each animal. The ears are beautifully tufted; the tail is of moderate length, and not banded. Contrast these animals with the ocelot—a true cat—figured in this work.

May 1905.

THE CARACAL LYNX

“I see you stand like greyhounds in the slips,
Straining upon the start.”

King Henry V. Act III. Sc. I.

Probably every nation under the sun has at one time or another adopted the device of employing one animal to hunt another. The Nineveh sculptures represent trained dogs, fierce and eager for the chase; a tame hunting-leopard, as elsewhere mentioned, appears on the monuments of Beni Hassan. In India, otters have been taught to fish for their masters; the Chinese employ cormorants for the same purpose; saker and lanner hawks are still flown at bustard and gazelle by the Saharan Arabs. Even to-day, in England, enthusiasts go lark-hunting with merlin, while the occupation of taking rats and rabbits with ferrets is a humbler phase of the same sport. One of the most interesting of these deputy hunters—employed in India for coursing lesser game—is the handsome and widely distributed caracal lynx.

The caracal (*Felis caracal*)—karakal (= black-eared) of the Turks—siya gush of the Persians—roi kat of the Boers—is found in India, Mesopotamia, and Persia, and ranges all over Africa, from the Cape to Cairo. From its peculiar zoological position, it is a very interesting animal; for as the Madagascar fossa is half cat half civet, so is the caracal half way between the true cats and the true lynxes. It measures about eighteen inches at the shoulder, and

a large African example taped about four feet three inches from the tip of the nose to the tip of the tail, measured in the flesh; the tail itself was about thirteen inches long. The face is short and somewhat rounded; the ears are pointed and slightly curved (with concavity anterior) so that the tips point directly upwards; they are beautifully tufted with pencils of black hair. The muzzle is bisected by a cleft which, forming a hare lip, passes upwards between the nostrils for about an inch, recalling a similar groove in the muzzle of the thylacine of Tasmania.¹ The legs are longer than in the true cats; the tail is longer than in the true lynxes, and slightly thicker in the middle than at either end.

The coloration of the caracal is variable, ranging from reddish to dark brown, and there are probably individual differences also. The ear tufts are, however, always black; but it seems to have hitherto escaped the notice of naturalists that these black ears are often *frosted over* with white, thus in some specimens imparting a grey appearance to the pinna.

In several individuals recently studied alive by the writer the muzzle was purplish suffused with black, and a more or less well-defined dark line bisected the forehead, like Burchell's *linea faciem percurrans* in the Cape hunting-dog. The roots of the ears were heavily semi-circled in black posteriorly, and

1. Renshaw: "More Natural History Essays," pp. 216-232. The thylacine is fully described and figured from a specimen then living in the Zoological Gardens.

an ill-defined dusky line ran along the back. In South African specimens the fur is more or less suffused with purplish black, and when the tongue is fully retracted (as in snarling) a black pigmented space is seen on the floor of the mouth, just in front of the tip of the tongue ; the eyes in these specimens are very pale greenish yellow. Prof. Matschie has proposed to separate the Algerian caracal as a distinct form under the name of *Caracal berberorum*, and some would also separate Asiatic from African examples ; in any case, it appears that the African ones are uniformly larger than their eastern brethren.

As already stated, the caracal is a connecting link between the true cats and the true lynxes. Taking the true cats first, one finds amongst the lesser *Felidæ* the very curious chaus or jungle cat (*Felis chaus*) of India ; the chaus is, as it were, an incipient caracal. The pupil of the eye is *circular* as in lynxes, not linear as in cats—a very important character ; then again the ears, though not frosted as in the caracal, are black-tipped and semi-tufted with long hair ; the tail is much shorter than in typical cats. The colour of the fur ranges from sandy grey to greyish brown, and some individuals are distinctly tinged with red on the spine ; others, again, have an indistinct dusky line along the back. Yet, though half caracal, this strange beast has several undoubted “cat” characters ; the inside of the forearm bears two stripes as in the ocelot, serval,

and other true *felidæ* ; the tail, though shortened, is *ringed*—no lynx has a banded tail. Although some chaus are pale-coloured, others are barred on face and breast ; thus there is a wheel within a wheel, and the chaus—the last of the cats—is so aberrant and inconstant in markings as to suggest that the species is undergoing evolution in the direction of the lynxes, or at least of the caracal. The temper of the chaus is fierce and courageous ; as a rule it is untameable, and of several which the writer examined in captivity none invited any friendly advances. Wolf has executed a fine plate of this cat ; with blazing eyes and twitching tail it strides out of a brake, carrying a fire-backed pheasant in its mouth.

The true lynxes, on the other hand, resemble the caracal in the shape of the skull, in their tufted ears, in their longish legs ; the rufous colouration of many individuals, and the variable amount of spotting of the fur, perhaps also indicate affinity. The true lynxes, however, have the face heavily ruffed with a thick whisker not found in the caracal ; their bodies are of much stouter build, and the tail is much shorter ; hence they form quite a distinct group of animals. Again, though the fur is often rufous like the caracal's it is as frequently of a sandy grey (European lynx), isabelline (Thibetan lynx), or dark grey (Canada lynx) ; it may be distinctly dotted all over with small black spots as in the pardine lynx, or streaked in vertical dark lines, as in the fasciated

ISABELLINE LYNX.

September 1901.

Note the ruff round the face, the long legs, and short tail.

variety of the bay lynx. Naturalists as yet are by no means agreed as to the number of lynx species existing, so that much work yet remains to be done in this direction. Unlike the caracal, the true lynxes are unknown in Africa and India.

The caracal (in Africa at any rate) inhabits mountainous yet fairly open country.¹ From its shy habits it is but seldom seen, even in the districts where it occurs; it preys on lesser antelopes and hares, and is said to be able to spring up and strike birds flying directly overhead. In 1903 the writer passed through a good deal of the caracal country; it was exceedingly interesting to observe Africa's rugged mountains, sparsely clad with rough vegetation, stretching for league after league towards the Sahara, and even invading the burning desert itself. The heated rocks and sand, the deep silence everywhere, seemed to suggest a world destroyed by fire; yawning ravines, doubly impressive in the deathly stillness, and stony beds from which all moisture had departed, added a savage picturesqueness to the scene. The scrubby bushes which nourished the gazelles seemed hardly capable of supporting a mouse; many birds of prey soared aloft as if temporarily "out of work." Specht's figure of a pair of caracal in the "Royal Natural History" gives a fair idea of the

1. It is interesting to compare the habits of the caracal with those of the serval cat of the same districts. The self-coloured caracal inhabits open country; the spotted serval skulks among long grass and reeds near rivers.

haunts of this species. The pose of the individual in the foreground (represented as capturing a sand grouse) is well rendered, though it would have been better to have shown it a moment later throwing its whole body, caracal fashion, over the bird to prevent its struggles. The South African caracals are big enough to be dangerous, and attack sheep and goats like a leopard; the stomach of one examined contained the remains of a dusty ichneumon (*Herpestes pulverentulus*)—a curious repast, one would think!

A beautiful plate representing the caracal appears in Elliott's "Monograph of the *Felidæ*." A pair of these animals is seen resting after pulling down a large game bird. One caracal, handsome and dark coated, lies curled up asleep like a cat; the other—a red-coloured beast—sits up on his haunches as if meditating over his recent dinner. The ground is littered with feathers, and some have floated on to the neighbouring bushes, where they stick like sparrows on a limed twig; in the foreground is seen a leg of the hapless quarry—a grim souvenir of the feast.

The present species appears to have been the Ethiopian lynx of Pliny, and was probably the animal to which the term "lynx-eyed" was first applied; it is represented on the walls of tombs at Beni Hassan in Egypt. The first *scientific* description of the animal was that of Guldenstadt, who conferred upon it the

name of *Felis caracal* (Nov. Comm. Acad. Petrop. 1776).¹ It has long been used in the East to chase game; the Arabs and Persians employ it to hunt antelope, peafowl, and demoiselle crane during the cold weather, the animal being kept hooded like a cheetah and then turned after its quarry in the wheat and millet fields. The speed and strength of the caracal is much greater than would be expected. In Vigne's day (1842) many of the Indian princes regularly kept caracal for coursing. "The speed of the caracal, or Indian lynx," observes Vigne, "is, if possible, quicker in proportion than that of the chita." The same traveller saw a caracal slipped at a grey fox, which it ran into as a dog would into a rat. As regards the *strength* of this lynx, Dr. Charleton relates that he saw one fall on a hound, which it killed and tore to pieces, though the dog defended itself to the utmost.

Many years ago Commandant Loche received a caracal from M. Rose, officer of the Bureau Arabe at Biskra, in the Sahara Desert. It was gentle, playful, and fond of being stroked; it used to lie on the furniture, and especially on the beds, like a domestic cat; in cold weather it crept inside the bed! Another individual was equally tame, but of uncertain temper.

1. The Hunterian M.S. published by Owen contains an account of a dissection of a "Shargoss" (probably=siya gush or caracal); and the Royal College of Surgeons' Museum contains a nearly complete caracal skeleton, formerly labelled "Bones of a Shargoss"—hence, probably, the same individual as in the MS.

It used often to lie in Mdlle. Loche's lap; one day when she wished to put it down the spoilt thing resented it and, turning savagely on her, seized her arm with claws and teeth. Happily the Commandant was at hand to intervene, or the consequences might have been serious. Loche records a male caracal from Barkadem, a female from Arbâ, and a young one (sex not stated) from near Djelfa; these were all placed in the museum at Algiers. He also gives Colea, Biskra, Lake Halloula, and the vicinity of Constantine as localities for the Algerian caracal.

The first specimen received into the Regent's Park collection seems to have been the individual which the Duke of Sussex presented in 1830. Apparently the caracal must be taken young in order to be tamed; the writer has seen some dozen specimens, all either nervous, or savage, or both, hissing loudly or growling with open mouth (see illustration). Frequently pacing its cage in the daytime, the caracal is not noticeably active at dusk; several kept captive in their native India were noticed to be asleep in the evening, when other cats in the same collection were awake and lively. Those in the Calcutta Gardens were fed on live fowls, pigeons, and rabbits; a natural though somewhat expensive diet.

THE BROWN HYÆNA.

In spite of the rapid progress made in matters zoological of late years many popular errors respecting animals still persist. The magnanimity of the lion is pure nonsense. The tiger is not more blood-thirsty than the leopard, the jaguar, or even the weasel. "Harmless" antelopes and deer have before now turned furiously on their keepers. Gorillas said to have been killed while charging are found to have the shot-holes in the back. The small-brained Indian elephant is not so superlatively intelligent as the average writer makes out; the bumps on his forehead indicate air cells and not intellect. "Silly" sheep show true wisdom in following the footsteps of a tacitly elected leader; pigs are not fonder of wallowing in the mire than rhinoceroses, buffaloes, or even some antelopes. The various species of hyæna, though largely carrion feeders, are not exclusively so; they are to some extent distinctly carnivorous, attacking cattle and even man, as will be shown in this Essay. Ferocious and ravenous, grim and cowardly, the hyænas offer a character study of very great interest; three species are recognised, of which the striped hyæna is both Asiatic and African, while the spotted hyæna is African only. The brown hyæna is *South* African chiefly; though its northern limit is at present unknown.

The brown hyæna (*Hyæna brunnea*) strandwolf of the Cape Dutch—is much the rarest of the three species. It stands about two foot six inches at the shoulder, and measures about five feet eight inches from the tip of the nose to the tip of the twelve-inch tail. Like its congeners—and many African animals of various families—it is much lower at the rump than at the withers; it is clothed in long rough hair, shaggy on the neck, back, and tail, though not forming a distinct mane. The general colour is greyish, heavily clouded with rich purplish black; the face is blackish brown, and the ears are blackish brown suffused with purple. The throat and sides of the neck are dirty yellowish white; the general grey colour becomes yellowish along the spine.¹ The coloration of the tail seems to vary; Steedman calls it uniform dark brown, but Sir Cornwallis Harris describes it as black, tipped with a few red hairs.

A melancholy interest attaches to the strandwolf, since it seems to be well on the way to extermination. To the naturalist all forms of life, however uncouth, are interesting and fascinating; and this hyæna, equally with the vanished quagga and the all but vanished black wildebeest, is a type of the glorious South Africa that has been, of the days when Cornwallis Harris shot elephants on the site of Pretoria, and

1. The above description was drawn up from two living specimens then before the writer; there is probably much individual variation in these hyænas. Others have described the species as grizzled brown, with dirty yellowish-white collar, sides and hips banded with deep vinous brown, and black and white stripes on the legs.

BROWN HYÆNA.

Adult female. Note the pale-coloured shoulders and the indefinite clouded appearance of the rest of the coat.

May 1906.

when Gordon Cumming hunted giraffe on the site of Mafeking. Unfortunately, the brown hyæna made itself such a nuisance to the farmers by attacking their flocks and herds that it has been almost exterminated in Cape Colony; like the Antarctic wolf and the thylacine, it has been crowded out with advancing civilisation. Brave when there is no danger, cowardly in time of peril, pitilessly ferocious to living things weaker than itself, the strandwolf may well be styled the bully of the bushveldt; and its final exit will probably be contemplated without tears by those most concerned in affecting it.

The early career of the brown hyæna, like that of many historical personages, appears to have been free from blame—perhaps from lack of opportunity. Remarkable in its preference for the seashore, it appears to have originally fed on crustacea (much like the crab-eating thylacine) occasionally feeding on offal, such as the carcasses of whales or seals. In 1652 the Dutch settlers landed at the Cape; with advancing civilisation stockfarms were established; the strandwolf and its spotted cousin promptly called on the new arrivals, and soon acquired a taste for mutton. In the daytime the hyænas lay hidden in the mountains or amongst the thick bush of the sand veldt; but at night their dismal howls could be heard rising in hideous cadence among the kloofs and poortes of the hills. Remarkably daring, they became a serious source of loss to the farmers;

perhaps realising that domestic cattle were easier to find than carrion, and less trouble than hunting buck. Not only sheep, but calves were killed by the strandwolves, and even men were not safe from molestation; unfortunately, the hyænas were found to be by no means confined to the coast, being quite abundant far inland. Dogs and firearms were freely used against the depredators, so that it was presently noticed that the strandwolves near the Cape were less bold than those further afield; but Lieutenant Moodie, as late as 1835, states that they seemed to increase with the population, their long dismal howls being answered every night by the farm dogs.¹

The hyænas of the interior had a terrible reason for their boldness. During a period of many years the monster Chaka, king of the Zulus, had ravaged the country with his sable battalions; the idea of this black Napoleon being to unite his rabble forces into one formidable army which would make him "master of the world." His troops consisted of one hundred thousand men; fifty thousand of these, marshalled into regiments, were kept constantly under arms. Every spring Chaka loosed his human tigers upon neighbouring tribes in a savage war of extermination; kept to their work by the severest discipline, the warriors invaded, routed and massacred throughout

1. "Valour and a whole skin" seems to have been the motto of the hyænas. Steedman relates that on one occasion these brutes, though whooping all night round a cattle kraal, were prevented from attacking by the incessant barking of the dogs.

the whole country as far as St. John's River. As a consequence of these wars thousands of corpses lay rotting on the veldt, a feast for hyæna and vulture. The unhappy natives being too distracted to molest them, the strandwolves became exceedingly fierce and dangerous; stimulated by plenty of human food they even ventured to attack living persons. The Rev. Theophilus Shepstone, a missionary stationed in Mamboland, stated that in a few months he heard of no less than forty attacks on persons asleep in their huts. Even lighted fires did not deter the strandwolves; they passed the calves in the outer yard (which at other times they would have readily attacked) and drew sleeping infants so deftly from under the mother's kaross that she was only awakened by the cries of her child.¹

A hyæna tore away part of the face of a little lad; and on another night the same beast carried a boy right off, only a small fragment of the victim being found. A third time the marauder appeared, and seized a boy about ten years old. Thus terribly awakened, the lad pluckily struck his assailant, compelling him to let go. The hyæna again seized him in his vice-like jaws, breaking his collar bone, but the unfortunate lad still struggling, dropped him again. With terrible pertinacity the animal once

1. A similar increase in the hyænas of Somaliland was recently noticed. On the cessation of hostilities against the Mad Mullah numbers of these ravenous brutes wandered about the country, their occupation gone.

more seized his victim by the fleshy part of the thigh, and although pursued ran off with him for a quarter of a mile. The boy's friends finally compelled the hyæna to relinquish his prey; before he would do so the determined beast bit out a mass of flesh and bolted with it, leaving the boy terribly mangled, though happily the thigh was not broken.

A little girl about eight years old, reclining in the cool of the day, was attacked by four strandwolves. One seized her head, another her shoulders, and the remaining two her thighs; and although the people of the kraal managed to drive them off, the hyænas left her so terribly mangled that her relations gave her the choice of being killed by themselves or being turned out into the bush. Happily she managed to reach the mission station, and being kindly treated, eventually recovered. Such then was the ghastly legacy left by the wars of Chaka; one almost sympathises with Lieutenant Moodie when he says: "I often employed myself in destroying hyænas by smoking them to death in their holes."¹

A Hottentot having carelessly left a calf in a field, two hyænas attacked it. Lieutenant Moodie, accompanied by the erring herdsman, hastened to the rescue, finding however that the mother of the

1. After his assassination Chaka's body was left out all night to be devoured, the remains of the tyrant thus receiving the same treatment as those of his victims. In the morning the assassins, finding it untouched, declared that the hyænas would not devour a chief, and proceeded to bury it, superstitiously closing up all the holes in the neighbourhood, lest his spirit should emerge and pay them a visit!

calf, assisted by another which had recently lost her young one, had managed to beat off the hyænas. The unfortunate calf though terribly mangled managed to get home, but died some time afterwards. A strandwolf now in the Capetown Museum is said to have killed three large calves before it was shot.

Dr. Sparrman relates a story which will be of service to temperance reformers. A drunken trumpeter, overcome by strong waters at a convivial meeting, was carried helpless out of doors and laid down to cool. To him entered a hyæna—a spotted one this time. Perhaps mistaking him for a corpse, it ran off with him, so that the man woke to find himself in an ugly predicament, being at very close quarters with an antagonist capable of cracking his bones like biscuits. Luckily the drunkard had enough wit to blow his trumpet, thus scaring off the hyæna. Since Sparrman's day this story has become quite a venerable chestnut, reappearing in several guises. Thus in one story "Piet the bugler" scares off a lion, which had seized him when asleep, by an impromptu solo on his bugle; in another a man seized by a tiger frightens him away by letting off fireworks which he conveniently happened to have in his pocket!

The brown hyæna was first described by Sparrman in 1785 from a specimen taken at the Cape; but the doctor supposed it to be the striped hyæna of North

Africa, as the strandwolf at that time was thought to be entirely confined to the seashore. In 1835, however, Steedman found it some distance inland.¹ To Sir Andrew Smith is due the credit of recognising this hyæna not merely as distinct from the spotted species, but also from the striped one (*Hyæna striata*);² in view of its indefinite markings, the term "clouded hyæna" might well be employed to denote the strandwolf. Sir Andrew kept one alive and published a figure and description of the new animal in the fifteenth volume of the Transactions of the Linnæan Society. Steedman's book of travels also contain a figure of this "new species of hyæna only known from the description of Sir Andrew Smith." The latter illustration will be familiar to many; it has doubtless done duty as a "striped hyæna" in many a book on natural history!

The affinities of the brown hyæna are with the

1. It is remarkable that Belon in the sixteenth century called the hyæna the "marine wolf"—almost the same title being afterwards applied to the brown species by the Dutch settlers. One wonders whether the brown hyæna was known to Europeans *before* Sparrman's day; but the very early naturalists often confused distinct forms together, so that it is frequently difficult to recognise the actual species intended in their descriptions.

2. Early in the nineteenth century, long before Sir Andrew Smith described the brown hyæna, the Paris museum contained a remarkable specimen which puzzled Cuvier. "There is in the French museum," said he, "an *Hyæna* whose country is unknown, on which I am in doubt whether to call it a variety of the striped *Hyæna* or to consider it a *distinct species*;" the italics are our own. The hairs of this animal were long over the whole of the back and flanks, being whitish grey at the base, *blackish brown* thence to the tip; so that the whole fur appeared of a *uniform brown colour*. There were some transverse whitish brown bands on the fore legs and hind feet. If, as seems likely, this was really a strandwolf, it should probably rank as the type specimen.

striped rather than with the spotted species ; this depends on anatomical characters, and not merely on the marking of the pelt. It is, however, interesting to note that in Somaliland there occurs a variety of the striped hyæna which, in its greyish ground colour and purple-brown bands, forcibly recalls the strandwolf ; especially is this evident when one has had, like the present writer, the opportunity of comparing living specimens of either animal side by side. This Somali hyæna is quite *handsome*, paradoxical though such a statement may seem. A specimen presented to the Zoological Gardens by Mr. Wm. Northrup Macmillan on September 21, 1903, was still living there in May, 1907. Now young hyænas are more clearly marked than their seniors, whose coats tend to become *uniform* in tint ; hence this individual, which was at least three years old and yet retained some brilliancy of markings, is well worth passing notice. The animals of Somaliland, by the way, seem to tend to special variation ; witness the local form of the leopard (var. *nanopardus*) and the small variety of the wild hunting-dog, which also occur in this region.

The first example seen in England was the specimen brought over by Steedman ; it taped four feet four inches from the tip of the nose to the root of the tail, and stood two feet four inches at the shoulder ; the tail (with hair) measured fourteen inches. Steedman also had a young one, being one of three taken alive

in the Nieuweveld Mountains. The cub was woollier than its senior, which it otherwise much resembled. Specimens were received at the London Zoological Gardens about 1832, a fine pair having been presented by Mr. Hanmer Warrington; these were probably quite young animals, since they were described as being smaller and lighter than the striped hyænas in the menagerie, and of a playful disposition.

At present a fine pair is living in the London collection, obtained from Carl Hagenbeck on November 12th, 1900; they have thus been over six years in England. When inspected by the writer on May 11th, 1906, these two individuals were in splendid condition, as the rich gloss on their coats testified. At about half-past twelve (noon) the female was lying down; the male, standing by, lazily caressed her, nonchalantly biting his consort and grasping the loose skin in his teeth to draw it out in elastic folds that reminded one of the "india-rubber man" at Barnum's. The shambling appearance of the brown hyæna is much increased by its knock-kneed appearance viewed from the front. The specimen kept by Sir Andrew Smith had the curious habit of regurgitating its food like a cow, to chew again.¹

1. It may here be mentioned that the allied striped hyæna is very quarrelsome in captivity and liable to mutilate animals in adjoining cages if it gets the chance. If several striped hyænas are kept together they will begin to try and burrow holes in the floor. A specimen sent by rail to Calcutta from West Bengal bit through the wooden battens of its cage, and was found, on arrival at the terminus, comfortably seated behind some bales of goods!

The brown hyæna still occurs near Grahamstown, in the Fish River Bush. This is an immense tract covered all over with scrub on hill and valley alike, yet in spite of its vegetation singularly destitute of water. Silent and sombre in spite of its green appearance, it is intersected in places by deep ravines; stunted aloes bristle on the summits of the kopjes, and the great candelabra euphorbias bedeck the sides of the kloofs. The lilac flowers of the speckboom and the white blossoms of the jasmine add a touch of variety to the monotonous scene; after the spring rains also amaryllis and narcissus shoot up in the arid valleys. The yellow flowers of the prickly pear attract the lovely sunbirds, shimmering in rainbow hues; green and yellow weaver birds play among the branches of the river willows; golden cuckoos and hoopoes call from the depths of the thickets. Kudu and bush buck, jackal and warthog inhabit the Fish River Bush; in the moonlight the spring haas or leaping hare may be seen browsing on the scrub, while the shy antbear forages for its meal of termites. Leopard and serval, caracal and wild dog range the bush for their prey; here also the strandwolf, once the tyrant of the colonial farmers, finds tardy refuge from extermination.¹

1. The *spotted* hyænas inhabiting this district are sometimes taken alive in wooden traps ten or fifteen feet square and baited at the end opposite the door, which falls on the bait being loosened. It is said that a farmer, having attacked a hyæna which had broken into his sheep kraal, was badly wounded by the animal, and would probably have been killed outright but for the arrival of help. Strychnine is also used in destroying the hyænas.

In view of the increasing rarity of the strandwolf, it has been thought advisable to complete a census of museum specimens; for, though threatened men may live long, threatened animals are apt to become extinct with unlooked for rapidity almost before they are known to be rare. The following examples of the brown hyæna have been recorded:—

1. Steedman's adult specimen.
2. Steedman's young specimen.
3. Example in the South African Museum, Cape-town, taken at Groenkloof in the Malmesbury division of Cape Colony.
4. Specimen from the Nieuwveld near Beaufort West, now in the South African Museum.
5. Female specimen in the same collection taken in the Fish River Bush near Grahamstown.
6. Adult male and cranium obtained by Dr. Von Horstock in Caffraria, on November 23rd, 1829, and now in the Leyden Museum.
7. The Royal College of Surgeons' Museum contains the skeleton of an old female which lived over thirteen years in the Zoological Gardens.
- 8, 9. Two skulls at the College of Surgeons, one of these from Gordon Cumming's collection.¹

1. Probably referring to this individual, Cumming says "I started a strandwolf, or fuscous hyæna, which I rode into and slew." This occurred on February 12, 1844, near the Vaal River. It may here be mentioned that happily the hunting trophies of Gordon Cumming were *not* all destroyed by fire, as has been supposed, after they had been purchased by Barnum; a few good specimens of skulls and horns were bought for the College of Surgeons in 1866, and decorate one of the staircases in the museum.

10, 11. Two young specimens were preserved in the British Museum in 1843; they had been born in Liverpool—perhaps in the Zoological Gardens formerly existing there.

12, 13. Two examples in the Jardin des Plantes. One of these, though faded, is a good example of a “clouded” hyæna; perhaps it is Cuvier’s specimen.

Thus far the brown hyæna has been considered in its relations to man; its destructiveness to his cattle, and ferocity towards his person. Let us now, setting back the clock some centuries, picture it as it lived on the sand-flats of the Cape, before the white man began to colonise South Africa.

Scene, the seashore in Southern Cape Colony: time, A.D. 1652. An immense tract of sand glistens white in the hot sunshine. On one hand rise mountains of hard metamorphic sandstone; on the other, the heaving of the sea reflects in opal brilliance the glorious southern sky. Everywhere the land shows impress of the heat and glare of the African sun; the hills, of a general greyish or brownish tint, are covered merely with bushes, not with trees; the very foliage is dusted brick red, and the landscape swims in a heat haze. A small gorge, watered by a tiny cascade and gay with ferns, affords a pleasant relief to the eye, as do also the brilliant little sun-birds—veritable winged gems—which hover over the snowy blossoms of the protea bushes. The chattering of a troop of baboons rises dully on

the drowsy silence ; bold in the security of centuries, swarms of rock rabbits (*Hyrax*) pop in and out of their burrows, feed on the herbage, or bask in the sunshine. Geometric tortoises with pretty embossed shells wander here and there ; a large shrike with yellowish breast sits on the topmost twig of a bush, as if on sentinel duty. Right at one's feet—a broad groove enclosing a narrower one—lies the sinister track of a puff adder.¹

Looking seawards, the vast sandy flats are seen to be bored all over with the holes of the mole-rats ; here and there a recently turned molehill shows damp and dark against the background of shimmering white. Glittering snowy against the brilliant blue the Dominican gulls float and hover ; the booby gannets dive headlong into the waves, and the close-drawn cordon of cormorants drives landward, as with a living net, hosts of silvery fish. A school of porpoises play in the surf, rising and falling with easy undulation ; a shoal of fish crosses their path, and instantly the big fellows are snapping right and left, in eager pursuit following their quarry to the very shore of a little bay. The terrified fish leap upon the strand, to lie flapping in silvery disorder ; one of the porpoises over-eager rushes after them, to lie high and dry surrounded by his victims. Vainly does he struggle ; his heavy chest and feeble ribs, no longer supported by a watery medium, collapse

1. The inside track is of course made by the reptile's tail.

hopelessly ; gasping he dies—asphyxiated though surrounded by air—amid a host of dying fish. High in the ether appears a single soaring speck ; then another, and another.

A rush of wings. An asvogel vulture has settled near the carcase ; it is rapidly joined by others, sweeping down like smuts from a chimney ; the air is now full of swaying specks. Silently they examine the carcase, hesitating lest any life yet linger ; then they hop sideways to it, and begin to peck out the eyes. Their beaks are too feeble to penetrate the leathery hide of the porpoise ; they must wait till it decomposes, or till further assistance arrives. Far in the distance, with the declining sun, rises the curfew wail of a jackal—sign of oncoming night.

Three or four strandwolves suddenly appear at the edge of the sand belt ; presently they steal across towards the porpoise, and are joined by others slinking through the bush. The banquet is soon in full swing ; the tough hide, torn open by iron jaws, is rent in fragments, and the luckless porpoise entirely hidden by a growling, grunting, gorging mass of hyænas, jackals, and vultures. Now and then a vulture hops aside, endeavouring to swallow a huge morsel far too big for it ; many of the birds are right inside the carcase. Night suddenly closes on the scene, as if shut down by an extinguisher.

Morning. Not a sign remains of the feast save

a few fragments; the hyænas have cracked and swallowed the very bones themselves, and the rising sun looks down upon a deserted beach. The gulls and cormorants ply their trade as yesterday, and many yesterdays before. Inland, the baboons chatter amid the kloofs; the hyrax youngsters play like kittens in and out of the rock caves. Black rhinoceroses, active and agile, climb Table Mountain; hippopotami bellow over the future site of Capetown. The beautiful blaauwbok antelope—now alas! extinct—pastures with springbok and bontebok in all the southern valleys; the craggy uplands harbour strong troops of Cape zebras, wary and and surefooted, true equine mountaineers.

Never comes the trader, never comes the European flag
Slides the bird o'er lustrous woodland, swings the trailer
from the crag.

So it has ever been, through the long centuries;
shall it not continue so to the end?

A sail appears on the horizon, then another and another. It is the Dutch under Van Riebeck, coming to found a colony at the Cape of Storms. Slowly the clumsy vessels make the land, harbingers of European civilisation. The anchor rattles over the bows, disturbing the peace of centuries. The white man has come to South Africa.

It is the beginning of the end.

THE WHITE COMPANY.

Polar animals in winter dress. Natural History Museum, South Kensington

1. Arctic fox
2. Arctic hare.
3. Ermine.
4. Ptarmigan.

THE ARCTIC FOX.

The beautifully mounted group of animals seen in our illustration represents certain species of mutable coloration in their winter dress. A white hare reclines at ease accompanied by a couple of ptarmigan: sheltered under a rock, two more ptarmigan are squatted, apparently regardless of the lissom stoat working its silent course through the snow in close proximity. Above them all an Arctic fox stands on an artificial rock adrip with icicles; his sharp muzzle and bushy tail recall the toy Pomeranian dogs so often kept as house pets. The whole group is exceedingly interesting, and well worth an actual inspection as a true work of art.

The Arctic fox (*Canis lagopus*)—terienniak and kaka of the Greenlanders—is structurally remarkable for its short muzzle and its rounded ears, for the ruff of hair on the cheek, and for the woolly sole with which its feet are effectually shod, like a worsted stocking on an old lady's foot in frosty weather. This fox is also unique amongst its congeners in exhibiting a seasonal change of coat. Moderately long in summer, the fur is then brown or dull rufous on the head, back and tail, becoming yellowish white below; the legs are brown, and the underfur is bluish grey. White and also grey hairs are sprinkled in the pelage, which is sometimes entirely

pervaded by the bluish tinge above mentioned, thus constituting the animal a "blue" fox. A living specimen examined by the writer on May 12, 1906, was brown all over with a bluish tinge on the cheeks; the median area of the face, the ears, and the feet were dark brown. The intensity of tint gradually paled from before backwards, and the tail and a patch on each buttock was quite light-coloured. This animal had a white patch under the chin, and a few white hairs were sprinkled in the coat.

In winter the fur is longer and thicker; though still grey at the roots, the individual hairs become tipped with white. The white hairs originally sprinkled through the coat also increase in number; so that with the gradual substitution of white for grey in the other hairs, the little animal in his snowy winter coat bears small resemblance to the dusky fellow of June. All the foxes do not, however, change colour at the same season, and some do not assume the winter coat at all; thus Fischer and Pelzeln noted grey foxes as late as December 27, though they saw the first white one as early as November 21.¹ Many individuals retain even in midwinter a little duskiness on the snout; the white fur is patched here and there with lemon yellow, and a specimen now in the Natural History Museum (taken in Discovery Harbour, Grantland, by the

1. Foxes which remain "blue" have the best pelts from November till the end of February; after which time the fur begins to turn brown and later almost yellow.

Arctic Expedition of 1878) still exhibits some lemon yellow about the head. In April and May, according to Steller, the foxes begin to shed their long fur ; so that by midsummer they are waistcoated, as it were, in the underlying wool.

Widely distributed throughout the Polar regions, the present species is a partial migrant, living in summer high up among the stony *débris* on the mountain side, and in winter descending to range the seashore. The Arctic fox is an expert climber ; daring and surefooted, it pillages the cliffs, causing great destruction of seafowl and their eggs ; while well-worn fox paths may be seen on the banks of the salmon streams. This fox pounces on the lemmings—curious rat-like little rodents—as they pop out of their holes to feed some eight hundred feet up in the snow and mist ; in the dismal Polar night it sneaks after the white bears to devour their leavings. Ptarmigan and hares inland, carrion, shellfish, and crustaceans on the seashore, contribute to the bill of fare ; small fish are attracted by the fox dabbling its tail in the water, and promptly secured. In the winter the unbroken ice allows the animals to wander to the islands off the coast, and sometimes, breaking up suddenly, carries the unfortunate beasts off to sea. In hard winters numbers of razorbills, searching vainly for water, fall down upon the ice and are devoured by the foxes.

In common with many other animals, the present species is sharp enough to provide against a rainy day by burying anything which it does not immediately require. The food is hidden under the snow, which the fox presses down upon it with its snub nose. Regular *caches* of provisions have been found, twenty, thirty, or even fifty lemming being packed away together, all killed by a bite in the brain, and perfectly preserved in the icy atmosphere as in a natural refrigerator. Although several feet of snow may conceal the hoard, the fox is said to readily return to the spot to dig out his dinner; several *caches* may exist in different parts of the country, yet all are visited with a certainty little short of marvellous. In this connection one may recall the story of the dog fox kept by Captain Lyon; unable to bury his dinner under the snow, the animal employed a substitute by coiling over and over it the chain by which he was secured. Perfectly satisfied, the animal then walked away, of course uncoiling the chain; he repeated the experiment with the same result. Again and again—some five or six times in all—did the fox struggle with the problem; at last the philosopher lost his temper, and settled it for ever by swallowing the meat!

The Arctic fox is one of the few carnivora which are of sociable habits; twenty or thirty burrows may be found together, and the foxes also make long tunnels in the snow. The young are born in June, and are

said to be nine or ten in a litter; all the cubs are born "blue," but those which will eventually turn white in winter are lighter than the others. As they grow older the future white foxes become yellow; those which remain permanently blue alter but little with advancing age.

The present species, together with the northern sea-cow, was first discovered by Bering's party, who in 1741 were shipwrecked on the Commander Islands in the North Pacific. The story of these luckless mariners has been elsewhere related;¹ suffice it to say that during their involuntary sojourn the sailors had but too ample an opportunity of studying the Arctic fox. Impudent, inquisitive, and cunning, the animals broke into the huts both by day and by night, not only stealing provisions but committing all kinds of senseless thefts, such as purloining knives, sticks, and clothes. Every movement of the party was watched with insatiable curiosity; the foxes accompanied the crew on their journeys, and even dared to snatch flesh from the hands of those who were flaying dead animals. At night the foxes came round the sleeping camp, stealing the very nightcaps of the sailors and the gloves that lay under their heads; and caused more serious annoyance by crowding about the sick and infirm, so that they could scarcely be kept off. In the intervals of business, so to speak, the foxes patrolled

1. Renshaw: "More Natural History Essays" pp. 157-8 and 159-60.

the beach, searching for carcases amongst the sleeping seal herd. If a body was found they tore it to pieces and dragged the fragments away ; what they did not eat immediately was buried under stones, but anything that the *crew* buried was sought out with tireless patience and finally grubbed up with exasperating success.

Irritated by the continual annoyance, the sailors killed the foxes right and left ; so daring were the animals that they could easily be enticed within sticking distance by holding out a piece of flesh. Steller, who accompanied the party, states that he slew over two hundred with his own hands, and that on the third day after his arrival he clubbed in three hours over seventy foxes, whose skins he utilised as a covering for his tent. In short, when the party at last left the Commander Islands, in a craft of their own manufacture, they took with them a valuable cargo of furs (including many fox-pelts)—a substantial compensation for the miseries which they had undergone. The fur industry of the Northern Pacific may be said to date from 1741 ; for many subsequent voyagers fitted out expeditions to hunt (amongst other animals) the valuable white foxes.

The present species was the *Canis lagopus* described by Linnaeus in the twelfth edition of his "Systema Naturae" published in 1766 ; Pennant also figured the animal fairly well as plate 162 of his "History of Quadrupeds," the dark summer coat

being quite recognisable. The Arctic fox was apparently represented in the museum of Sir Ashton Lever.

At the present day the Arctic fox is an animal of considerable commercial importance, by reason of its valuable fur. Blue pelts are the most esteemed, especially when nearly black—a rare form ; these summer skins fetch, or used to fetch, as much as £1 apiece at the annual sales in Copenhagen, while in Greenland they fetch two rigsdaler (4s. 6d.) as against three marks (1s. 1½d.) for white skins. In S.W. Greenland the coast supplies blue foxes mostly, the white ones being commoner in the north and on the north and east coasts ; but the blue foxes, even in winter, seem to be commoner than the white ones, since Mr. R. Brown, in 1868, stated that 3,000 blue and only 1,000 white skins were annually taken in Greenland, and a return for forty years showed an average of ten blue to seven white. The Esquimaux take these animals in an ingenious trap made of stones, and shaped like a small arched hut. A single square aperture is situated on the top of the trap, and is closed—apparently securely—by a platform of whalebone. The fox stepping on to the platform to reach the bait is unceremoniously lowered through the skylight, while the elasticity of the whalebone springing back allows the trap to be instantly re-set for a fresh victim. Captain Lyon states that he once captured fifteen foxes, one after the other, in

the same trap in the short space of four hours ; but of some kinds of traps, at any rate, the animals are suspicious enough, and may leave them alone all the winter, although set near a regular and well-frequented track. Sometimes the fox is sharp enough to steal the bait without paying the penalty; " It is a common occurrence," observes Dr. Rae, "for the fox to make a trench up to the bait, seize it, and permit the charge to pass over his head."

THE PACIFIC WALRUS.

"I write 'the walrus of Behring Sea' because this animal is quite distinct from the walrus of the North Atlantic and Greenland, differing from it specifically in the most striking manner."

Mr. H. W. Elliott, on the Pacific Walrus, 1873.

The sun shines steadily upon the burnished surface of the Polar Ocean. Above, a sky of brilliant blue; seawards, a gently heaving surface, calm as a mill-pond; landwards, a rugged shore, backed by snow-clad hills, which reflect in creamy brightness the welcome rays of the sun. Prone in an icy channel lies the carcase of a rorqual, beclouded with seagulls; some twenty polar bears and a crowd of white foxes are tearing and dragging at this welcome find. A small group of sea-lions bask in the sunshine, and away on the hillside a few specks indicate a troop of caribou deer. The animals are too far off to make any audible sound; the world is "dumb with snow;" around and over everything, like an invisible pall, hangs the silence of the Arctic.

A sound, like the deepest of sighs, rises from the surface of the sea; a huge black object has appeared in the opal water. A faint vapour ascends from unseen blow-holes; and with a whisk of his broad-fluked tail, the whale descends into the abyss. Again silence. A few petrels flit over the heaving waters. Now a tiny breath of vapour appears just

above the waves, then another, and another. A number of dark objects are seen swimming well and strongly towards the shore. Then, as the animals crowd up towards the beach, the sea is alive with savage-looking, spouting, bellowing heads. For a moment the water boils in swirling commotion; then, waddling and grunting, the beasts quit the water, huge, hairless creatures, battle-scarred and heavily armed with long white tusks. Tediously they jerk their dripping bodies over the foreshore, and in a dense-packed mass, compose themselves to sleep—a herd of Pacific walruses.

The Pacific walrus (*Odobænus obesus*) attains a total length of twelve to fifteen feet, a girth of about twelve feet, and approximate weight of two thousand pounds; the skin alone, thick and heavy as a giraffe's, weighs from two hundred and fifty to four hundred pounds, and is two or three inches thick on the neck and shoulders. The head of this species is remarkably flat; seen from the front, the massive bony sockets of the tusks give a curious square appearance to the muzzle, while the true cranium behind rises in a gentle dome that detracts but little from the quaint, almost geometric construction of the skull. As in the hippopotamus, nostril, eye, and ear are situated near the top of the head; the nostrils are oval in shape and open directly over the muzzle. Resembling in general outlines a clumsy seal, the Pacific walrus has the neck and shoulders so thickly overladen with

blubber as to dwarf the head and flippers to medium proportions. The tusks measure from ten inches to two feet in length, and weigh from five to fifteen pounds ; they are long, thin, and convergent, and a short bristly moustache adorns the lip from which they spring. Young pups are black ; young adults are brown ; old animals become almost hairless, and the dark yellowish-brown hide, wrinkled like that of a rhinoceros, is lined with red veinings and clotted over with scurvy patches. The Pacific walrus has long been confounded with the Atlantic species, but the researches of naturalists have shown the following differences between the two forms :—

PACIFIC WALRUS.	ATLANTIC WALRUS.
1. Muzzle broad.	Muzzle narrower.
2. Skull broader in front than behind.	Skull narrower in front than behind.
3. "Whites" of the eyes coffee-brown.	Eyes red and bloodshot.
4. Moustache short.	Moustache longer.
5. Tusks long, thin, and convergent.	Tusks shorter, stouter, and divergent.

In addition to the above there are also important osteological differences between the two animals.

The present species inhabits the Northern Pacific and the adjacent coasts of Asia and America ; to-day it is rapidly tending towards extinction. Bidding fair to follow the huge rhytina or sea-cow of the same

regions, it may possibly have been first discovered by Steller, the original describer of the sea-cow and the Arctic fox ; but this seems doubtful, and perhaps the credit should be assigned to Captain Cook, who found this walrus swarming in Bristol Bay.¹ Huddled together on the ice like pigs in a sty, the walruses had a rough and ready method of mounting sentry. Each individual before dropping off to sleep would prod his neighbour with his tusks; the second animal waking up would grunt sleepily, and in his turn give a dig to a third one before composing himself anew to slumber. This wireless telegraphy was gradually communicated through the whole herd, like buckets passed at a fire. The majority might be fast asleep, heads happily pillowed on one another, yet in the huge herd which lay like a mass of dirty snow on the icefield there would always be one or two animals awake. When alarmed the walrus set up a loud bellowing ; the great armed heads swung round and the close-packed ranks tumbled over each other in haste to reach the sea. The braying of a herd of walrus is said to be distinctly audible at a distance of several miles.

Curiosity is a strong point in the character of both the Pacific and the Atlantic walruses ; the earlier voyagers found them following close to the boat,

1. The name of the first European to meet with *Odobænus obesus* seems to be unknown. Thus in 1786 G. Pribylov, a mate in the service of a swan-hunting company, discovered one of its haunts in the islands which bear his name ; but even *he* found signs—pipe, brass knife-handle, and traces of fire—that indicated that he was not the first to land there.

savage-looking and numerous, yet sinking like a flash if alarmed.

“Rude Heiskar’s seals through surges dark
Will oft pursue the minstrel’s bark.”

Quite so; but perhaps they would follow it as closely without any orchestral performances. The appearance of so many armed and moustachioed heads round a boat might well unsettle the nerves of men only provided with muskets; yet it is said that unless molested these sea-horses are peaceable enough. Wounded walruses are both brave and ferocious—small blame to them: from their great strength and activity in the water they are most dangerous antagonists, readily thrusting their tusks through the bottom of a boat, or tearing men almost in two with a stroke of their natural sabres. In time of danger the cows take their young under their flippers, and endeavour to escape with them; the bulls do the fighting, and it must need a stout heart to combat a rush of infuriated beasts, which try to capsize the boat by hooking their tusks over the gunwale, bellowing as if demented, while the sea boils with their monstrous bodies as big as horses.¹ At the end of September and in October the walruses are said to congregate in such numbers at the mouth of Nagsugtok Fiord that the kayakers,

1. In 1869 a boat’s crew were pursued to an island by a herd of walrus, which actually blockaded them in. Serious consequences would have ensued had the infuriated animals swarmed on the beach to press the attack.

even when several together, dare not pass, and hence postal communication between North and South Greenland is entirely cut off!

The Polar bear attacks the walrus calves and kills them with a blow of his paw; sometimes, however, the older ones catch Bruin in the water and combine against him. The fight is one-sided enough. The walrus are well armed with ivory daggers; their bodies are cuirassed in tough hide; and they also have the advantage of numbers. Swimming far better than their enemy, they drag him under water and tear him to pieces with their tusks. The orca or killer—a black and white grampus fully described in a previous work¹—is a ravenous creature which includes infant walrus in its bill of fare. Occasionally, however, it is mortally injured by a cow walrus whose young it has butted off her back and swallowed. Against one enemy—man—alas! no courage avails; and since the carcase of every bull is worth about £12. 10s. od., there seems little chance of the present species surviving much longer. Tusks, oil, and hide are alike exceedingly valuable, and the luckless animals have been pursued with a hearty appreciation the reverse of consolatory to the naturalist.

The history of the Pacific walrus is dismal reading enough. Captain Cook found it abundant in Bristol Bay, Alaska; in 1821 a Russian named

1. Renshaw: "More Natural History Essays," pp. 175—176.

Hülßen observed hundreds of thousands in Bering Straits. Fifty years later the animal was still abundant in Bering Sea and Southern Alaska ; but about this date the crews of the whalers began to hunt walrus in July and August, whilst waiting to attack their larger quarry, and since the walrus "fishery" had already been prosecuted for many years, the consequences were very serious. Some years ago it was computed that over *twelve thousand* animals were being annually killed, besides those slain by the natives ; six thousand being yearly sacrificed in Bering Straits alone ! Shot with rifle and musket, speared and harpooned, the unfortunate beasts present a ghastly record of destruction comparable only to the massacre of herons by the Florida plume-hunters, or the reckless destruction of South African game by the Boers. One almost already seeks language in which to write the epitaph of the Pacific walrus.

Sad as it is to contemplate the threatened loss of a fine species, the destruction of human life is yet more harrowing. The coast natives are entirely dependent on the walrus for food, tools, and building materials ; for huts and boats ; for dog-harness, fishing tackle, and money (material for barter)—nay, for life itself. In those icy regions the walrus is to the Esquimaux what the American bison was to the Red Indian, and what the reindeer is to the Lapp. In the winter of 1878 it became grimly evident that

the extermination of the walrus meant the extermination of the natives. Far out on the ice the whaling crews were destroying in thousands the only food of the starving inhabitants. Half of the people of Lawrence Island and one third of the population south of St. Lawrence Bay died from sheer famine; despairing mothers took their emaciated children to the burying ground, and either strangled them or left them to die of cold. Surely in all the grim history of Polar voyaging the red Arctic sun has looked down upon no sadder tragedy!

In concluding this almost obituary notice of the Pacific walrus, it is pleasant to recall that, in one spot at any rate, the species receives but little molestation. Walrus Island—one of the Pribylov group—is a lava rock off the coast of Alaska, less than a quarter of a mile long, and but a few hundred yards wide—less than five acres in extent—yet here several hundred walrus lie closely packed on the inclement basalt, their breath rising like a sea fog in the icy air. Amongst themselves, the walrus are said to be almost good-tempered, blows being given and received with perfect amiability; this is well, since in quarrelling the animals might, like the American travelling by railway in England, run right off the tiny little island! Once a year only—in June and July—is this sanctuary disturbed; the natives, laden with tubs and baskets, visit this rock to collect the eggs of the *Lomvia arra*.

Picture then the Pacific walrus in its northern home. The low outlines of Walrus Island loom indistinctly through the thick muggy atmosphere of Bering Sea. The grunting of thousands of *lomvia* is borne upon the icy air; swaying in long files, multitudes of loons sit on the water. There are hundreds of thousands of other sea-fowl—cormorants, auks, and gulls; the shore of the rock is encompassed by a thick belt of birds standing like so many bottles, grunting and quarrelling; while their eggs lie everywhere, and frequently roll off into the sea. The walrus themselves lie in huge crowded masses, their immense blubber-laden shoulders contrasting oddly with their flat heads; the old males with hides almost bare, long drooping tusks, and bristly moustaches, are veritable warriors of Neptune. Here in the driving sleet and heavy mist the Pacific walrus enjoys an ideal home. Plenty of food is to be found in the shell-fish, or in the bulbous roots of the seaweeds which encumber the bays of the mainland; the vast icy water gives ample room for swimming exercise, no hardship to an animal clad in so warm an undervest of blubber; tired of action, it can repair to the isolated refuge of Walrus Island, whose low flat surface, but a few feet above the waves, gives, if required, a speedy "emergency exit" to the water. The walrus do not seem to attack the bird population; indeed, the glaucous gulls breed in the very interior of the island, among the early close-growing

grass. Unfortunately, the males only inhabit Walrus Island ; the females breed on the ice and never come down to the Pribylovs. The reckless destruction which has been waged for long years still threatens these interesting creatures, and only too much emphasis must be attached to the words of the writer who, in 1879, accompanied the walrus hunters to Cape Lisburne: "I advise all natural history societies and museums to get a specimen while they can."

Extinctus amabitur idem.

THE EUROPEAN BISON.

“Awake again I say all men
Be merry as ye may,
For Harry our King has gone hunting
To bring his deer to bay.”

So runs the jolly lilt of an old hunting song dating from the time of bluff King Hal; one can picture him plumed and spurred, galloping after his hounds through the glades of Windsor Park, past Herne's Oak all gnarled and riven, and toiling up the height near the castle with a gay company clad in Lincoln green. Hunting scenes indeed are deeply woven into the fabric of English history; *videlicet* William Rufus lying arrow-slain, a huddled heap in the New Forest bracken; and James I. hare-hunting at Royston, in happy ignorance of the impending Gunpowder Plot. England of to-day retains but little of the old romance; but the Continent of Europe yet harbours many fine beasts of the chase. The burly lynx of Norway, ambushed on the snow-covered pine boughs; the brown bear nosing after a square meal in the Russian forests; the great elk in the birch woods of Scandinavia; and the reindeer patrolling the lichen-clad wastes of Lapland, are all cases in point. Wolf and mouflon, ibex and chamois are all interesting; preeminently is this the case with that magnificent survival of Pleistocene times, the great bison of Lithuania and the Caucasus.

The European bison (*Bos bonassus*) wisent of the Germans—zubr of the Russians—stands about six feet high at the shoulder,¹ and measures about 10 feet 1 inch from the tip of the muzzle to the root of the tail. The weight of an adult specimen is at least up to 1,700 lbs. Humped on the withers and semi-maned on the shoulders, neck, and chest, it differs from the American bison (miscalled “buffalo”) in its larger horns, longer legs and tail, and more powerful hind quarters: the elevation of the withers, although noticeable, is less than in the Transatlantic species, and they are less luxuriantly clad in curly hair. The eye sockets in both animals are tubular; the colour of the European bison is black-brown on the head, dark brown on the neck and shoulders, and paler brown on the rest of the body. About May this great beast presents a very ragged, untidy appearance, the long winter robe being almost shed; stray wisps of wool, scattered over the hide, reveal the smooth, mouse-coloured coat beneath. The tongue, palate, and, it is also said, the roasted meat of this bison are of a bluish colour; in the wild state it exhales an aromatic scent, especially about the head. The longest recorded horns measure $8\frac{1}{4}$ inches along the outside curve, with a basal girth of $12\frac{1}{8}$ inches.¹

Once widely distributed through Spain, Switzerland, Germany, Russia, and Poland, the bison as a

1. A bison cow with unequal horns was shot in the Caucasus in 1895; length of right horn 15 inches, left 17 inches; circumference at base 7 in., greatest span $10\frac{1}{2}$ in.; tip to tip $2\frac{1}{2}$ in.

EUROPEAN BISON.

By permission of M. L'hoest, May 1900.

Adult bull casting "buffalo robe," the remains of which are seen as untidy wisps of wool. Note the hump on the withers, the powerful hind quarters, and the longish legs and tail.

truly wild animal is now confined to the rugged district of the Caucasus ; a herd under the protection of the Russian Government is maintained in the famous forest of Bialowicsa, in Lithuania. As far as can now be ascertained, the animal appears to have always associated in small bands rather than in herds ; this would consort better with its woodland habitat, whereas the vast prairies once covered by its American cousin gave ample scope for the massing together of thousands of individuals. In summer the European bison frequents low-lying thickets in swampy situations, where it can bathe and wallow ; in winter it inhabits the densest portions of the elevated pine woods, climbing readily about the mountain sides.¹ At dawn the bison descend to drink at the forest springs, and then begin to feed slowly up hill ; in spite of their great weight they gallop well, carrying their heads close to the ground like antelope ; they are also good swimmers. The voice of the European bison is a deep, short grunt. Young animals resemble the calves of the American species ; they are born at all seasons, and generally do well even in cold weather.

M. Dolmatoff has vividly described how on July 20th, 1846, he and his party came upon a troop of bison in the forest of Bialowisca. The weather was magnificent, the sky calm, not a breath of wind ;

1. Prince Demidoff records bison tracks in the snow at 8,000 feet ; Radde met them at 7,600 feet.

the older animals lay chewing the cud in a sequestered valley, while the youngsters romped about, playing amongst themselves and sending up clouds of sand. At the first note of the horn the troop as by magic bounded to their feet, eyes and ears alert; the calves pressed timidly against their mothers. When they heard the yelping of the dogs, the bison hastily placed the young ones in front and, themselves acting as rear guard, took to flight. The beaters receiving them with yells and blank powder, the older animals then charged furiously through their assailants, who slipped behind the tree trunks. The foresters managed to hold a three months calf; but another of fifteen months upset the *eight* men who seized him, and made off. Several others were taken on this occasion; they were required for the London Zoological Gardens and elsewhere, it having been found that adult animals could not survive in captivity.

A curious plant—the zubr grass—with an entirely green blade—grows in the Caucasus forests; it exhales a remarkable scent, half musky half violet, and imparts this odour to the bison which feed on it.¹ Bison are also fond of the wide-leaved onoclea (*Onoclea struthiopteris*) a small plant growing in the woods; they feed on ferns, on the bark of various trees such as the birch and rowan, and on tree

1. The scent of the zubr grass is probably due to the presence of benzoic acid.

lichens. The aromatic odour imparted to the bison by the zubr grass reminds one of the perfume exhaled by many antelopes, such as eland, blesbok, etc.

The European bison appears to have first been noticed by Julius Cæsar, who mentions it in his account of the fauna of the Black Forest—*De Bello Gallico*, *Lib. VI. 21*. “Hi sunt magnitudine paulo infra elephantos” he says of the wild oxen; although in reality very much less than an elephant, the magnificent proportions of the animals must have strongly impressed the Romans. Aristotle also notices the “bonasus.” It inhabited the mountainous country between Pæonia and Media; was as large as an ox, but with a shorter and thicker body; had the neck and shoulders clothed with a reddish gray mane, which overhung the eyes; the rest of the body was light-coloured. The Cossack-like Pæonian hunters were probably the originals of the legendary centaurs. According to Aristotle, however, the horns were directed downwards and curved in a circle; Cuvier has sagaciously shown that this latter feature was doubtless an individual abnormality, adding that the Paris Museum at the time of writing actually possessed a bison skeleton having one horn curved in this manner. These malformations are quite common among the *Bovidæ*; indeed the “cow with the crumpled horn” has entered into nursery literature. Pliny mentions “Jubatos bisontes,” while Seneca and Martial both notice the

present species, distinguishing it from the urus or aurochs.

Tibi dant variae pectora Tigres
Tibi villosi terga Bisontes
Latisque feri cornibus Uri.

Senec. Hippol.

In mediæval literature one finds bison and urus hopelessly mixed up. The urus (*Bos taurus*) was a fine beast inhabiting the Black Forest, and was probably of a white colour varied with dun and red ; its horns were situated at the *summit* of the skull, and attained a span of 50 inches. It was thus entirely different from the bonasus ; yet one finds writer after writer (Gyllius, Erasmus Stella, Claus Magnus, and Albert the Great) hopelessly confusing the two animals, and even mistaking elk and reindeer for bison ! Gesner figured two beasts, one of which he thought was a bison, the other the urus ; Pallas, however, showed that both represented the urus. The matter was cleared up in truly drastic fashion by the extinction of the wild urus ; some strain of urus blood probably persists in the half-wild cattle of a few English parks. The strange perversity which has misnamed the American bison the “buffalo” and the Indian gaur the “bison” has applied the term “aurochs” to the European bison ; the latter term really belongs to the urus—hence the only “aurochs” alive to-day are the white park cattle.

In the old days the bison was abundant, and its

THE AUROCHS.

British wild ox. The late Professor Newton was the first to point out that the term "Aurochs" was incorrect when applied to the European bison. The true aurochs or urus has long been extinct, but it is possible that the British "wild" cattle still preserved in a few English parks retain some strain of aurochs blood.

May 1905.

shaggy troops must have been a fine sight climbing the rugged hillsides or bathing in the rivers. So plentiful were they in 1594, that peasants passing through the Transylvanian forests were sometimes trampled to death by a rush of startled bonasus. The old Polish kings and nobles had grand sport with these magnificent animals, taking the woods with thousands of beaters ; perhaps the last to enjoy such royal pastime was Augustus III. of Poland, who in 1752 killed no less than sixty bison. The last bison shot in Pomerania was killed by Duke Wratislaw V. about the middle of the fourteenth century—doubtless with a crossbow ; one of its horns, originally used as a drinking cup, was afterwards deposited as a reliquary in the Cathedral of Commin. It is said that the last bison taken in Hungary was killed in the forest of Sohl by an expert crossbow shooter as early as the reign of King Mathias (1458-1490) ; but according to Edward von Crynk this did not occur till 1814, when the last survivor was slain in the Siebenberg. The last bison in Prussia was killed by two poachers in 1755. Unsettled political conditions have rendered it difficult to satisfactorily protect the Polish bison, and many were killed in 1863 by insurgents who took refuge in the forests. In the Caucasus, however, the wild bonasus yet linger in small troops, sole remnant of a once widespread race ; they frequent the northern side of the mountains, and occur in the

forests near the sources of the Leba and Bjillaga rivers, their headquarters being in the dense woods of the Kisha valley. These Caucasian animals are, however, comparatively rare, and as many as five are seldom seen together, though it is said that thirty years ago herds of fifty or sixty head then occurred in the same regions.¹ Seventy bison horns, set in silver, figured at a feast given by some Caucasian nobles in honour of General von Rosen; a single horn holds barely four litres of liquor.

The Lithuanian herd are almost park animals. The forest which they inhabit consists of a flat woodland, timbered with magnificent limes and other trees, and intersected by a number of grass rides drawn at right angles to each other. This reserve was originally made by Augustus III., who enclosed thirty square miles with a strong wooden fence thirty metres high. A stand having been erected for the marksmen, the bison were driven through an opening in the fence twenty feet away. In one day forty-two head were killed in this unsportsmanlike fashion; the queen slew twenty of them, and filled in the time by reading a novel till the beaters came up!

At the present day, it is satisfactory to note, the Lithuanian bison are pretty strictly looked after. The forest is patrolled by a military guard; so severe are the game laws that it has been said that

1. The fire-breathing bulls of the Argonauts were probably Caucasian bison, red-eyed and savage.

it is cheaper in Russia to kill a man than a bison. The slaughter of a bison is punished by three years hard labour and a fine of 800 roubles ; the slaughter of a man by three years in Siberia and no fine at all ! Any motherless bison, elk, or red deer found in the forest are brought up on cow's milk until four months old, when they are fed on bruised oats ; a fine strong bull and four cows thus reared were sent to Pless in 1893.¹ The Lithuanian bison are supposed to have degenerated by interbreeding ; but at any rate a wild bison killed by Johann Sigismund in 1595 weighed only 19 cwt., or 100 lbs. less than the specimen living in the Berlin Zoological Gardens !

From its fine appearance and status as a genuine big game animal, the European bison has always been a desirable exhibit for zoological gardens and museums. All the specimens now in captivity are supplied from the Lithuanian herd ; but on one occasion—on December 19, 1866—a Caucasian example which Adjeff had taken near Ateikar was with great difficulty conveyed to Moscow. When Henry IV. of England visited Prussia in 1390-91, a bison and two bears were presented to him—royal gifts indeed : a bison was also sent to London as a present to George IV. The first examples received in the London Zoological Gardens

1. The care taken of the Lithuanian bison—nominally wild animals—has become almost ludicrous. According to Brehm, the fiery bonasus of Aristotle now follow people to be fed, like the "wild" bears which frequent the hotels in Yellowstone Park !

arrived in 1847. They consisted of a pair of young animals which, through the influence of Sir R. I. Murchison, had been presented by the Czar Nicholas I. to the Zoological Society. Fifty foresters and three hundred beaters were employed in driving the forest; a keeper was sent as far as Memel to take charge of the animals, which were in fairly good condition. The Council awarded the silver medal to Sir R. Murchison and M. Dolmatoff, the master of the imperial forest of Bialowicsa. Unfortunately, the male bison died in the following year from inflammation of the lungs, being two years and five months old. In September, 1848, the animal suddenly began to fail, and refused its food; feverish and exhausted by impeded respiration, it died about a week later. Sir Richard Owen, who dissected the carcase, found that the whole right lung was congested, being glued to the pericardium by adhesions; and there was also bronchitis. In 1849 the female, together with three American bison, succumbed to pleuropneumonia. In 1860 a pair of bison were sent to St. Petersburg; and about this time the Emperor Franz Josef presented a three year old bull and a two year old cow to the Dresden collection. The cow calved in 1860, but treated her offspring badly and trampled on it, so that it died; another calf, however, lived. A specimen was exhibited in the Berlin Zoological Gardens about 1864; and

EUROPEAN BISON.

Pair of young animals presented to the Antwerp Zoological Society by M. Henry Vanderlinden. The first animal is in the smooth summer coat; the second one still shows remnants of the winter robe.

By permission of M. L'hoest, August 1900.

in November, 1868, the Zoological Society of London purchased one which had been born in the Amsterdam collection on July 14th, 1866.

Regarding more recent specimens, mention may be made of the bison seen by the writer at Amsterdam in 1900; at Antwerp in the same year he also photographed an old bull which, received as a mere youngster, had attained the age of twenty-three years in captivity. A few months later a pair of young bison, acquired through M. Henry Vanderlinden, President of the Antwerp Zoological Society, were added to the Gardens. In 1901 a bull and two cows from the Lithuanian herd were received on a private estate in England. Dr. Heck's valuable book of photographs illustrating the collection at Berlin contains a good picture of a pair of young bonasus; the bull looks a very fine sturdy animal as with mild interest he turns his great head to regard the camera.

Lastly, on April 15, 1904, the first specimens seen in America reached the New York Zoological Park; although thin, weak, and bruised on arrival, they steadily improved in condition. They consisted of a pair of animals about five years old, and had been purchased from the private herd of the Prince of Pless in Silesia. This private herd was started about 1855 by a former Prince, who thus introduced the bison to its old haunts. The Prince exchanged some red deer with the Czar for a three-year old

bull and three cows, and turned the bison into the great deer forest of Emanuel Segen. In 1885 this herd consisted of six bulls, two cows and two calves.

The following census of museum specimens of a fast disappearing species may be valuable :—

1 and 2. Adult bull and cow in the Natural History Museum, South Kensington; shot by Mr. St. G. Littledale, and presented by him in 1892. Published measurements: height of bull, 5 ft. 11 in. at the withers and 10 ft. 1 in. muzzle to root of tail. Colour bright chestnut brown, perhaps due to fading. From the Caucasus.

3. Bull bison from Lithuania, presented by the Czar to the British Museum in 1845.

4. Cow in the Edinburgh Museum, stuffed, from the Duke of Bedford's collection.

5. Adult bull in the Leyden Museum, received from the St. Petersburg Museum.

6 and 7. Skins of two half-grown specimens now in the Leyden Museum, received from the Rotterdam Zoological Gardens in October, 1871.

8. Skin of a young individual at Leyden, received from the Zoological Gardens at Amsterdam, April, 1869.

9. Skull of male bison from Lithuania in the Royal College of Surgeons' Museum, presented by Professor Otto in 1838.

10. Bones of the trunk of a young bull in the Royal College of Surgeons' Museum. This animal was

presented alive to the Zoological Gardens in 1847 by the Czar of Russia.

11. A pair of horns (said to be those of a young bison cow) are in the same museum.

12. Bison presented to the Göttingen Museum by the Czar.

13. Specimen presented to the Copenhagen Museum.

14. Mounted group representing a fight between bison and panther ; set up under the supervision of Gustav Radde, and now in the Tiflis Museum.

Every naturalist will hope that the European bison will yet be preserved for many years. The wild animals of the Caucasus perhaps stand the best chance ; for although every care may be taken of the Lithuanian herd there is always the danger that their numbers may sink so low (by an outbreak of rinderpest for instance) as to actually snuff out. Preponderance of male offspring in the herd would herald disaster ; then in absence of fresh blood the successive generations would become malformed, with twisted crumpled horns and weak stamina—*Fuit bonassus* : exit the bison.

A curious method of preserving at least some strain of bison blood has been adopted of late years, working with the *American* species. The "buffalo" breeds with domestic cattle ; so freely does it intermix that many of these hybrid animals can hardly be distinguished from pure bison. Although such creatures

can hardly be satisfactory to the naturalist, being neither one thing nor the other, yet by this introduction of fresh blood it would doubtless be possible to preserve indefinitely a feral race of bovines bearing at least some outward resemblance to the monarch of the prairies. The supposed antagonism of the European bison to domestic cattle has been proved false by Count Walicki, who crossed his bonasus with Swiss cows ; while the pair of calves received at the Zoological Gardens in 1847 took readily to the foster-mothers provided for them. It might therefore be possible to establish a race of half-bred or three-quarter-bred bonasus ; but experiments in this direction would be far inferior to the plan of strictly protecting it as a pure-bred, truly wild animal.

Happily, the shooting of bison has been absolutely prohibited throughout the Russian Empire, so that even a grand duke has to get permission to kill one or two ; in addition, the Kisha district of the Caucasus is now strictly preserved by the Grand Duke Sergius Mikhailvitch, who has rented 500,000 acres of the bison country, and checkmates poaching by a staff of good keepers. It is said that in ten years the Grand Duke's party only killed one Caucasian bison. The present species was probably the first animal to receive Government protection—save, perhaps, the New Forest deer at the time of the Conquest—hence, possibly, the fact that it now survives at all.

Tame or wild, Lithuanian or Caucasian, the bonasus is a splendid creature whose extinction would be an irreparable loss to Zoology. He is not stately like the giraffe, useful like the elephant, nor beautiful like the zebra; yet his very uncouth sturdiness and his rugged home, not amid tropical verdure, but amid hardy pines and rowans, make him a picturesque and striking figure. Long may he frequent the icy peaks dim with mist and white with snowfields; long may he pasture beside the mountain rill, swim the turquoise lakes, and repose under the spreading boughs on a couch of pine needles—a wild dweller in a wild region! The bison is not British, but he is very European; and all lovers of wild life will wish him well.

THE CAPE BUFFALO.

As the bison represents the great game animals of Europe, so is the African buffalo pre-eminently typical of the Dark Continent. Sturdy, powerful, and courageous, it is remarkably interesting, studied merely for its own sake; but various side issues invest it with an additional importance perhaps equalled by no other wild beast. Buffalo's blood harbours the *Trypanosoma brucei* which, sucked up into the proboscis of the tse tse fly, kill wholesale the horses and oxen which it bites; buffalo susceptibility to rinderpest has spread this scourge far and wide in Africa, causing fearful destruction amongst wild game and domestic cattle. Thus the study of zoology is no mere relaxation for amateurs, but in its everyday aspect has a very practical bearing on the progress of colonisation.

The Cape buffalo (*Bos caffer*)—buffel of the Cape Dutch—nyati of the Zanzibaris—in its typical race stands about 4 feet 8 inches high at the shoulders, and measures some 12 feet in extreme length, allowing 3 feet for the tail. The head is helmeted with a stout boss formed by the bases of the strong uncinatè horns which, passing outward with a bold sweep, may attain a length of 3 feet measured over the curve. The muzzle, large and expanded, is moist and naked; the eyes have a hollow below the

AFRICAN BUFFALO.

By permission of M. L'hoest, May 1900.

Adult bull. One of the Western races intermediate between the Cape form and the bush cow of the Congo. Note the short thick horns, and the smooth hide covered only by very thin hair.

inner angle; the pointed ears are enormous, and are heavily fringed with long hair. There is no marked hump on the withers; the coat is coarse and scanty; the tail bears a swinging tassel, which reaches below the hock. Young calves of this Cape race are reddish brown, becoming dun when older; at about three years they begin to turn black. With increasing age the hair falls out till at last the animal is almost as bare as a rhinoceros; aged buffalo are haired on limbs and head only—even the ear-fringes and tail tassel may be lost.

Now the Congo buffalo (*Bos nanus* of some writers)—bush cow of the colonists—bona of the Hausas—differs strikingly from the above. It is much smaller than the Cape race, standing a full foot lower at the withers, and in its light, almost antelopine build recalls an Alderney cow; the horns are much smaller and less curved, and bear no special frontal boss. The calves are light red, the adults rufous red, and aged animals dirty brown; with increasing age much of the hair on the shoulders and quarters is lost. The ears and tail are haired as in the Cape race. Comparison of museum specimens will show how widely different are these extreme types of buffalo; for many years indeed they were supposed to be perfectly distinct.

A more extended study of the African *Bovidae* has, however, shown that there exist a number of transitional forms linking up in perfect sequence the

heavily-armed, muscular beast of the Cape with the small bush cow of the Congo. The dark brown Abyssinian buffalo, with smallish horns and a semi-boss on the forehead, is nearest to the Cape race ; next comes the Senegambian form, with the horns markedly shortened, thickened, and blunt ; the rare buffalo from Lake Tchad, discovered by Denham and Clapperton in the first half of the last century, fits in somewhere here. Doubtless other connecting links will be eventually discovered, demonstrating the essential unity of all African forms. For the purpose of this work the "Cape" buffalo is considered as single species, though somewhat modified in various parts of Africa.

The present species inhabits Africa from the Cape to Abyssinia ; in many places, however, it has been seriously thinned, or even exterminated, by man. Like zebra and rhinoceros, it must drink every day ; hence it is never found far from water, and its haunts accord with this necessity. Wide rivers slowly flowing under the shade of graceful willows ; papyrus marshes reeking with miasma and beclouded with mosquitoes ; streams winding through rocky gorges and kloofs—these are the haunts of the buffalo. Feeding towards dawn, about daylight the dusky herd goes down to drink, resuming grazing till the hot sun drives them to their lair. In the heat of the day the well-nigh impenetrable tangle of wait-a-bit thorn and roibosch affords a secure and ready-made

summer house ; while in the wet season the long grass on the plains (attaining a height of six or eight feet) conceals the herd as effectually as in England the June herbage shelters the hare. Buffalo wallow frequently and bathe much, lying motionless hour after hour with the head alone above the surface, more like lumps of clay than living creatures. These animals go in herds of from fifty to two or even three hundred individuals. The young are born from January to April, and only one calf is produced at a birth ; they are easily tamed, but very difficult to rear, since they are liable to take cold and also care little for cows' milk. The domestication of the African buffalo on lines similar to that of the long-horned buffalo of India has, however, been suggested.

Early dawn in the yellowwood thickets. A herd of buffalo slowly pasture through the more open glades, their huge helmeted heads closely applied to the greensward, and their long tails swishing about their sable flanks. Along the backs of these wild cattle run the rhinoceros birds, smart and starling-like, pausing every now and then to prise a tick out of the hide. Save for an occasional grunt, not a sound is uttered by the dusky herd ; all is silent and peaceful in the fast-growing sunshine. Others besides buffaloes are abroad in the forest. A honey-guide wings its undulating flight into the scrub ; a flock of mouse-birds fly like arrows into the trees, jerking up their

tails in characteristic fashion as they alight. A tiny antelope darts across the clearing to dive headlong into the bush; a troop of pallah, red-coated and gazelle-eyed, streak through the neighbouring thicket, often leaping high in the air, as if made of indiarubber. Feeding slowly along, the buffaloes begin to pass some of the larger forest trees; hundreds of the trunks show a smear where some mud-covered elephant has rubbed against them. Here an uprooted mimosa lies bent and broken on the red soil; there in a tangled mass lie half-chewed stalks of the sanseviera hemp. And now the actual herd of elephants is seen, and the wood seems alive with dark swaying tarpaulin-covered wagons—the bodies of the elephants. Passing among the weather-beaten trees, these same trees seem to take life and motion as out into the sunshine, with peacock necks swinging up and down, glides a troop of beautiful giraffe. As the buffaloes progress, through the thinning forest are seen glimpses of a wide plain, its vast expanse dotted with acacia trees and black with game. Far out on the veldt an immense troop of zebras, their striped coats toned down to a dull grey by the distance, pasture in a huge crescent; hundreds of wildebeest blacken the plains, the old bulls standing solitary on sentry duty; dim in the distance a troop of hartebeest show as a dull red blur among the anthills. To the naturalist, this zoological gardens let loose is of the greatest interest; but the buffaloes

are chiefly concerned in the patch of young grass at the edge of the thicket, growing over the remnants of a bush fire.

Later. The sun-drenched veldt is fast obscuring with heat haze—so fast, indeed, that the zebras and antelopes seem to be walking in water; the ruddy coats of the hartebeests have blanched to white in the solar rays. Full-fed and drowsy, the buffalo make for the river, whose papyrus brakes will afford a welcome retreat. Filing through the bush, they come upon the water, a sheet of ultramarine matched only by the peerless cobalt of the sky. Acres of flowering rushes wave their flossy plumes in the breeze: hundreds of rough-coated waterbuck, brilliant against the lush green vegetation, stand at gaze among the sedges like a troop of red deer in a Highland glen. Here a startled reedbuck dashes away, its white brush jerked upwards like the tail of a rabbit; there a couple of wart-hogs, tusked and grizzled, scamper fussily out of a mud wallow. Close to the water's edge a party of hippopotami lie basking in a self-made sand bath; as the buffaloes plunge into the tepid river a cloud of frogs rise hopping from beneath their very feet.

Sunset. Immense flocks of tiny birds (wax-bills) wing their undulating flight to shelter in the reed beds. A flock of crested cranes settle in the acacia trees; night herons croak discordantly in the papyrus jungle. The waters of the marsh swirl in hideous

commotion ; thrust above the surface are seen the snouts of numerous crocodiles rousing up for the evening's carnival. The bellowing of the hippopotami shakes the earth as numbers of huge heads appear floating down stream, like the masks of monstrous frogs ; then black, glistening and dripping, the hippos leave the water, passing along well-worn tracks to feed. There is a shaking of the papyrus as the buffalo leave their reedy covert, looming larger than life in the fast-thickening darkness. A whinnying from a herd of pallah stationed somewhere out on the veldt ; a neighing of zebras approaching the water under the guidance of an old stallion ; last of all, in the sudden darkness, a ferocious sobbing roar that cannot be mistaken—the king of the forests is afoot—it is the voice of Africa !

The Cape buffalo was first mentioned in 1705 by Kolben, who noted its abundance near Capetown. Sparrman described and figured a specimen which he obtained on December 13, 1775, near Bushman's River ; in 1777, Paterson observed it in Caledon ; later, Sir Cornwallis Harris first met with it near Mosega (1836), and Gordon Cumming (1844) records it from the Bakatla district of Bechuanaland. In recent years the African buffaloes have been sadly thinned out by gunners and decimated by the rinderpest.

Arising about 1883-84 in the Dinka and Galla cattle countries on the Upper Nile, the rinderpest

swept Eastern Africa in a ghastly tornado of desolation, spreading everywhere, through wild game and tame cattle, through buffalo and eland, through giraffe and wart-hog, through Nuer heifer and Galla ox.¹ By 1890 the scourge had appeared in British East Africa and in the adjoining German territory. So severely did the wild buffaloes suffer that it is said that in one day an English official saw about a hundred sick animals in various stages of the disease. The great herds which had enlivened the Kawenda district with their lowing were all but wiped out, and in many parts of the Uganda Protectorate the buffalo became entirely extinct. Eland and wart-hog also suffered severely; elephants and hippopotami, rhinoceroses and wildebeest remained unharmed. In 1892 the plague had reached the north of Nyassa, causing a mortality of over ninety per cent; in 1895 it entered Matebeleland. At last, in Cape Colony, the rinderpest came into contact with the forces of civilisation, and the services of a distinguished scientist were called in to endeavour to stay the scourge.

A remarkable consequence of this visitation was the ruin of the once dreaded Masai, a warlike race of nomads inhabiting East Africa. Their sole wealth consisted in their great herds. Despising

1. Post mortem examination of a banteng (Javan wild ox) calf which died of rinderpest at Calcutta revealed extensive congestion of the larynx and windpipe, which were full of frothy mucus; there was ulceration in the large intestine but not in the small; the liver and spleen were healthy.

agriculture, they tyrannised over weaker tribes, plundering and killing their Bantu and Nandi neighbours, and harrying the country even to within sight of the sea. The rinderpest slew thousands of their cattle, and, like the Esquimaux deprived of their walrus, the Masai sickened and died in thousands through sheer starvation. Round the native camps of 1890 were found many human skulls mingled with the cattle bones; charms and incantations had alike proved useless, and the warrior shepherds had shared the fate of their flocks. Thus has the African buffalo indirectly contributed to the pacification of Africa; dying of rinderpest, it communicated the disease to the flocks and herds of the Masai; and this once formidable tribe became a mere starved remnant on the face of the earth.

Attention has already been drawn to the serious crippling of the colonisation of Africa by the tse tse fly, which by biting, or rather stabbing, the trek oxen hampers the movements of travellers. It has now been shown that the progressive emaciation and anæmia seen in "stung" cattle is in some way connected with the presence in the blood of minute parasites called trypanosomes, introduced through the proboscis of the tse tse at the time of attack. These parasites occur naturally in the blood of many wild animals—buffalo, wildebeeste, kudu; the tse tse feeding on them, flies off infected with

trypanosomes, which having been sucked in through the hollow proboscis, develop freely in the stomach of the fly. The trypanosomes increase rapidly, multiplying by longitudinal division; they assume two forms, having either thick bodies and protoplasm taking a blue stain with laboratory reagents, or else very slender bodies and protoplasm that cannot be so stained. The fly next communicates the disease to any tame cattle on which it happens to feed; these, however, cannot tolerate the presence of the trypanosomes, and eventually die exhausted. It has often been noticed that where the wild buffaloes have been exterminated the tse tse has vanished also: these oxen act as a reservoir whence the tse tse (itself harmless) draws its supply of trypanosomes. Together with several other wild animals, the buffalo, though acting as host for the parasite, is itself immune from the disease. Thus the presence of big game by favouring trypanosomiasis (or "nagana") may hinder colonisation by means of cattle; another instance of the indirect influence of the African buffalo.¹

Finally, the buffalo is an agent in disseminating diseases borne by ticks. These ticks are eight-legged spider-like creatures which infest the long

1. Happily the presence of big game in a district does not necessarily *imply the presence of the tse tse*; thus it is now absent from the Transvaal (having disappeared with the rinderpest) though a considerable amount of game still exists in the Reserves. The crazy measure to check nagana recently advocated—the extermination of big game—will receive little support from practical men.

grass, and stand ready to seize upon any animal brushing its way through. Attaching themselves firmly to the hide of their host, they suck its blood; if the ticks contain any parasites derived from a previous meal on a buffalo they will probably transfer it to their new host. Millions of ticks cover the grass and bushes near the haunts and feeding places of the wild buffalo; three distinct species of *Rhipicephalus* (*R. sanguineus*, *R. appendiculatus*, and *R. pulchellus*) have been found in the swamps of the Pangani River. In this connection it is interesting to note that another tick (*R. australis*) develops Texas fever in man by harbouring within it the curious *Piroplasma bigeminum*. The piroplasma at first exists as a pyriform parasite in a red blood-corpuscle of its first host (cattle); on being drawn into the stomach of the female tick it acts in some way (perhaps by breaking up and passing through the walls of the stomach) so that her offspring are infected with trypanosomes and are able to spread the disease by their bites. One thus sees the importance of protecting those feathered police, the rhinoceros birds, which by ridding the wild game of ticks hinder the spread of blood diseases.

The red Congo buffalo or bush cow appears to have first been known from a specimen described by Belon, as early as 1555, as the "Petit Bœuf d'Afrique;" a pair of horns—probably the same as described by Belon—were preserved in the Royal

CONGO BUFFALO, OR BUSH COW.

Note the light build of the animal and the small though handsome horns, tending to converge at the tips. Original in the Natural History Museum, South Kensington.

Society's collection and described by Grew in 1686; these are now in the British Museum. The bush cow is still comparatively little known; the late Dr. Gray, however, records that Mr. Cross, of the Surrey Zoological Gardens, received a living female from Sierra Leone in 1839. In 1872 a pair of this race—immature animals, but growing fast—were exhibited in the collection at Berlin. The present writer in 1900 inspected and photographed a pair of "buffle nain du Sénégal," then living in the Antwerp Zoological Gardens.¹ These animals were both of a blackish brown colour, and apparently belonged to one of the races intermediate between the bush cow and the Cape form; the horns sloped backwards almost in the plane of the forehead, being more curved in the female than the male. The bull was savage enough, rushing up to the railings and fiercely butting them with his armed head; the cow was quite tame. They were kept in separate pens; the keeper said they would fight if placed together.

In May, 1906, the writer also photographed a dwarf buffalo (*Bos centralis*)—one of the intermediate forms—deposited in the London Zoological Gardens on November 21, 1904. It was a good healthy specimen, well covered all over with dark blackish brown hair tinged with

1. Renshaw: "Short-horned Buffaloes in the Antwerp Zoological Gardens."—Proc. Zool. Soc., 1904.

chocolate. The lead-coloured muzzle had a few hairs scattered about it; the tongue was dull purplish, and the floor of the mouth pink; the nasal region, seen in profile, was slightly arched. The iris was chocolate brown, and the eye-lashes long, fine, and delicate; the hair between the bases of the horns was greyish white. The ears bore only a few stray wisps of long hair, and were lead-coloured; from occiput to withers there were nine more or less prominent transverse folds of skin; an indistinct mane passed from occiput to withers, where it disappeared. The "knees" of the fore legs were provided with long curly wisps of yellowish-white hair; the tail was nearly bare in the upper half, but the rest was furnished with a fairly ample blackish-brown tassel, which hung below the hocks. The under parts of this buffalo were pale yellowish.

In conclusion it is satisfactory to note that the African animals so sorely stricken by the rinderpest have shown notable increase of late years, especially buffalo, eland, oryx antelope, roan antelope, and giraffe. Already a herd of five hundred buffalo has been observed in British East Africa; in Southern Ankole and Buddu three or four herds of a very large variety of this animal are reported as *rapidly* increasing in numbers. Similarly, the Cape race has increased materially in the Transvaal Game Reserves, having enjoyed two and a half years of virtually absolute protection from gunners; and

other accounts equally interesting now appear from time to time in publications devoted to natural history. The Society for the Preservation of the Fauna of the Empire includes the buffalo in the scope of its operations; and one may well desire all such efforts to succeed and prosper.

THE MUSK OX.

"The king went this evening to lie at Lord Arundel's in Highgate that he may be nearer and readier to hunt the stag on the morrow in St. John's Wood."

Sir Dudley Carleton on James I.

Few chronicles are more interesting than the history of our own country; these records of bygone times reveal a state of things strange indeed to the reader of to-day. Charing Cross, a monument erected by royal Edward in memory of his queen; later, the name of a village outside London, situated near the hamlets of Kensington and Westminster; Temple Gardens, where Plantagenet plucked the white rose and Somerset the red; Hyde Park, the former hunting ground of Edward VI.; Tottenham, in whose brooks Izaak Walton used to angle, once had associations different indeed from those now attached to them. It seems strange to read that as late as 1834 Regent's Park abounded with hares, which used to eat the plants and flowers in the Zoological Gardens; while about this date, Lord Malmesbury recorded that he shot pheasants in the same park. Could one, however, have beheld Britain in the Glacial Epoch, strange indeed would the country have appeared, overrun with giant beasts and savage men.

The British mammalia in these prosaic days have fallen on hard times. Cave lion and cave bear, rhinoceros and mammoth, giant Irish deer and white urus all gone; even the English beaver is extinct. The marten and wild cat are rare almost to vanishing point. Stoat and weasel, fox and badger stand to-day for the glorious game animals of the past, while such small deer as bats and shrews usurp the place once occupied by mastodon and sabre-toothed tiger. However, there yet remain elsewhere representatives of the great fauna that once inhabited these islands; thus the African lion is indistinguishable from that found in cave deposits, and the musk ox, once British, still lingers in Greenland and Arctic America east of the Mackenzie River.

The musk ox (*Ovibos moschatus*)—umimak of the Esquimaux and Greenlanders—stands about four feet high at the withers, and measures over five and a half feet from the tip of the nose to the root of the tail, being about the size of a Kerry cow. The muzzle is broad and hairy; the horns, springing from greatly expanded and flattened bases, curve outwards, downwards, and finally upwards like those of the black wildebeest. The neck is short; the heavily-built body is covered all over with long shaggy hair and warmly undervested with wool; the rudimentary tail is quite hidden under so ample an overcoat. The feet are broad; in each the outer

hoof is round and the inner one pointed. The horns of the musk ox average twenty-five inches in length, with a maximum record of thirty-six inches; those of bulls almost meet in the middle line by their bases, but those of cows are much smaller and never develop the frontal helmet. The horns of calves are at first thimble-like projections, afterwards growing out as long straight spikes before the curved basal portion of the horn is developed.

The musk ox may be divided according to its coloration into two well-marked local races. Thus the Canadian form is of a general grizzled umber brown hue; there is a saddle of light yellow on the middle of the back, and the under wool is light brown. Old bulls become nearly black on the head, neck, and sides; there is often if not always some white on the legs, irrespective of sex. In Eastern Greenland, however, the musk oxen are of a rufous brown colour on the shoulders, have a light brown or whitish saddle on the back, and are dark brown on the rest of the body; there is a large white or whitish patch on the face between the base of the horns and the muzzle, the rest of the face being greyish. The nose is white; the ears and an ill-defined patch below them are grey, while the feet are white or greyish, gradually merging above into the darker body hue. So remarkably does the Greenland musk ox differ from the Canadian animal that some have proposed to rank it as

a distinct species under the name of *Ovibos wardi*.

The true zoological position of the musk ox is a matter of debate. Singularly isolated from the rest of the animal kingdom, its name *Ovibos* indicates an ox having affinities with the sheep; *it is not, however, a connecting link between the two*. The muzzle has a bare strip above the nostrils, as in sheep, but the lip is not cleft as in them, neither are there any foot-glands; recent investigations seem to indicate that the animal cannot be referred to either group, and that it should form a sub-family of its own. The nearest ally to the musk ox is the curious takin (*Budorcas taxicolor*) of Thibet, a fierce and little-known animal which has never yet been shot by a European sportsman. The takin stands about three and a half feet at the shoulder, and has thick black horns; it resembles a musk ox in the making. A specimen of the typical form, now in the Natural History Museum at South Kensington, has the face black and the limbs deep chocolate; there is a good deal of pale yellow about the nape of the neck, withers and back; the rest of the fur is blackish brown, and a black line runs along the back. A photograph of a takin calf appeared in the *Field* for October 13, 1906; probably the first living specimen seen by Europeans, it was supposed to be less than twelve months old when the picture was taken. The animal had been obtained in the Sikkim

district by some natives, who brought it to the Commissioner; unfortunately, it presently died—poisoned, it was supposed, by eating aconite plants.

Inhabiting the icy wildernesses of the North, the musk ox wanders in herds of eighty or a hundred individuals, feeding like reindeer on mosses and lichens, and climbing the rocky hills with remarkable ease.¹ In spring, the animals are in poor condition; during the summer, however, they frequent the valleys, and browse on the leaves of stunted willows, so that by winter they are fat and lusty. In summer the loose undercoat is shed in patches, and may be seen hanging in untidy wisps on twigs and bushes. Fearing no enemy save the Arctic wolf, the musk ox is amongst the most unwary of big game animals; the regions it inhabits being permanently occupied only by Esquimaux, whose primitive weapons make little impression on the shaggy herds. Indian and white hunters are limited by the tree-line; fuel must be cut beforehand and laden on sledges, the hunters depending on caribou deer for meat until they can reach the musk oxen. Hence in this region of intense cold the present species enjoys a considerable amount of natural protection; as for the weather it defies it, warmly clad in its great overcoat as it wanders over the dreary landscape. One readily

1. So great is the activity of these clumsy-looking beasts that Sir John Richardson notes that one individual readily scaled a steep sand-cliff on the Coppermine River, up which the party were obliged to crawl on hands and knees!

pictures a troop of musk oxen adding life and character to the misty expanse of white, their dusky forms dotted over the snowfield as they crop the lichen wherever the snow has drifted from the icy ridges.

Picture then a troop of musk oxen, drawn up on the top of a bluff, like Highland cattle in a picture by Landseer. The curving horns and shaggy coats of the animals give them a rugged picturesqueness well matched by the savage desolation of the Arctic; their breath rises like steam in the crystal-clear atmosphere. In the foreground a white hare crops the scanty herbage; in the rocky gorge far below a snowy owl floats on noiseless pinions through a world of mist and ice. Weird, desolate, yet fascinating, such a subject rendered by a master-hand would appeal to every naturalist; gazing upon it one would almost expect to see a lemming pop out of its burrow, or to hear the bark of an Arctic fox.

On December 4, 1900, the skins and skulls of a pair of *Greenland* musk ox (the first specimens known to science) were received in England. The skins were mounted, and the female, exhibited at a meeting of the Zoological Society, was afterwards presented to the National Collection by Mr. Rowland Ward. In March, 1901, Dr. J. A. Allen published a valuable memoir on "The Musk Oxen of Arctic America and Greenland," in Vol XIV. of

the Bulletin of the American Museum of Natural History.¹

The first living musk oxen in England since the Glacial Epoch consisted of two calves which had been taken by a Swedish expedition on Clavering Island, off Eastern Greenland, on August 16, 1899. About the size of retriever dogs on their arrival in England, they were purchased by the Duke of Bedford, and although one soon died, the other lived for several years at Woburn. These animals both had the white forehead and face characteristic of the Greenland race; the survivor showed at two years old very considerable development of the horns and of the light-coloured patch on the back. It was figured in *Knowledge* for June 1, 1900; the horns were just appearing above the long hair of the head, while the comparatively short hair on the flanks allowed the stoutly built pasterns to be seen to great advantage.

In 1900, some Norwegians achieved remarkable success with the musk ox, no less than fourteen calves being brought over to Europe. Of these, a yearling male was sold in Hamburg for £65, he having lost a horn on his travels; five were bought for the collection at Antwerp at £50 each, three unfortunately dying before reaching their destination;

1. The musk ox was the *Bos moschatus* of Zimmerman (Geograp. Geschichte, 1780). For many years it was so little known that as late as 1850 the well-preserved bull in the British collection was the only specimen in any European or American museum! The anatomy of the soft parts was studied for the first time in 1900.

another of the calves went to the Zoological Garden at Berlin. About the end of September, 1900, Lieut. Amdrup's expedition returned home; they brought with them a calf, the survivor of two obtained by the drastic method of shooting down a whole herd on two separate occasions! Two musk calves imported into Sweden some years ago were described as being quite tame, with splendid coats and very suitable to acclimatise in that country.

On March 12, 1902, the New York Zoological Society received a female musk ox which had been obtained by a party of whalers and Esquimaux in the previous year. A herd containing four calves had been found and the calves all taken; unfortunately the sled dogs killed three of them, but the survivor was preserved, and fed on a diet of coarse grass and willow twigs till hay could be obtained for her. The calf was bought for the New York Zoological Park for \$1,600, and installed in a comfortable enclosure provided with suitable shade. Twenty-two months old at the time of arrival, her horns were six inches apart at the base and measured ten inches along the curve; she stood three feet ten inches at the shoulder, and the combined length of head and body was four feet ten inches. The animal was fed on clover hay, crushed oats, etc., and also browsed on the bushes growing in the enclosure. Another—a very small specimen—was added to the collection in the same year, but neither lived twelve months. In July,

1903, five young musk ox were landed at Tromsøe, Norway.

The acclimatization of the musk ox in Sweden, if not in the north of Scotland, has been suggested. Such an experiment would be extremely interesting ; for it would restore to its original habitat a beast which has been extinct in Europe since the Glacial Epoch. From a sentimental point of view it would be thrilling to as it were set back the clock for centuries, repeopling Northern Europe with a vanished race ; truly would the Highlands be ornamented with these rugged colonists, besides which red deer and roebuck would seem tame indeed !¹ From an economic point of view also something might be done, since stockings made in France many years ago from musk ox wool were said to be equal to those of silk. Musk ox wool is remarkably strong and fine ; a single musk ox yields as much as twenty sheep.

Let us picture the musk ox as it lived in Britain in the Pleistocene Epoch. Scene, a great valley sheeted in white and damp with mist. Here and there masses of rock, glittering with icicles and obscured by a scrubby tangle of snow-laden bushes, dot the landscape at irregular intervals. Dim in the distance pine woods climb the rugged mountain sides to the very skyline. An immense herd of

1. In December, 1903, one male and two female musk oxen were living practically at liberty in Norrland, Sweden, on pasture closely resembling that of Greenland.

saiga antelope, with proboscis muzzles and grey coats, crop the stunted herbage ; here and there the huge form of a woolly rhinoceros looms ashy grey in the fading twilight. With lurching gait a cave bear swings out of the tangled thicket ; far off in the forest a dim red herd of mammoth—primeval elephants—are huddled for the night under a canopy of pine boughs. In the middle distance a troop of musk oxen, sturdy and well-clad, rise slowly from the sheltered hollow where they have lain all day.

The last rays of the red winter sun fade from the primeval scene ; the darkness is, however, dispelled by the rising moon, silvering the boughs of the pine forest, and casting inky shadows. The saiga antelopes appear as a huge dim blur, grunting and grazing. A troop of grey phantoms—wolves on the prowl—flit across the valley. A shrill alarm whistle rises from the herd of saiga ; instantly all the grey-coated antelopes are standing at gaze, peering, snorting, and stamping in perplexity, with necks craned out, the youngsters as alert as their elders ; then off dashes the whole herd in a whirlwind of powdery snow. Most of the wolves pursue the antelopes ; a few, however, remain to menace the musk ox, which form up in line of defence, with the master bull on the extreme right, crowding up their well-armed ranks like recruits on parade. The howling attackers completely surround the troop with a cordon of savage eyes and sharp teeth ; the

musk oxen wheel into a circle, presenting at every point nothing but a broad rampart of horned heads. A too venturesome wolf is suddenly caught on the horns of the leader—is whirled up into the air, and lies gasping on the earth with a broken spine. This attack, however, is too much for the nerves of the musk oxen ; panic seizes the herd, and they file off in flight, the oldest bulls covering the retreat. Drawn upon the top of a ridge, the musk oxen stand for one moment to look back on the excited pursuers ; then all disappear together down the opposite side.

Silence. Then a movement in the pine forest. The clamour of the wolves has disturbed the mammoth. Bunched up under a huge pine tree, this cluster suddenly dissolves with a hurried scrambling movement, like the outpouring of ants from a disturbed nest. Noiselessly they seek safer quarters, coming out into the moonlight—huge elephants, powerful, majestic, impressive, and clothed in a thick shaggy garment of hair and wool. With the moonlight glancing silvery on their enormous tusks, and their breath rising frosty in the biting air they pass up silently along the wooded heights.

THE BARBARY SHEEP.

The gate of Africa! What a world of romance is comprised in those words! The Dark Continent, at once an El Dorado and a deathtrap, the grave of many a reputation, the cradle of many a millionaire, yet exerts a wonderful fascination for the adventurous traveller, and still prompts those who have once set foot on her soil to return thither. Rugged peaks uplifted to a sky of indigo; mountain torrents roaring over masses of water-worn boulders; still lakes, where the ambatch bean grows, and the papyrus reed rears its graceful plume of green and gold; glaring deserts carpeted with flints, desolate and waterless—these are amongst her attractions.¹ The extreme north of the continent—Algeria for instance—exhibits so striking a resemblance to Europe that one can hardly realise that the Mediterranean stretches between; but the traveller will find at El Kantara a rent in the limestone mountains through which he may view the palm trees of the desert. El Kantara, in short, may be regarded as the gate of Africa; it marks the northernmost limit of the date palm, was formerly the home of the lion and leopard, and still harbours to-day

1. The fascination of the African wilderness must be experienced to be understood; to the writer, the utter absolute silence of the desert constitutes its chief charm.

considerable numbers of that curious and exclusively African animal—the Barbary sheep.

The Barbary sheep or aoudad (*Ovis lervia*)—aroui of the Arabs—mouflon à manchettes of the French colonists—stands about three feet six inches at the shoulder, old males attaining the bulk of a small ox. The horns are curved backwards and slightly downwards, while the tips are directed inwards, thus allowing the animal to pass easily through the scrub; a few faint annulations are seen along the outside. The face is long and rather expressionless; the shoulders are somewhat elevated; the tail bears a terminal tassel. The males are bearded like goats, but more so, a long mat of hair hanging under the throat and along the chest; the knees are besleeved with a generous frill.¹

The colour of the aoudad—males, females and young alike—is a uniform reddish gray tinged with yellow, like that of the rocks amongst which they wander. The horns attain an average length of 25 inches over the curve; the young have them quite wrinkled, these corrugations disappearing with age.

The zoological position of the Barbary sheep is highly interesting, for like the musk ox it stands in “splendid isolation” from all other forms. The only African member of the genus *Ovis*, its curious

1. Bare patches of hard skin occur on the knees, recalling similar callosities in the giraffe.

August 30, 1907.

BARBARY SHEEP.

Young male. Note the inward curvature of the horns, allowing the animal to pass readily through the scrub. The throat mane is ample, and the fore legs are decorated with bunches of hair.

horns, maned forequarters, and uniform coloration render it striking and singular; the horns are much smoother than in most wild sheep—compare them for instance with the huge ribbed weapons of the *Ovis Poli*—they also entirely lack the forward curvature of the tips seen in that species. Perhaps the bharal, or blue sheep of Thibet, comes nearest to the aoudad in the structure of its horns and skull; but the blue sheep, though brownish grey above, has the rump and underparts distinctly white, and has no elongated hair on the throat and chest.

Amongst the goats, however, several species occur bearing superficial likeness, both in horns and pelage, to the aoudad. Thus the thar of the Himalayas has the horns compressed in front, angulated, and triangular in section; flattened laterally, they bear considerable resemblance, on a small scale, to the weapons of the Barbary sheep. Again, they are almost as large in females as in males; another point of similarity. In old thar the shaggy coat becomes elongated on neck, chest, and shoulders to form a half-mane; the coat is also almost uniformly coloured, of a dark or reddish brown. One must not, however, press the analogy too closely; for although Barbary sheep and thar may well have been descended from a common ancestor, at the present day structural differences sufficiently indicate the gap that has intervened. Thus the thar has no gland between the hoofs of

the fore feet ; it has the muzzle naked, and no beard, though it agrees with the aoudad in lacking the gland below the eye, which is found in all typical sheep.

The aoudad inhabits the lofty mountains of the Atlas, Aurès, and other ranges, being distributed throughout Tripoli, Tunis, Algeria, and Morocco. Never found far from the desert, its haunts (as the writer can testify) are rugged and desolate in the extreme. Bare cliffs, brilliantly coloured in red and yellow, and scantily bedecked with dwarf bushes, constitute the home of the Barbary sheep ; its best known haunt is the district of El Kantara, on the very edge of the great African desert. Here yawning precipices and waterless ravines intersect the limestone cliffs, giving shade and asylum to the game ; ragged clumps of thuja scrub and patches of alfa grass constitute almost the only vegetation. The rufous coat of the sheep well matches the red and yellow tints of the rocks, so that it is very difficult to make them out ; one recalls similar instances of desert animals coloured to match their surroundings, jerboas and gerbilles amongst mammals, and coursers amongst birds, being cases in point.

The Barbary sheep appears to have been first mentioned by Herodotus, the Romans having established on the site of El Kantara their southern outpost of Calceus Herculis.¹ Herodotus also

1. The "asses with horns" in Libya were probably aoudad.

mentions the mountain of salt, supposed to be that situated near the oasis of El Outäia, another locality for the aoudad. This mountain is noticeable a long way off by reason of its white saline surface, contrasting markedly with the red and yellow rocks around it; owing to its solubility, great chasms and trenches have been washed out by the action of successive storms, and dangerous craters have developed—some of them a hundred feet deep—in the friable crust. Aoudad and antelope occur here in some numbers; a little outlying farm has been named by the French *Fontaine des Gazelles*.

Although inhabiting so sterile a country—the Arabs say the aoudad only drink once in five days—the present species thrives remarkably well in the cold, damp climate of Europe. It has bred in the menagerie of the *Jardin des Plantes*, whence specimens have been distributed to many other collections, where they have again bred freely. It is always represented in every big vivarium (such as our own *Gardens in Regent's Park*); quite a number of animals of different sizes and ages can be seen in the London collection, affording a most interesting object lesson in the growth and appearance of the horns at various ages, the appearance of the throat-mane, etc. Provided with artificial rock-work, whose rough exterior forms a ready gymnasium, and whose hollow interior forms a snug dormitory, the Barbary sheep thrives under

these artificial conditions ; special mention may be made of the fine show of aoudad at the Düsseldorf Zoological Garden, where an enormous troop of some sixty animals scramble in picturesque confusion about an artificial ruined castle. The New York Zoological Park also contains a fine "mountain sheep hill," consisting of a ridge of pink granite ; it is 500 feet long and 25 feet high. Shaded by trees at one end, the other is fully exposed ; it is partly covered with green turf, has five roomy caves constructed in it, and is subdivided by light fencing into six enclosures for aoudad and similar animals. The new Zoological Park at Stellingen, near Hamburg, also has a good series of artificial mountains amongst its other attractions. The rocks rise from 80 to 150 feet, and with their living tenants present a fine appearance, though the animals do not ascend to the summit of the peaks. In the Barbary sheep one has a zoological paradox ; a beast difficult enough to find (or to capture when found) in its native mountains, and inhabiting the burning climate of Africa, not only tolerates the change of air and scene but breeds with such success in Europe as to become a familiar menagerie exhibit.

THE NILGAI ANTELOPE.

“Amongst the riches which of late years have been imported from India may be reckoned a fine animal, the Nylghau; which it is to be hoped will now be propagated in this country so as to become one of the most useful or at least one of the most ornamental beasts of the field.”

Wm. Hunter on the Nilgai. Phil. Trans., vol. 61.

Prominent amongst the many fine buildings of London stands the noble museum of the Royal College of Surgeons, in Lincoln's Inn Fields. Built to house the great anatomical and pathological collections made by John Hunter, it stands as a perpetual monument of the labours of that distinguished surgeon. The professional visitor will find rows on rows of preparations, ranged with greatest taste and judgment in perfect order; to the layman the skeletons of long-extinct monsters and other purely zoological exhibits will doubtless prove of greater interest. Here may be seen the huge ground sloth or megatherium—the very specimen described by Owen; the great deer once inhabiting the Emerald Isle and miscalled the Irish “elk”; and the huge moa of New Zealand, taller than the tallest ostrich. Whales and elephants, mice and humming birds—all are here; the animals are chiefly represented by skeletons or good dissections, but a few stuffed examples may also be seen.

The Hunters—John and William—were famous as

anatomists rather than as naturalists; but their versatile minds turned with ready interest to the sciences ancillary to medicine. Thus the hibernation of the hedgehog and the anatomy of the caracal lynx occupied their attention, as did also the subject of the present Essay, the beautiful nilgai antelope.

The nilgai (*Boselaphus tragocamelus*) stands about fifty-four inches high at the shoulder, and tapes about six and a half feet in length; the tail measures about eighteen inches. The graceful head is rather small, and is provided (in the males only) with a pair of short, smooth, and nearly straight horns; these are triangular at the base, becoming cylindrical near the tip. The muzzle during life is leaden colour, coarsely granulated, and so moist as to appear newly varnished; it is provided with a number of fine, long, delicate hairs or *vibrissae*. The neck is flattish, and is scantily maned along the nape to the withers; the throat in the males bears a tuft of wiry hair. The forelegs are longer than the hind ones, and the withers are humped; the tail is tufted and reaches to the hocks. Young animals are brown, and the females remain always of this colour; but at twelve months old the bulls begin to darken and when fully adult are rich grey, tinged with blue or brown. The under parts are white in both sexes, as are also the fetlocks; hence the name of "white-footed antelope" applied to this species by Pennant. There are a few white marks—on face, ears,

and throat—which probably by breaking up the outlines of the animal render it less conspicuous in the bush than a uniformly coloured beast would be. Average length of horns eight or nine inches; maximum recorded length $11\frac{3}{4}$ inches.

Distributed over a limited portion of India (being absent from Eastern Bengal and Ceylon) nilgai inhabit thin forest or fairly open plain, going in bands of from seven to twenty individuals; they keep much to the same patch of forest, and both graze and browse. Like the African elephant, they care little for shelter from the hot sun. Nilgai are said to be good climbers; they can break into a heavy gallop if alarmed. These antelopes do considerable damage by rifling sugar-cane plantations; in the jungle they feed on the acid douna (*Phyllanthus*) and other fruits, and on the leaves of the zizyphus or bêt tree. Although much preyed on by tigers, nilgai are still relatively abundant, even in the midst of densely populated country. In India man and beast live side by side; no war of extermination is permitted; even the usages of the chase are guarded by rules of etiquette. On application from the villagers, duly accredited shikarris are now and then permitted to thin out too destructive game; but there is no wanton slaughter, no shooting *en battue* merely to make an enormous bag. How different, alas! to South Africa, where guns of a sort have been supplied to all and sundry, and the

game animals have well-nigh been exterminated by men powerless to create them !

The date of the discovery of the nilgai by Europeans is unknown ; Mr. Ogilby, however, supposed it to be identical with the hippelaphus of Aristotle, and Alexander's troops may have met with it in the Punjab in 326—325 B.C. Bernier, who in 1664 travelled from Delhi to Cashmere with the Mogul Aurengzeb, states that the king used to hunt nilgai. The herd having been surrounded by an army of hunters, the nets were gradually approximated until a space was enclosed, into which Aurengzeb and his party entered, killing the terrified quarry with spears and muskets. The king sometimes sent quarters of nilgai venison as presents to his nobles, just as to-day the squire sends to his friends gifts of hare and pheasant.

Although the above details are interesting enough, it is remarkable that the present species was first accurately described, long after its discovery, not from skin or skeleton, but from a captive specimen living in London. The nilgai is *par excellence* a menagerie beast, if not indeed *the* menagerie beast ; its history is so intricately bound up with progress in the art of keeping vivaria that the remainder of this Essay will be devoted to outlining the subject, such appearing by for the best method of dealing with this antelope. To begin with, the original specimen was a male, sent alive from Bengal, and was described

in 1745 by Dr. James Parsons, F.R.S., in vol. 43 of the Philosophical Transactions. A pair sent from Bombay by Governor Cromelin as a gift to Lord Clive arrived in August, 1767, and presently began to breed.

About this time the nilgai appears to have been quite extensively known in England, considering the length and uncertainty of the then voyage round the Cape. Lord Clive had several in his possession ; it is recorded that the two bulls which he had used to drop on the knees when fighting. William Hunter's nilgai also used to drop on their knees when he entered the paddock—a habit innocently interpreted as a sign of submission, but much more likely a menace! One of Hunter's animals, however, became tame enough to lick the hand ; it allowed itself to be stroked, and would feed from the hand like a horse. This beast disliked the odour of turpentine or spirits, and refused food from those who had handled either. Mr. Sullivan presented two live nilgai to the then queen ; after its death one of them was dissected by the Hunters, and the skin and skeleton was preserved. William IV. kept nilgai in the royal menagerie at Sandpit Gate, Windsor Park ; the animals in this collection were well looked after, and provided with ample paddocks and shelter trees.

In 1826 the Zoological Society was founded ; two years later the famous historic collection in Regent's

Park was established. An important accession to the already extensive menagerie was made in 1830, when William IV. presented to the Society the whole of his Windsor collection—kangaroos, zebras, deer, emeus, and so forth. More than a hundred men were set to work to drain the banks of the Regent's Canal, and in making houses for the new animals. Amongst this series were two nilgai, a species which afterwards bred at the farm at Kingston-on-Thames. The first example seems to have been born in February, 1831; by April 30, 1838, no less than nine nilgai had been bred at Kingston, together with kangaroos, armadillos, and many other interesting animals.

The present species was also represented in the once famous menagerie of Exeter 'Change, where now Exeter Hall stands. This institution consisted of a clumsily shaped building, its front projecting over the street, with shops beneath; it was covered over with paintings of lions, tigers, and so forth, while a sham Yeoman of the Guard harangued the passers-by on the wonders to be seen within. The exhibition consisted of various wild animals arranged in a large room, with one apartment below and another above it; this latter contained an elephant, housed at the top of the building! Amongst the animals shown were a true quagga, a zebra, and a tapir; a nilgai lived amid these unnatural surroundings for six years—a tough test, surely! The

proprietor afterwards removed to Charing Cross Mews, and later to Walworth, where he set up the Surrey Zoological Gardens. This latter collection was sold by auction by Mr. Stevens in November, 1856; Frank Buckland attended the sale, and records that the boa constrictor was sold for five guineas, and a nilgai for £9. A spiteful zebra hybrid (zebra $\times$ wild ass) fetched £8; it had formerly belonged to Edward Stanley, 13th Earl of Derby, in his day a famous naturalist.

Lord Derby's splendid collection at Knowsley Hall covered more ground than even the Zoological Gardens at that time; and though the buildings were plain even to unsightliness, there could be no question of the value of the animals which they housed. Quaggas (now extinct), zebras, springbok and other antelopes, American bison, llamas, alpacas, and various species of deer and kangaroos were amongst the treasures at Knowsley. In a special paddock was kept the famous herd of eland antelope (till then unknown alive in England), and with them a troop of nilgai—one bull and four cows. Appropriately enough were these two species placed together, though, doubtless, the good Earl little guessed how appropriately—for on the plains of India the nilgai represents the tragelaphine antelopes—eland, bushbuck, and kudu—of the African jungles.¹

1. A yearling nilgai from the Knowsley menagerie is now in the Leyden Museum. Six others were also bred by Lord Derby.

Tragelaphs—classed as antelopes by most writers—differ markedly from the rest of the *Bovidæ* in the character of their horns, which, originally triangular in section, have in the course of evolution assumed a spiral curvature. The curious anoa of Celebes—half ox, half antelope—has its horns simple and almost triangular; but those of the nilgai show commencing evolution by the half turn into which they are twisted. Passing on to the African tragelaphs, one finds a well-developed twist in the horns of the eland and harnessed antelopes, whilst the weapons of the greater and lesser kudu are handsome indeed in their open, graceful spiral. *Per contra*, the horns of *typical* antelopes—sable, roan, oryx—show either transverse annulations, or else rings of growth, by which the gradual development may be traced from youth to age; but nilgai and eland, harnessed antelope and kudu do not exhibit such markings.

The occurrence of a tragelaph like the nilgai in India—the only representative of a race otherwise African—reminds one of the curious African element in the fauna of Asia; thus groups now entirely confined to the Dark Continent are found as fossils in the Pliocene strata of the Himalayas. Chimpanzees and huge baboons once ranged the the forests of Northern India, from which they are now entirely absent. The Chinese giraffe, as graceful if not quite so tall as its descendant of Uganda, once paced the woods of the Pliocene East. Two species

of hippopotamus frequented the Narbada valley, and a third inhabited the Siwalik marshes, while hartebeest and sable antelope grazed where the Himalayas now stand. Truly to a present-day naturalist would such a world have appeared topsy turvy, and a Chinese giraffe indeed a *rara avis* !

Some ten years after the disposal of Lord Derby's collection, the Jardin d'Acclimatation was established in Paris. In the Bois de Boulogne there arose a greater Knowsley than Lord Derby had dreamt of, and on October 6, 1860, the Emperor himself inaugurated this magnificent zoological garden, specially designed for acclimatising new and rare animals under the skies of Europe. Its successes have been many—eland, giraffe, waterbuck, wapiti, nilgai, and other animals have been bred here; the large paddocks and leafy pathways of this naturalists' paradise render it an almost ideal institution. At the much older Jardin des Plantes the writer recently saw a fine exhibit of a herd of nilgai—quite a number of these interesting beasts in a spacious paddock well suited to their requirements.

In conclusion, the nilgai is preeminently adapted for extensive acclimatisation in Europe. Its pleasing outlines, considerable stature, and the handsome blue coat of the bulls render it a truly ornamental species, well suited for introduction into parks as a change from everlasting fallow deer; a troop of nilgai seen in the distance amid the oaks and elms of an English

park would indeed lend enchantment to the view. In Italy the experiment has already been made, and the herd of sixty head belonging to the King of Italy is a good object lesson. The nilgai stands for the study of animals amid natural surroundings, on an ampler scale than can be attempted in the best regulated Zoo; and though one may never see bison roaming over Exmoor, giraffes in the New Forest, or musk oxen in the Highlands, yet as an incentive to wider study in the future one may reasonably count on the success already achieved with that charming antelope—or rather tragelaph—the nilgai.

THE BEISA ANTELOPE.

“Still the same burning sun, no cloud in heaven,
The hot air quivers, and the sultry mist
Floats o’er the desert with a show
Of distant waters, mocking their distress.”

An immense plain, ocean-like in its expanse, baked and cracked by the fierce African sun, dotted with anthills, and encumbered with a scraggy growth of bushes and dry harsh grass. Here and there a clump of parasol-topped mimosas give some variety to the landscape; brilliant coloured rocks of every tint add intensity to the picture; far in the blue distance, shimmering in the heat haze, rises the conical peak of a snow-capped mountain, refreshing to the eye amid the heat of Africa.

In spite of its inhospitable appearance, the vast red steppe is a veritable naturalist’s paradise. Near by a few coursers run plover-like over the flinty surface; hawks and eagles swoop on outstretched pinions over the flats, casting shadows of inky blackness; ground squirrels pop in and out of their holes, or sit bolt upright in marmot fashion to stare at passers-by. A few mongooses patter with snaky undulations about the bases of the anthills, thrusting their short muzzles into or under everything, and continually squeaking in a low tone. A troop of Grant’s gazelle, long-horned and red-coated, are

spread out over the plain like Masai cattle, apparently grazing on flints. Three or four sullen rhinoceroses, their hides red with dried mud, stand like statues save for the continual flicking of their shapeless ears. A great herd of zebras—equine giants beautifully striped in sable and silver—the magnificent Grèvy's species—bask at a water hole after drinking ; mixed with them is a troop of large antelopes with long rapier horns, faces smartly pied in black and white, and tawny coats smartened by a lateral line of sable. These are the handsome beisa antelope of Somaliland and British East Africa ; grand animals indeed from the sportsman's and naturalist's standpoint, gallant quarry and strikingly picturesque—formidable foes too, on occasion, as both man and beast have learnt before now.

The beisa (*Oryx beisa*)—baet of the Somalis—stands about four feet high at the shoulder ; it is specially noteworthy for the long beautiful horns which, sweeping almost directly backwards in the plane of the face, are annulated for two-thirds their length, smooth and pointed at the tip. The figure is sturdy, with rather high withers ; the neck-mane is directed *forwards* ; there is no tuft of hair on the throat, but the tail is tasselled. In general coloration the harsh coat of the beisa recalls that of a donkey—a semblance heightened by the curious facial markings, which suggest a headstall. A black triangular patch, with its base at the base of the horns, decorates the

GRÉVY'S ZEBRA.

September 1901.

Adult mare about six years old, presented to Queen Victoria by Menelek, Emperor of Abyssinia. This magnificent species, the largest of all the zebras, is as big as a horse, as may be seen by comparison with the man shown in the illustration. Note the long beautiful head, the wide ears and the narrow, regular striping. See "Natural History Essays," pp.

forehead; it is connected by a narrow black line with the apex of a much larger triangle, reversed as it were to meet it, covering the greater part of the face; a black stripe runs through the eye towards the edge of the lower jaw. The general body colour is tawny; a black line runs along the back, and another separates the tawny of the body from the white under-surface. The forelegs are banded with black above the "knee" and a longitudinal black line runs down the cannon bone; the hind legs are uniform whitish, not banded, and the cannon bone is unstriped. The average length of beisa horns is about 30 inches in the bulls, the cows bearing longer and thinner weapons; maximum recorded length 36 inches (bull) and 37 inches (cow).¹

Distributed throughout Somaliland, with part of British East Africa, and once occurring as far north as Suakin on the Red Sea, the southern range of this fine oryx is limited by the Tana River, beyond which it is replaced by the fringe-eared beisa, and yet further south by the splendid gemsbok of the Cape. A true desert animal, it often occurs far from water, feeding morning and evening on the harsh bamboo-like grass of the steppes, and finding in the fleshy tissues of various succulent plants (and perhaps also in the night dew) sufficient moisture for its needs. Beisa go in herds of from half a dozen to fifty

1. 39 inches is the record now given of a female obtained in Somaliland by Mr. E. P. Hare.

individuals. The bulls fight furiously amongst themselves, using their long horns as effective rapiers; the thick skin of the shoulders conversely provides them with a buckler, and the Midgan Somalis, recognising this, themselves use beisa hide in constructing their fighting shields. Beisa are frequently attacked by lions—though one would suppose that even a lion would hesitate to face such formidable weapons as the horns of this antelope.¹

Spirited and pugnacious, beisa often lose an eye in battle; often, too, a horn is snapped off, so that the animal becomes a unicorn.

The beisa may really be the original of the unicorn; some have supposed the gemsbok to claim this title—a beast little likely in its far southern habitat to have attracted the notice of the ancients. But the beisa, as we have seen, even in the last century occurred as near to the Egyptian frontier as Suakin; and the cartanozon which the Persians designed on the monuments of Persepolis corresponded marvellously with the present species. It had indeed but one horn; but if the sculptor, ignorant of perspective, had drawn the pair of parallel straight horns as one (the further one being accurately covered by its fellow) the difficulty vanishes. Similarly, a clumsy attempt to depict the

1. Sweirs, an elderly Boer cited by Gordon Cumming, stated that he had found the carcasses of the allied Cape gemsbok and the lion rotting together on the veldt—the lion slain by the antelope, which had been unable to rid himself of his humbled foe.

May or August, 1900.

BEISA.

Note the curious pied markings on the face and the long straight horns.

animal charging with lowered head would account for the forward inclination of the horn so familiar to all students of heraldry. The unicorn of fable had a slender straight horn, ringed at the base; a reversed mane; a flowing tail; divided hoofs; the colour and size of an ass, and black markings on the face—surely here is a veritable portrait of the beisa! Perhaps also the beatrix antelope of Arabia (much resembling a small beisa in outlines) contributed its share to the legends of Crusaders and others; in this connection one remembers how Sir John Barrow, having found in a cave a Caffre drawing of a roan antelope head, supposed himself to be on the track of a true unicorn.¹

On April 17, 1848, Baron von Müller met at Melpes in Kordofan a man who used to sell him specimens of animals. One day this man asked him if he wished for an A'nasa—a thick-bodied beast the size of a donkey, and tailed like a boar. It had a single long horn on its forehead, which it raised on seeing an enemy; the negroes often killed it to make shields from its skin. Here again one sees a recognisable portrait of some kind of oryx, if not actually the beisa. The erection of the horn is readily explained by the animal raising its head to stand at gaze in presence of an enemy.²

1. Renshaw: "Natural History Essays," pp. 76-8.

2. Sparrman relates a similar fable current in his day (1775) at the Cape. The horn of the black rhinoceros was supposed to lie flat in repose, the animal raising it on observing an enemy!

First discovered in 1832 by Dr. Rüppell of Frankfort, and described and figured by him in 1835, the beisa remained for a long time comparatively unknown.¹ Even in 1857 Dr. J. E. Gray remarked that "the *O. Biessa* of Rüppell" appeared to be "only a small variety of *O. gazella*" (the gemsbok or Cape oryx), and compared it with the dwarf kudu which, discovered by Sir Cornwallis Harris in Abyssinia, was only half the size of the kudu of the Cape. The beisa (and the lesser kudu also for that matter) is now of course recognised as a valid species distinct enough from any other; but material for study long continued rare, and as late as 1874 only one specimen seems to have been received alive into Europe.

On May 28, 1874, a male specimen presented by Admiral Arthur Cumming of H.M.S. "Glasgow" to the Zoological Society arrived at its destination; a lantern photograph of this individual was afterwards employed by the writer in pleading the cause of the vanishing fauna of Africa.² In the summer of 1874 the French Vice-Consul at Aden sent a specimen to the Jardin des Plantes at Paris. In 1875 the Sultan of Zanzibar presented to the Zoological Society a female, whose portrait afterwards appeared in the Garden Guide; thus the Zoological Society

1. The *horns* of this antelope were known as early as 1811; in which year Mr. Salt, the Abyssinian traveller, presented a pair to the Royal College of Surgeons' Museum.

2. Renshaw: "The Vanishing African Fauna." Lecture before the Selborne Society, 1899. The beisa is seen with its head down as if feeding, and appears to be in excellent condition.

May or August, 1900.

THE "UNICORN."

Beisa (same individual as in preceding illustration) showing how the straight parallel horns, seen sideways, appear as one. There are strong reasons for supposing the beisa to be the original of the unicorn.

possessed the only living pair in Europe. Other specimens were received in 1877 and 1878.

On April 12, 1881, the first calf ever bred in captivity (a female) was born in the Gardens. A coloured drawing of the calf was exhibited at a meeting of the Zoological Society held on May 17, 1881, and a figure of mother and young was published in the Proceedings of the Society for that year. The calf as figured looks remarkably like a foal, save for the tiny spike horns and the somewhat faint facial markings; the mother stands behind it at a little distance, capitably drawn, the very long horns characteristic of female beisa showing up well against the sky, and the sable stripes on face and flank contrasting effectively with the general body colour. In September, 1885, a second calf was born of the same parents. The mother died, but the calf learnt to suck milk from a bottle, and butted the keeper if the suction tube fell out of its mouth! Unfortunately it did not survive. A photograph of this second youngster will be found in Captain Nott's "Wild Animals Photographed and Described." The beisa has bred twice in the collection at Calcutta. On May 25, 1878, a young animal of this species was received at the Calcutta Zoological Gardens; it was turned out into an enclosure, and being unfortunately tempted after its month's voyage to make a hearty meal of fresh grass, gorged itself to repletion. It was found dead of excessive dilatation

of the stomach—killed by its own gluttony, like Henry II. after his feast of lampreys!

In conclusion a few words may be devoted to two other antelopes—the gemsbok and the fringe-eared oryx—which have been confused with the beisa. The gemsbok is a magnificent creature standing four feet at the withers and bearing a splendid pair of horns which, longer even than those of the beisa, attain a measurement of from 40 to 47½ inches. The general colour of the gemsbok is a fine vinous buff; it also carries a jet black headstall, a reversed mane, and a tufted tail; but the black triangle just above the muzzle is *much longer and more expanded* than in the beisa, fusing with the stripe which runs through the eye. The rump bears a *black patch*, and another adorns the *outside of the thighs*; the cannon bones in *both fore and hind legs* are handsomely decorated with a longitudinal black stripe. In addition to these superficial markings the gemsbok has a *tuft on the throat* absent in the beisa.

The fringe-eared oryx (*Oryx callotis*) stands about 46 inches at the withers. On the plains of the Kilimanjaro district it replaces the beisa; it is rather smaller than that animal, and the coat is of a *richer ruddier tawny*; the facial markings are practically the same, save that the stripe running through the eye frequently *reaches the edge of the lower jaw* and even passes under the throat; there is *no black patch* on the front of the cannon bone. The fringe-eared

A PAIR OF GEMSBOK.

The gemsbok is the finest of all the oryx antelopes. Note the tuft of hair on the larynx, and the great development of the markings on the face, which unite, as it were, to form a headstall. Both fore and hind legs are handsomely marked with black. Originals in the Natural History Museum, South Kensington.

oryx is, however, best known by the long beautiful tufts of hair which adorn the ears; the animal accentuates their graceful droop by carrying them a little lower than the beisa does, so that they resemble, on a small scale, those of the roan antelope. The type specimen of the *Oryx callotis*, obtained from near Mt. Kilimanjaro, was at first supposed to be a beisa until further examination showed it to be new. The type head, exhibited at a meeting of the Zoological Society on March 15, 1892, is now in the National Collection; the horns are $23\frac{1}{2}$ and 22 inches in length respectively.

Thus the beisa antelope is plainly separable as a species entirely distinct even from its nearest congeners; and an interest attaches to it which they do not arouse, in that it is probably the original of the unicorn. For this reason it is one of the most fascinating of all the antelopes, and well deserves the attention not only of the sportsman and the naturalist, but also of the antiquarian and the student of heraldry.

THE BEATRIX ANTELOPE.

"For look where Beatrice, like a lapwing, runs
Close to the ground."

Much Ado about Nothing, Act III., Scene I.

Charming in outlines, pleasing in coloration, and diminutive in size, the little beatrix oryx is remarkable as being the smallest of its genus, and the only one which occurs outside Africa. As far as is known it appears to be exclusively an Arabian species; for although Col. Hamilton Smith observed in 1826 "we have seen the head of one shot on the west side of the Indus, in the deserts of the Mekran," the statement requires confirmation and there may well have been an error in locality.

The beatrix antelope (*Oryx beatrix*)—el walrush and el bakrus of the Bahrein Arabs—stands about 35 inches at the shoulder. The long horns attain an average length of 25 inches, with a maximum of 27 inches. The general body colour is whitish, as are also the ears and mane; a blackish brown triangle adorns the forehead, and on each cheek is a larger patch of the same colour, uniting with its fellow under the throat. A faint brown longitudinal stripe runs between the belly and the flanks; the tail tassel is black, while on each fetlock a snowy ring shows up in smart contrast to the brown hue of the rest of the limb.¹ The coloration of the beatrix

1. The foot of the beatrix thus appears to be encased in a dainty white slipper, with a smart black toecap.

BEATRIX ANTELOPES.

The pair of oryx seen at Mecca by Belon in the sixteenth century may have belonged to this species : if so, Pennant cannot
le ranked as the first describer of the animal, being anticipated by some two hundred years.

May 1905.

is most singular, for instead of being dark above and lighter below (the usual arrangement) the disposition of the tints is exactly reversed; like the young of the grison, and the honey ratel at all ages, the beatrix has the darker hue on the *lower* portion of the body. The typical oryx coloration, rich enough in the gemsbok though paling in the beisa, is seen in the beatrix actually blanching to white.

The beatrix antelope appears to have first been described by Thomas Pennant in 1781, from two drawings then in the British Museum; in attempting to figure the species in his "History of Quadrupeds" some mistake seems to have arisen, the heavily-built animal with *white* limbs, and eye-streak barely extending to the jaw, indicating a beisa antelope rather than the present species.¹ Pennant further styles his figure "leucoryx antelope;" it is not, however, the leucoryx of modern writers, as shown plainly by the uniformly coloured neck and the straightness of the horns. The original specimens were kept by Sultan Houssein, Shah of Persia, in a park eight leagues from the capital, and were figured from life in 1712 by order of Sir John Lock, agent of the East India Company at Ispahan.²

The present species was redescribed in 1857 by

1. Similarly Dr. Shaw compares Pennant's figure to the pasan or Egyptian antelope (probably =beisa or gemsbok—or both). "had the figure alone of this animal been given, without its description, one would almost be tempted to suppose it a bad representation of the former species."

2. An interesting old oil painting of a beatrix oryx is still preserved in the Royal College of Surgeons' Museum.

Dr. J. E. Gray, who named it after the Princess Beatrice, born in that year. This "type" specimen was a male, being the survivor of a pair which had been sent from Bombay by "Capt. John Shepherd of the India House" as a gift to the Zoological Society. Dr. Gray surmised that although shipped from India the antelope had probably been "brought from the shores of the Red Sea." The new animal was at first supposed to be a half-grown gemsbok—a pardonable mistake when one remembers the pale colouration of gemsbok calves. On its death soon afterwards the animal was obtained for the National Collection, where it still remains.

Nothing more appears to have been heard of this smart little oryx, accounted a curiosity even in its native land, until in November, 1864, Major O. B. St. John and Col. Pelly, when visiting the Imaum of Muscat at his country house, were shown a "wild cow" kept in an adjoining yard. This animal—an adult female beatrix—was at once presented to Col. Pelly, who sent it to the Botanical Gardens at Poonah; it was said to have come from a district situated a week's camel ride over the mountains. In 1869-70 Col. Pelly obtained a pair of beatrix for the late Mr. Gwyn Jefferies, F.R.S. They were so tame as to be allowed to go about free, and lived for some time at the Colonel's country house near Bushire. The male was accidentally killed; he was not, however, a good specimen, having

imperfect horns. On March 26, 1872, Mr. Jefferies deposited the female in the Regent's Park collection. In 1878 a male beatrix, supposed to have been taken in the Hedjaz Passes, some 150 miles east of the Red Sea, was presented to the Zoological Gardens by Commander F. M. Burke.

In 1894 Dr. A. S. G. Jayakar, who had already presented many interesting specimens of mammals to the National Collection, sent home a further series of great value. The specimens had all been collected in the Oman district of Arabia, and included examples of all the mammals known to occur there; especially interesting was the skin of an immature female beatrix—the first wild-killed specimen ever sent to England. The fur of this individual was exceedingly short and close—perhaps the summer pelage. Besides this oryx, the collection contained several examples of a very rare hedgehog; a new diminutive species of hare; and a fine new goat of a sandy or brownish colour.

In October 1881 Lord Lilford presented to the Zoological Society two female beatrix which Lieut. Col. S. B. Miles, H.M. Consul at Muscat, had obtained for him in the great desert behind the mountains of Oman; unfortunately, only one of them was in good condition, the other having been injured about the head. About 1895 a specimen in the the Regent's Park collection was photographed, and in a lantern slide now before me appears to have been a

really fine animal, with long slightly curved horns and a distinct neck mane ; a good specimen was also living in the New York Zoological Park in 1903. Lastly, in April, 1906, a pair of live beatrix were offered for sale by Cross of Liverpool.

In 1905 the writer spent some time in studying a pair of young beatrix in the gardens of the Zoological Society ; a photograph then taken is reproduced in this book. These oryx were remarkable for a number of transverse markings on the neck and withers, perhaps corresponding to the underlying vertebræ ; and also for the beautiful pinkish hue which suffused their coats, recalling the exquisite roseate tinge on the breast of Ross' gull. They were fond of sparring with each other, butting their heads together like calves at play ; the stronger of the two was rather inclined to bully, driving off his mate when the fit took him by prodding or threatening to prod with his horns. Such squabbles were soon made up, the two licking each other's coats in the most amicable manner. The cry of the beatrix is a hoarse braying grunt.

Rare as it is in zoological gardens, the present species seems to be still rarer as a museum exhibit ; as late as 1899 no Continental museum (save perhaps that of Paris) possessed any specimens at all. A Paris example bears the record horns, which tape 27 inches ; other specimens are in the Natural History Museum at South Kensington, and consist of :—

1. Type specimen described by Gray in 1857.
2. Skin presented to the British Museum by Lieut. Col. Jayakar in 1894.
3. Adult female (Col. Pelly's specimen).
4. Skeleton of young female obtained on the Persian Gulf by B. T. Finch, Esq., F.Z.S.
- 5, 6, etc. Some skins and skulls collected in Muscat by Dr. A. S. G. Jayakar.

The foregoing account comprises practically all our knowledge of the Arabian oryx. Happy is the country that has no history ; happy is the species in the same case—for, too often, such history is but a record of extermination. *Etiam periere ruinae* is a comment applicable to many extinct animals equally with the vanished cities of the ancients ; that this exquisite little creature may never require an obituary notice will be the wish of every naturalist.

THE LEUCORYX ANTELOPE.

"In densis etiam sævissima bestia sylvis
Trux stabulatur oryx."

Oppian.

A sheltered rocky valley in the African wilderness. A feeble stream trickles through a struggling tangle of acacia and terebinth, which rear their scrubby heads from a sullen soil covered with flints and adorned with brightly coloured pebbles. A pair of little black and white birds—desert chats—flit briskly from stone to stone, undeterred by the awful silence, and uttering now and then a chacking note. Two or three jerboa rats, long-legged and wide-eared, sit sleepily basking at the entrance to their burrow. Coiled up like an ammonite shell, a cerastes viper lies half buried in the sand. A cloud of insects dance in playful gambol above the heated earth; skink lizards, alert and glittering, flash amongst the pebbles like streaks of fire. A group of large antelope (sandy white and rufous in colour, and armed with long horns) take their siesta in peace—a party of leucoryx very much at home.

Evening. The nocturnal life of the oasis begins to show itself. An incessant hum of insects rises from the scanty herbage; jerboas run in dozens over the sand, croaking as they go; a jackal howls in the distance. The leucoryx begin to lick their coats; rising one after another they stretch themselves, and stand with powerful figures and sweeping horns

outlined against the fast-darkening sky—a magnificent group of animal statues. One sturdy bull rakes his horns nonchalantly against a convenient rock; another devotes nearly five minutes to scratching his muzzle. Caring little for the water, where a covey of sand-grouse have just alighted to drink, the great antelopes begin to pasture. The sand-grouse spread themselves thickly over the little valley; the rough slopes are covered with them, drinking, pecking, or walking about with nodding gait, like so many pigeons.

Suddenly there is an alarm snort from the old female who acts as sentinel; every animal is instantly at attention, staring hard at a small group of parti-coloured beasts which have just entered the opposite end of the valley. Square-headed and large-eared, with long legs and a mixed coat of black, white, and yellow—these are the terrible wild dogs which ravage the desert in their nightly wanderings. There is a pause of a few seconds; then the leucoryx are in full flight, leaping and bounding like ibexes, and scattering the flints behind them in a stony shower. Silently the terrible hounds spread out, trying to encircle their quarry; too quick for them, the oryx top a neighbouring ridge and slip like lightning down the opposite side. Mute yet determined, their white tails gleaming in the fast-growing darkness, the tortoiseshell pack sweeps after them, keen, persevering, relentless;

then the hot African night settles down like a curtain over the desert.

The leucoryx (*Oryx leucoryx*)—about harb of the Kubabish Arabs—stands about 40 inches at the withers ; it is a fine sturdy beast, its long curved horns and sweeping tail giving it a thoroughly wild game-like appearance that renders it most attractive. The general colour of the leucoryx is reddish or reddish white ; the neck and shoulders are ruddy brown, and there are brown patches on the limbs, somewhat as in other members of the family. The usual style of ornamentation is, however, but faintly developed. The triangular face markings of the other oryxes occur in the present species, as also the stripe running through the eye ; but they are marked in greyish brown rather than black or blackish, while there is no dorsal stripe at all, and only a faint longitudinal one. The legs and abdomen are whitish ; tail tassel black. Maximum length of horns 3 feet $3\frac{5}{8}$ inches.

At the present day the leucoryx inhabits both Nubia and Senegal ; it is also recorded from Lokoja on the Niger, and probably, like the addax antelope and fennec fox, ranges right across Africa. It appears to have been known to the ancient Egyptians under the name of toa or tao ; and in the inner chamber of the Great Pyramid of Memphis a number of these antelopes are depicted. Some are being led along by a cord round the neck or by the horns,

LEUCORYX.

July 1st, 1902.

Note the long curved horns and horse-like tail. The typical oryx coloration is not much developed in this species : note the dark-coloured neck and light coloured body. The second specimen here shown had had its horns broken off quite short.

—*Jardin d'Acclimatation, Paris.*

others driven—apparently as trophies or tribute. The Musée Alaoui at Tunis contains a Roman pavement depicting a lion attacking a beast supposed to be a leucoryx.

Hemprich and Ehrenberg were the first modern naturalists to meet with the present species and to bring home examples; they saw it in 1820-1825 in Dongola, between Ambukol and Simrie, and hunted it on horseback with the Arabs. Lichtenstein of Berlin described and figured the species about 1827; his work was, however, somewhat anticipated by the presence of an adult male from Senegal in the Jardin des Plantes menagerie as early as 1819. The first living example in *England* seems to have been the individual which was brought home about 1835 by Mr. Musket, and passed into the possession of his mother at Edmonton. The animal—a female—subsequently became troublesome, and in 1837 Mrs. Musket gladly sold it to Lord Derby for £50; the Earl added it to his collection at Knowsley. Some time afterwards M. Reboulet arrived at Southampton with some giraffes, a pair of addax antelope, and a male leucoryx; Lord Derby wished to purchase the addax and leucoryx, and sent the head keeper down with the price (£100) agreed for them without the giraffes. The Frenchman, however, wishing to sell all his animals in one lot, delayed under various pretexts, until he eventually sold them all to Mr. Cross of the Surrey Zoological Gardens.

On Mr. Cross retiring from business about 1843, the antelopes were transferred by him to his brother-in-law, Mr. Herring, from whom the persevering Lord Derby eventually purchased them for £114. Lord Derby thus had the only living pair of leucoryx in England. Two calves were bred, though neither lived; the first was sent to the British Museum. The second was born dead about June 19, 1845; the mother died in 1846, having then been about eleven years in England. The two adult animals and one of their calves were figured by Waterhouse Hawkins in the "Gleanings from the Menagerie and Aviary at Knowsley Hall," published in 1850; the second leucoryx calf and one of the parents is still preserved in the Derby Museum at Liverpool.¹ On July 2, 1851, Lord Derby died, and his unrivalled collection was sold by auction in the following October by Mr. J. C. Stevens. The sale lasted a week and attracted many naturalists; lot 73 consisted of a pair of leucoryx—an Abyssinian male and a Nubian female—which was selected by the Zoological Society in virtue of Lord Derby's bequest. Calves of this pair or their descendants were bred by the Society in 1852, 1853, 1860, and 1864.²

In captivity the leucoryx becomes partly tame, and

1. As late as 1900 the British Museum possessed no perfect example of the leucoryx. A good, fresh male specimen from Kordofan was however presented by Capt. Dunn, R.A.M.C., in 1903.

2. The first of these Zoo youngsters was figured in a well-known natural history as "the first leucoryx born out of Africa." The calf is shown at apparently some five weeks old; it thrived well and soon was almost as tall as its parents.

will feed from the hand ; but it must here be insisted upon that all the larger antelopes when caged become very dangerous pets, far different from the timid, pretty creatures of popular imagination. "He is at times very fierce" wrote Lord Derby of his first male leucoryx ; and the late Mr. A. D. Bartlett once said that he would rather go into a cage with a lion than enter the enclosure of a certain species of gnu. Similarly the leucoryx in the Berlin collection has been described as "rowdy fellow," liable when in a blind fury to attack even his consort. The present writer well remembers the powerful and savage sable antelope which in 1895-7 was one of the chief attractions of Barnum and Bailey's show, and how it struck at the iron bars of its waggon, apparently in sheer viciousness. Perhaps in some of these cases the beast develops a malevolent disposition from sheer *ennui*, the distractions natural to it in the wild state—such as seeking its food, taking sentry duty, running from its enemies, or fighting with its rivals—all being removed. In others the animal perhaps attacks in self-defence, being in an enclosed space whence there is no retreat, and the fear of man being upon it. In any case it should be noted that "changed by captivity" does not invariably mean "*tamed* by captivity;" the hippopotamus which some three years ago in a Continental collection killed the keeper with whom he was quite familiar is an instance of this.

THE BUBALINE ANTELOPE.

“Animal Africæ proprium, vituli cervive quâdam similitudine.”

Pliny on the bubaline antelope.

The game animals of Algeria, though neither so large nor so varied as those of Southern Africa, nevertheless, from their existence so near to Europe, have a special charm of their own. Probably they once produced many a trophy for the Roman amphitheatre, for in the old days elephants roamed the wilderness of the Tell and haunted the Atlas Mountains;¹ centuries afterwards lions still overran the country in all directions, and panthers and hyænas infested the hill ravines. The caracal lynx ranged the open Sahara after hare and bustard; the hunting leopard ambushed the herds of antelope in the wilderness of M'zab. The serval cat dwelt among the tamarisks of Constantine; the tiny fennec fox haunted the dunes of Souf, and the cork forests of Tunisia sheltered troops of Barbary stag and sounders of wild boar. Gazelles of various species replaced in the southern valleys the springbok of austral Africa; the beautiful addax, spiral-horned and silver-coated, frequented the saline marshes to lick the salt;² while the fertile pastures and open

1. Hanno mentions herds of elephants, seen on the coast of Morocco, in his voyage of B.C. 470; in Algeria these animals persisted till between 300 and 700 A.D.

2. One of these salt lakes will be found figured from a photograph in “Natural History Essays.”

moorland of the Tell country were enlivened by herds of that curious and now rare antelope—the bubaline hartebeest.

The bubaline antelope (*Bubalis buselaphus*)—begra el ouach of the Arabs—kargum of the Touaregs—is the smallest, the dingiest, and the quaintest of the hartebeest family. It stands about 44 inches high at the shoulder. The horns are short, heavily ringed, and curiously curved in a U-shape; they are set upon a short pedicel rising from the summit of the skull. The face bears a melancholy expression; the humped shoulders and sloping quarters give the animal a deprecatory appearance, as if it apologised for its very existence. The hair in the middle of the forehead is curiously whorled, with a central depression, as if this dejected-looking creature had made one solitary effort to smarten up. The general colour is greyish brown, with an indistinct greyish area on each side of the muzzle; the tail tuft is black. The horns may attain a length of $14\frac{1}{2}$ inches over the curve, as seen in a specimen in the National Collection.

The above is a description of the typical bubal of Tunisia, Algeria, and Morocco; it is, however, possible that this northern race is but a subspecies of the West African hartebeest (*Bubalis major*), distinguished by its deep brown face, and the general body colour varying from fawn to sandy grey. The horns of this western species may attain

a length of 22 inches (specimen in the National Collection); young animals are pale-coloured, and the coat again becomes light in old age. A specimen of the *Bubalis major* is preserved in the Leyden Museum; but it is scarce and very little known to European naturalists.

The bubaline hartebeest was the βούβαλος of Aristotle, of Oppian, and of Pliny; the buselaphus of Gesner, who mentions it in his "History of Quadrupeds," published in 1520; and the *Bos africanus* of Belon (1555). Thus it differs strikingly from most other mammals of the Dark Continent, being probably the very first of African big game to become known to civilised Europe. Unfortunately, in the sixteenth century, the "Barbary cow" was confused with the very different hartebeest of the Cape, and the study of both animals was thus hindered.

The caama or Cape hartebeest (*Bubalis caama*) is a fine animal standing at the very opposite end of the scale to the bubaline antelope, being larger and (although thin, long, and angular) much more cheerfully coloured. The general body tint is bright reddish brown, darker on the back and pleasingly shot with purple along the spine; the face and outside of the limbs are smartly patched with sable; there is a yellowish-white patch on the rump; and the tail tassel is black. The horns form a V-shape and not a U as seen from the front. Essentially a southern species, the caama once occurred in Cape

June 1903.

CAPE HARTEBEEST.

Note the short stout horns set on a special prolongation of the skull, the thin bony angular body, the long legs, and the apology for a tail. The great length of the face gives the animal a melancholy appearance.

Colony down to the very seashore ; further north it is replaced by other species of hartebeest—Lichtenstein's, Jackson's, Coke's, Swayne's, and so forth—until one reaches the tétel of Kordofan, and the bubal of Algeria.

Now in the sixteenth century Dr. Caius (well known as the founder of Caius and Gonville College, Cambridge) correctly described the bubal in his contribution to Gesner's work, aptly styling the animal *boselaphus* or "stag-ox." Buffon similarly described the animal in his own Natural History, though without figuring it. Dr. Allamand, however, thought fit to add a picture to Buffon's description ; and unfortunately delineated not the bubal but the caama, with Buffon's original letterpress. To make matters worse, Buffon, in publishing the sixth volume of his Supplement, copied Allamand's figure of the Cape hartebeest, and published it with a correct representation of the bubaline species, quite ignorant that each picture represented an entirely distinct animal ! This comedy of errors was continued by Gmelin ; but in 1819 Georges Cuvier separated the two species, styling the Cape form *Antilope caama*, and soundly basing his dictum on the series of skins and skeletons of both animals then in the Paris Museum.¹

1. Seba's supposed figure of a bubal (plate 42, Tom I., fig. 4) likewise represents the Cape hartebeest ; the error is the more singular as in his day (1765) one might well suppose the caama far more difficult to obtain than the bubal.

The first bubaline hartebeest seen alive in Europe was probably the specimen kept for some time in the Royal menagerie at Versailles and mentioned by Frédéric Cuvier in his work "*La Ménagerie du Museum.*" Afterwards transported to the collection at the Jardin des Plantes, it unfortunately received severe injuries *en route*, and died soon after reaching its destination. The first bubal in *England* was exhibited in the London Zoological Gardens in 1832; others have since been received, and at the time of writing a female specimen has just been added to Regent's Park collection after a hiatus of several years. The bubal bred in Lord Derby's menagerie at Knowsley Hall.

A fine herd of eight bubal (including several born in the collection) was studied by the writer some years ago in the Jardin des Plantes; the original members of the herd had been presented by M. de St. Julien, Commandant Supérieur at Lalla Marnia, in the province of Oran in Algeria. The writer took a number of photographs of this quaint party; the most interesting one represented a young bubal and its parents, and showed how the scraggy outlines of the little animal lying on the ground counterfeited the angles of a piece of rock. In the wild state, unfortunately, this interesting antelope is but little known to Europeans; apparently extinct in Egypt, it wanders in small troops in the mountains of the Sahara

“ . . . in a waste place, where no man comes,
Or hath come since the making of the world.”

Some three years ago the present writer passed through much of the old antelope country ; flocks of sheep and goats, with their Arab shepherds, wandered where once bubal and addax grazed ; and the haunt of leopard and hyæna was now marked by a trim French town. The days of Gérard and Bombonnel are indeed over ! the wild fauna is represented by bands of storks and flocks of cisalpine sparrows rather than by troops of lions and herds of antelope. Ancient Icosium has become modern Algiers ; agents for the Roman games would find it difficult to obtain from the entire colony a single lion for the arena.

Let us picture the bubal as it lived in the old days, when the Roman sentries guarded their outpost of Calceus Herculis, and the Numidian archers harassed ostrich and bustard on the very margin of the desert.

A wide uneven plain on the northern edge of the Sahara. Far on the horizon, rose-pink against a sky of turquoise, rise the Aurès mountains, the home of lion and wild sheep ; in the middle distance an arid valley gives shelter to a spruce, bright-eyed troop of gazelles. Round the remnants of an encampment a few cisalpine sparrows, pert and brisk as their London brethren, peck and bicker ; a desert lark springs into the air, and with a feeble ineffective song dives headlong into the bushes. In

the foreground are a small troop of hartebeest; some still crop the ungenerous herbage, others stand full-fed with drooping heads, lazily flicking off the flies. Perched on a convenient hillock, an old bubal stands rigid on sentry duty. Hard by two bulls drop on their knees and, swinging their foreheads almost to the ground, strike each other's horns with a dry clash. After a few minute's sparring they stand at ease, apparently taking no notice of each other. Suddenly, as by a prearranged signal, they are at it again, and with whisking tails and straining fetlocks strive for the mastery, raising a cloud of dust in the Homeric struggle. A loud snort from the leader; all the bubal are instantly at gaze, all animosities dropped as the the wiry forms spring smartly to attention. Dim in the distance a band of horsemen has alarmed the sensitive sentinel; in a moment the entire troop are off at a rocking gallop, striking the earth with all four feet together, and springing with immense bounds like indiarubber toys. The startled bustards rise in the air like automata or squat plover-fashion on the sand; the gazelles in the acacia brake stamp, snort, run together, and dash off at full speed. Gaining a small elevation, the bubals turn to stare. The horsemen are Roman cavalry returning to their fortress on military duty, not desert archers out after game. Reassured, the antelope stand at ease; yet those grim warriors are a menace serious indeed, heralding the

day when the bubal shall be swept far into the Central Sahara ; when France shall invade Africa by "pacific penetration," planting gardens in the Arab villages, and boring artesian wells in the thirsty desert ; when the iron horse shall tear along beside the old caravan track, and the rattle of the mitrailleuse shall awaken the hills of Casa Blanca. Already the shadow of Europe lies heavy over Africa—stern, indomitable, world-wide, the *pax Romana* grasps even the southern wilderness in a grip of steel.

THE BLESBOK ANTELOPE.

A vast saltpan, glittering in the sunshine and covered with coarse sand. Its surface is besprinkled with saline particles, as if touched with hoar frost; in places the limestone is hollowed out by the tongues of countless generations of game, which have resorted hither to lick the salt. The pan is black with the herds which have come up in the night, and the air is full of their bleatings; a strong bovine scent comes down wind. A troop of gemsbok graze on the scanty hay-like grass; their pied faces, great stature, and long swishing tails make them handsome and conspicuous, and the morning sun, glancing along their bayonet horns, makes them glitter as if of actual steel. A troop of fourteen ostriches sail past, with long necks outstretched and snowy plumes extended to the breeze. Further out a vast herd of springbok spreads over the flat, their myriads pouring over the frosted surface like sand released from a bag; while blue wildebeest and Burchell zebra, Cape eland and roan antelope play a less conspicuous part in the gathering. A huge area at the edge of the pan blooms in one glorious mass of purple brown; scanned attentively, it is seen to be composed of that magnificent antelope, white-faced and glossy-coated—the blesbok.

The blesbok (*Damaliscus albifrons*)—nunni of the

Bechuanas—stands about $4\frac{1}{2}$ feet at the shoulder, and measures about 6 feet in length. In general outlines it resembles a modified hartebeest; the head, however, is but little elongated, the horns are but slightly twisted, and the withers but slightly humped. The tail bears a crest of backwardly directed hair. The horns, annulated with almost white rings, are slightly lyrate, and measure some 15 inches in length; the record specimen (in Sir E. Loder's collection) tapes $18\frac{1}{2}$ inches over the curve. In spite of its relationship to the bubal, the blesbok is charmingly beautiful. The head and neck are rich dark purplish brown, with a snow-white blaze down the middle of the face; the body tint is also brown, exquisitely shot on the back with lilac; the ears are grey behind, as if lichenized; the chest and croup are rufous; the belly and inside of the limbs are snow-white, and a pale brown disc is situated above the tail. Elegantly coloured, gracefully proportioned, the blesbok is one of the most charming denizens of the veldt; a four-footed Mercury, it is the living embodiment of wild beauty and antelope grace. The present species formerly occurred in Northern Cape Colony, the Orange River Colony, and the Transvaal, and still inhabits Bechuanaland. It is now unfortunately a very scarce animal.

In the old days immense herds of blesbok roamed all over Central South Africa. Northwards it reached to the Molopo River, southwards it

extended to the great Karroo Desert. The early traveller, trekking through the blesbok country, saw thousands upon thousands running in close-packed ranks, their silvery muzzles lowered to the ground, like hounds on scent; his bivouac was enlivened by the grunting and snorting of the buck as they fed alongside the waggons; rising early next morning he beheld every little eminence alive with blesbok and wildebeest. The blesbok roamed over the sour veldt, cropping the harsh grass with relish, and resorting to the sun-baked vleys to lick the crystallized salt. Clouds of springbok were mingled in their purple companies, running and trotting, or leaping like shuttlecocks high in the air. Shaggy troops of wildebeest wheeled and frolicked about the wings of the advancing squadron, while the koorhaan bustard ran and tumbled like a mountebank, and the truculent wart-hog scampered off with tail absurdly held upright. Wary and suspicious, blesbok were usually difficult to approach; when young ones were about the animals became even more alert, and quickly sought safety in flight, covering the ground with a rapidity that left all pursuit far behind.

The blesbok seems to have been first discovered on the high veldt of the Colesberg division of Cape Colony—the so-called “bontebok flats”—perhaps by the unknown farmer who (doubtless unaware of any special interest attaching to his statement) noted that the “bontebok” in the north of Cape Colony

were somewhat different to those of the south, and is mentioned by Dr. Sparrman. Sir John Barrow in 1797 seems also to have visited this haunt of the blesbok, though not recognising the animals as new. An antelope formerly exhibited in Exeter 'Change is figured as the "blesbok" in Knight's "Museum of Animated Nature;" from the shape of the horns it was obviously a young animal, as indeed is stated in the accompanying letterpress, but there is a white (not yellowish) mark near the tail, and the specimen may not have been a blesbok at all, but an example of the closely allied bontebok. Indeed a true bontebok was exhibited in Exeter 'Change about this time, according to the "Zoological Journal;" the differences between blesbok and bontebok were not realised till long after this date, and the letterpress agrees with the latter rather than the former animal. Steedman, however, in 1835 noted the rarity of the former species in Cape Colony as contrasted with its old-time abundance; he states that it was already "exceedingly scarce and only found in the remoter districts, unless the bontebok *A. pygarga* of Pallas, still found in the vicinity of Zwelendani, should prove to be the same animal." Sir Cornwallis Harris in 1837 made a special visit to the bontebok preserve at Cape Agulhas, in order to determine whether blesbok and bontebok were one and the same species; and in his large work on South African animals gives a picture of the bontebok

flats, "which," he says, "would appear indebted for their nomenclature to the double fact of possessing within their wide limits neither a solitary antelope of the species referred to, nor one single square rood of level land!" On January 25, 1828, Dr. Von Horstock obtained a pair of blesbok at Uitenhage, and in October, 1833, a male at the same place—these specimens are now at Leyden.

In 1844 Gordon Cumming noted the gradual disappearance of the blesbok, observing that "to the south a few small herds are still to be found within the Colony;" its headquarters were to the north of the Vaal, in the sour veldt to the west of the Witteberg Mountains. In 1861 it lingered in considerable numbers on the north-eastern border of Cape Colony, while as late as 1873 Holub found great herds near Mafeking. In 1892, however, these antelopes were practically extinct in Southern Bechuanaland; the progress of civilisation—and especially the ruthless system of hide-hunting pursued for years by the trek Boers and their sons—had thinned down the once swarming blesbok to a mere remnant. Indeed in 1894 it seemed but too likely that the blesbok would soon share the fate of dodo and great auk; happily some few troops existed on fenced farms, where leave was necessary to shoot them. *Sero sapiunt Phryges*. The blesbok has now been taken under Government protection; and it would seem that the pendulum is swinging back

May 1906.

BLESBOK.

Adult female. Note the white blaze (or bles) down the middle of the face, and the humped withers. The blesbok somewhat recalls the Cape hartebeest also figured in this work.

again, since a census of the blesbok surviving in the Steynsburg division showed in June, 1904, a total of 650 individuals, being an increase of *two hundred* as compared with 1903! A fine male specimen from the Steynsburg herd is preserved in the South African Museum at Capetown. Blesbok bred in the Regent's Park collection in 1866, 1869, and 1870; the new Natural History Museum at Paris contains a blesbok calf born at the neighbouring Jardin d'Acclimatation; a pair of these animals were exhibited in the Antwerp Zoo in 1869. Some ten years since a young animal in the light brown coat of immaturity was exhibited in Barnum and Bailey's show, and was rightly described as one of the rarest antelopes then in captivity. In 1903 a blesbok was exhibited in the New York Zoological Park.

The specimens at present in the Zoo consist of a female presented by the Transvaal Museum and Zoological Gardens on April 8, 1903, and a male from Basutoland, purchased May 24, 1906. The female is impatient of captivity, charging the railings with lowered horns and whisking tail; sometimes she stands listening intently, afterwards lashing her sides; or drops on her knees to slowly scrape the ground with her horns. I did not see this individual plough up the ground, advancing in a straight line (still on her knees) as a black wildebeest will do; the strokes were directed right and left in a half-hearted fashion, as if in *ennui*. When inspecting an object closely

the animal snuffs air rapidly into the nostrils ; a strong sweet bovine scent is very noticeable.

No account of the blesbok would be complete with some mention of the closely allied bontebok. Handsomer than its cousin, the bontebok (*Damaliscus pygargus*) is a blesbok but more so, the characters of the latter—horns, humped back, pied coloration—being appropriated, adapted, and accentuated. The bontebok stands about 40 inches at the shoulder and tapes about 6 feet in extreme length ; the horns are black instead of greenish. Smarter than the blesbok, the bontebok has the silvery blaze down the face *continuous throughout*, instead of being interrupted about the level of the horn bases by a brown hiatus ; the belly, the disc above the tail, and the upper part of the tail itself are *pure snowy-white* ; the same remark applies to the legs, *both inside and out*. The rich purple brown of the neck, the lilac of the back, and the posterior direction of the crest on the tail are common to both species. In the bontebok at the Natural History Museum there is a much richer, darker purple gloss on the body, below the lilac “saddle,” than in the blesbok exhibited in the same case. The record bontebok horns tape $16\frac{1}{2}$ inches.

Unlike the blesbok, the bontebok has always been a rare animal ; it was already scarce when first described by Pallas in 1766. The old colonists made no distinction between the two species. The

vague methods of labelling museum specimens formerly in vogue—"Caffraria," or even "South Africa," being frequently considered quite sufficient—did not help in localising the bontebok. Sparrman, however, recorded it from the Bot River in Caledon (1785); Sir John Barrow noted its reduced numbers in 1801; Smuts about 1832 recorded it from the Breede River in Swellendam.¹ So rare was the species becoming that, by 1836, a fine of 500 rix dollars (£37 10s.) was imposed by the Government on any person shooting one without permission. Sir Cornwallis Harris, having obtained a permit to shoot some four bontebok, noted about three hundred individuals on the estate of Field Commandant Laurens at that time. "Still found in Zoetendals Vley," he writes in his book on South Africa; and, indeed, this locality near Cape Agulhas appears to be the only district in which these scarce antelopes now occur. That any remain at all, after so many years, is due to the farsighted policy of certain Dutch gentlemen. In 1864, Mr. Alexander van Byl enclosed his immense farm of 6,000 acres at Nachtwacht, and drove nearly all the surviving bontebok—some thirty head—into the enclosure,

1. Harris was the first to distinguish between bontebok and blesbok, though Hamilton Smith observed in 1826, regarding the white-faced antelope, "there is a variety which we have seen brought from the Boochwaana country, in which the white colour on the buttocks is not observable, but the white legs remain equally pure as in the others." The "white-faced antelope" would thus seem to be the bontebok, at that time confused with the true *albifrons* or blesbok; the variety "from the Boochwana country" being the blesbok of Bechuanaland.

thus preserving them from the extermination which had already long overtaken the blaauwbok of the same district. Dr. Albertyn also enclosed between twenty and thirty buck on his own farm, Zeekoe Vley; as late as 1895 some wild individuals were said to linger outside the enclosures near Breadsorp, and also near Swellendam. The bontebok is now even rarer than the blesbok; it is said that only about two hundred of the former are left, though happily this shows considerable increase since the enclosure was effected.

The following specimens have been brought to Europe:—

1. Bontebok preserved in the museum of Sir Ashton Lever (dispersed in 1806); this specimen, according to Pennant, stood “three feet to the top of the shoulders,” and had horns 16 inches long.
2. Stuffed male specimen in the National Collection, received in 1839 from Dr. Smuts.
3. Stuffed female, from Dr. Smuts (Dr. Gray’s handlist of mammalia in the British Museum).
4. Young animal, stuffed, face brown, from M. Verreaux (Dr. Gray).
5. Another young animal, stuffed, face brown (Dr. Gray).
- 6, 7. Mounted pair from Nachtwacht Farm, in National Collection.
8. 9. Pair of adult bontebok, purchased at the Knowsley sale in 1851 by Mr. D. W. Mitchell for the Zoological Gardens.

10, 11. Pair bred at Knowsley, sold to Prince Demidoff.

12. Bontebok living in the Antwerp collection in 1869.

13, 14. Two females, purchased by the Zoological Society for £50 in August, 1871.

15, 16. Stuffed pair in the Artis Museum, Amsterdam.

17. Specimen in the Vienna Museum.

18-21. Four examples—or portions thereof—in the Senckenberg Museum at Frankfort A/M, obtained by Baron von Ludwig in 1838.

22. Calvaria and horns from Caffraria, in Royal College of Surgeons' Museum (Hunterian series).¹

Thus is written the history of the bontebok; let us now return to the blesbok, as it lived in the good days gone for ever.

A ceaseless succession of undulating greensward, bright with flowers in great patches of colour. The sun rains down heat from a firmament of cloudless blue; dim in the distance the quivering horizon swims in hazy perspective. Not a hill nor a tree—nor even a bush—is in sight; the only landscape, the bare rolling veldt. Yet, though almost featureless, the scene is enlivened by a vast herd of blesbok, intermixed with springbok and a few black wildebeest; the brilliant coats of the antelopes are set

1. Perhaps the somewhat doubtful specimen exhibited at Exeter Change should be included in this list.

off to perfection by the green grass and golden sunshine. Thousands of elegant necks and snowy muzzles are outstretched in concert; a glorious purple *nuance* plays over the glossy hides of the blesbok, and the lilac sheen glazes their backs like a saddle of thinnest gossamer. A few brown-coated youngsters accompany their mothers; here and there springbok jump and caper, raising the scut on their backs like the fantail of a pigeon. A long line of black wildebeest trek serpentine across the veldt, their heavy heads and flowing tails giving them a grotesque resemblance to a troop of lions; in the distance a larger herd is grazing, the old bulls on sentry duty standing apart from the main body, and uttering from time to time a deep croak. Suddenly a loud snort sounds from one of the old fellows; something has alarmed him, and instantly the message is communicated to the entire company. A hunter's waggon appears far away, its white tilt conspicuous in the blinding sunshine. The wildebeest rush off capering, pull up within two hundred yards, and turn again to stare. Growing restless, the blesbok run together into little groups; then as by one impulse the entire company—springbok, blesbok, wildebeest—are in full flight. The grass swishes as the dense-packed masses tear through it; the earth re-echoes with the tremendous hammering of thousands of hoofs; with muzzles to ground and tails on high the blesbok thunder past, a vast cloud

of purple, brown, and white, the dust rising in a thick fog from under their twinkling feet. Hundreds and hundreds of antelopes scour against the wind in endless succession; the atmosphere is thickened with dust-fog and perfumed with warm bovine scent. Brilliant sky, brilliant earth, brilliant blesbok—we close our eyes, but the vision of those bright-coated antelopes is still before us.

THE BABIRUSA HOG.

“There are Hogs also with hornes and parats which prattle much.”

Purchas on the babirusa, A.D. 1693.

Europe in prehistoric times. The rays of a Miocene sun beat heavily upon the luxuriant landscape ; a vast lake, backed by a mighty forest, lies shining like a mirror in the riotous sunlight. A few guano-covered rocks project from the surface of the water ; on every rock sits a cormorant, preening its feathers, while close inshore a vast ribbon of thousands of flamingoes diligently patrol the shallows. Half a dozen crocodiles doze on an adjacent sand bank, their scaly faces set in an immovable smile. Brilliant kingfishers sit silent among the intense green of the reed beds, jewels of purest sapphire against a background of deepest emerald. White storks soar in drifting spirals high in the azure firmament ; dainty plover-like birds, graceful as the jacanas of recent Africa, run over the surface of the water vegetation ; giant butterflies float in the hot sunshine on wings of crimson and cobalt. Faint in the sultry afternoon silence sounds the dull croaking of innumerable frogs.

The stately forest half encircling the lake is composed of a mixed temperate and tropical

flora; oaks and palms, birches and bamboos, elms and laurels all occur in more or less abundance. Here a clump of tall *Flabellaria* raise their shapely crowns to the torrid sky; there a tangle of *Cucumites* shows dull green in the cathedral twilight. Deeper in the forest the trees interlace at the top; the air is close and steamy, reeking with excess of carbonic acid; while lower forms of plant life—mosses, lichens, creepers—flourish in sweating luxuriance. The thick undergrowth swarms with curtseying leeches; the boles of dead trees harbour great scorpions in their rotting wood. The canopy, 200 feet overhead, grows denser, the light fainter; drops of moisture glisten on every twig, and the ground underfoot is black with rotted leaves. Through the forest flows a small stream, green with *confervæ* and afire with dragon flies.

The dark wall of foliage sways to and fro, as if moved by a mighty wind; silently there appear in the forest depths a number of dusky forms, trunked and tusked like elephants, silent, strong, and sagacious—a troop of mastodon. As they pass along the opposite bank they show four tusks instead of two, trunks shorter than an elephant's, longer ears and legs; elephants in the making, rough creatures half way between the little meritherium of Eocene Egypt and the colossus of the Zoo. A troop of monkeys—(*dryopithecus*)—disturbed by the mastodon are seen in the trees, shouting in noisy

discord as they swing themselves from bough to bough with their powerful hands. Hardly have they passed than the water of the stream is seen in commotion, and three or four huge slate-coloured beasts appear floating on the surface, like so many submarines. About eighteen feet long and stoutly built, they somewhat recall a dugong or manatee; but as they roll and splash lazily in the tepid water they are seen to carry short trunks, while powerful tusks sprout from the lower jaw. These are deinotheria; less terrible beasts than would have been supposed, they lead a peaceful existence in the depths of the forest, playing and wallowing in the woodland marshes, and tearing up supplies of vegetable food with their ivory mattocks.

Abrupt indeed is the transition from Miocene times to the bustling world of to-day, with its wireless telegraphy and motor cars. Yet here and there, even in this unromantic age, linger traces of the mighty forests and dreamland animals of the Tertiary Period. Thus the island of Celebes, in the East Indies, is thought to be the remnant of an ancient continent; as late as 1894 much of it was still unknown, and it yet harbours that curious living fossil, that survivor of Miocene times—the babirusa hog.

The babirusa (*Babirusa alfurus*) stands about $27\frac{1}{2}$ inches at the shoulder, and measures about 47 inches from the tip of the snout to the root of the twelve-inch

tail. The general outlines resemble those of a pig, save that the body is compressed laterally, and that it stands much higher on the legs than usually misrepresented in books. The snout terminates in a disc; the eyes and ears are small;¹ the short tail bears a few stiff bristles at the tip. The skin is wrinkled transversely like a maggot's; it is nearly naked, and dotted all over with granulations, which become coarser about the limbs and feet and on the front of the head, face, and lower jaw. The colour of the hide is ashy grey, with blackish ears; a scanty covering of fine yellowish down may occur along the back in adult animals. In advanced age the hide on the back and sides becomes all rough, chipped, and scaly like the bark of a tree, and the down disappears. In younger adults such down is represented by black bristles, stubby like an unshaven chin, and plentifully besprinkled over the muzzle and median area of the face, on the vertex, occiput, and nape, and on the withers, back, loins, and tail.

The most remarkable feature of the babirusa, however, is its tusks. Most developed in the male, these weapons are arranged in two pairs; they are flattened laterally, are quite devoid of enamel, and are armed with sharp cutting edges. The upper pair (canines) rise close together near the middle

1. The iris is greyish white, giving the animal a peculiar appearance, as if a "doll's eye" had been inserted into the orbit. The actual tint is an exceedingly pale green-grey, faintly tinged with rusty brown.

line of the face; pass *though the cheek*, and sweep upwards and then backwards in a bold curve till they touch the forehead.¹ The upper canines of the babirusa *never enter the mouth*; that they should thus penetrate the muscle and skin of the face without causing serious inflammatory symptoms seems little short of marvellous. The lower tusks spring from the jaw in the usual way, and project above the lower lip as sharp backwardly-curved defences. Average length of upper tusk $14\frac{1}{2}$ inches; maximum recorded length 17 inches over the curve. The sows have small tusks situated in the lower jaw only.

The student will find an interesting collection of babirusa skulls in the museum of the Royal College of Surgeons, many of them dating from the time of John Hunter, the founder of the collection. No. 1825 (Hunterian) is a splendid specimen; the upper canines boldly cross each other above the head; the lower ones sweep round like miniature ivory scimitars.² A skull presented in 1818 by Daniel Moore has the upper canines so curved as to touch the frontal bones, which exhibit a depressed surface, perhaps actually due to pressure-absorption; another

1. A babirusa living in the London collection many years ago (1886?) carried such fine tusks that the late Mr. A. D. Bartlett sawed off the tips and inserted cork guards between the sawn ends and the face, lest the tusks should actually re-enter the skin! The animal, however, soon dislodged the corks.

2. A specimen in the Natural History Museum has the upper tusks widely divergent—the opposite of No. 1825.

specimen, presented in 1816 by Dr. Babington, has the upper tusks, though small, so much curved as to cause pressure-indentation of the skull at the fronto-nasal suture. Finally, a cranium in this series is remarkable in possessing an additional premolar tooth on each side.

The object of the curious curved defences of the male babirusa has long puzzled naturalists, and is still unknown. It has been suggested that their curvature is partly pathological; that the tusks, which formerly served some function not now required, have become abnormally curved like the incisor tooth of a rat or rabbit, which is no longer ground down, its fellow in the opposite jaw having been lost. Again it has been thought that they protect the face of the animal against the briars of the jungle, though this does not explain their absence in the sows. As fighting weapons they are probably effective enough, presenting several inches of razor-edge to an adversary; these wild swine are well-armed indeed, as may be seen from a record of injury inflicted by the much smaller weapons of the Indian boar. On February 3, 1904, a boy ten years old was admitted to the Purneah Charitable Hospital, Bengal, suffering from a serious chest wound caused by a wild boar. The ninth and tenth ribs were broken, a portion of engorged intestine protruded from the chest wall, and the diaphragm was also wounded; happily under treatment the boy made a

good recovery. As regards the story of the babirusa sleeping suspended by his tusks, it seems that these weapons are but loosely attached to the skull, as demonstrated by actual experiment in the deadhouse at the Zoological Gardens.

The babirusa may have been the four-horned boar (ὑστετράκερως) of Elian; Pliny more definitely notices a boar horned on the forehead, which he supposed to inhabit India (lib. viii. c. 52); Cosmes in the sixth century mentions it under the name of κοιρέλαφος or hog-deer.¹ Sailors in later times trading among the Moluccas brought over many of the curious tusked skulls. At least one specimen appears to have been amongst the "Rarities belonging to the Royal Society and preserved at Gresham College" described by Grew in 1686.

No less than ten of the College of Surgeons series were obtained in the lifetime of John Hunter (died 1793); this is remarkable indeed considering the very local range of the species and the uncertainty of travel in those days. The first *living* examples seen in Europe were a pair received in 1820 at the Jardin des Plantes in Paris, and perhaps it was this pair that produced a young one in the Paris collection.

It appears that as late as 1827 only the head of the animal was known *in this country*. Hamilton Smith

1. Perhaps in allusion to the antler-like (?) tusks; compare the Malay name babirusa, *babi* = hog, *rusa* = deer. *Deerhog* would have been a much more appropriate title; for the babirusa has been compared to a stag in lightness, *and justly so*. The true cervine hog-deer has nothing to do with the babirusa.

figured the babirusa with *red* eyes and a *brown* hide—an effort of the imagination, surely! and amusingly depicted the tusks as curled moustache-fashion *à la militaire*. The first living babirusa in England was presented to the London Zoo in 1839 by Captain Belcher, R.N. A comical figure of a young babirusa has been figured in one of the natural histories, the animal being shown reared up over the edge of its sty, like a parson in a pulpit. In captivity the babirusa soon becomes tame; a pair presented to the Zoo by the Duke of Bedford, on July 3, 1897, lived some years in the collection, and the female still (1907) survives. This pair were kept entirely in an unwarmed sty, summer and winter, though with plenty of good bedding; thus demonstrating that animals brought from countries under the Equator can completely adapt themselves to the rigours of the English climate. To the writer they were of exceptional interest, since they were the first mammals ever photographed by him.

Remarkable for its extremely limited distribution, the babirusa occurs only in the East Indies, on the little known islands of Celebes and Limbé; those on Boru are supposed to have been introduced from Celebes by man.¹ Several other mammals occur only on Celebes: the black “ape” for example, and the curious anoa, half buffalo half antelope. These

1. A specimen which Forsten brought over from Boru many years ago is preserved in alcohol in the Leyden Museum.

forms are *quite distinct* from any others found throughout the East Indies,¹ hence it has been thought that Celebes, as already stated in this Essay, once formed part of a Miocene continent, of which the greater portion has disappeared. The case is strengthened by the occurrence there of several birds, apparently actual remnants of a Miocene fauna; such as the *Meropogon* bee-eater, the *Ceycopsis* kingfisher, two curious species of magpie, and three genera of starling. Thus the interest already attaching to the babirusa, with its formidable tusks and its weird appearance, is heightened by its blue-blood ancestry—it is truly a living fossil, a survival as strange as would be a living mastodon or deinotherium.

The daily life of the babirusa probably differs but little from that of its ancestors in antediluvian times. The great forests of Celebes represent the woodlands of Miocene days, as restored and figured by the magic hand of Riou. Climbing strands of rattan palm meander over the boles of forest giants, or trail serpentwise among the thick layer of dead leaves carpeting the ground; *Livistonia* palms raise their giant-columns mast high in Nature's hot-house. As for the fauna, the curious black "ape," half monkey, half baboon, inhabits the tree-tops; the black anoa feeds in the clearings, its little yellow calf at heel. Tiny fruit-doves, grey-headed and green-backed,

1. An attempt has been made to show that the *Bos mindorensis*—a species of dwarf buffalo—is allied to the anoa.

coo and play in the thickets ; Nicobar ground-pigeons, hackled like game fowl, patrol the clearings in busy hungry flocks. Rollers and orioles, lorikeets and kingfishers inhabit the jungle ; enormous horn-bills sit in the tops of the trees, their quaint beaks of a gaudy orange colour suggesting the wondrous fauna of a pantomime. The babirusa wallows in the muddy clearings in the forest ; it swims well, and is said to be able to dive on occasion. The young are born in November, December and January, their nursery consisting of a small underground hole made by the sow, and lined with leaves ; they can move about on the second day. Many years ago a male babirusa was born in the London Zoological Gardens ; it was of a grey colour all over like its parents, was tinged with pink under the belly, and lived until the tusks began to appear.

THE SUMATRAN RHINOCEROS.

“Went with Sir William Godolphin to see the rhinoceros or unicorn, being the first, I suppose, that was ever brought to England. She belonged to some East India merchants, and was sold (as I remember) for above £2,000.”

John Evelyn, A.D. 1684.

The investigation of a jungle fauna, like that of the deep sea, presents special difficulties, for Nature yields up her secrets with but niggard hand. The Malayan forest animals are perhaps as little known as any, although specimens of them, both great and small, won at great expenditure of time and money and health, now enrich our museums. Cynogale and hemigale, babirusa and linsang, tarsier and tapir are cases in point; so also are the Javan and Sumatran rhinoceroses of South-Eastern Asia.

The Sumatran rhinoceros (*Rhinoceros sumatrensis*)—budak tapa (or recluse) of the Malays—kyan of the Burmese—stands about $4\frac{1}{2}$ feet at the shoulder and tapes about 8 feet from the tip of the snout to the root of the tail, being the smallest of living rhinoceroses. The head is elongated, with a pointed upper lip; the eyes are small, and the ears of moderate size. This animal carries two horns, the front one being occasionally strongly curved; the hinder horn is a mere fragment. Rough and granulated, the skin of

the Sumatran rhinoceros exhibits a well-marked fold behind the shoulder; the hide in the creases round the limbs is much softer than elsewhere, resembling the joints in mediæval armour. The tail is short and nearly naked, a few hairs only persisting near the tip. General body colour earthy brown; the hide is besprinkled with quite a number of brown or black bristles, remnant of an ancestral coat of fur. Maximum recorded length of anterior horn 32 inches over the curve. / Young animals are hornless.

This little rhinoceros is remarkable for the amount of hair carried even by the typical race; but the "hairy-eared" variety—the so-called *Rhinoceros lasiotis*—has the ear conches quite heavily fringed, while the body in the lower half is clad in long fine blackish-brown hair showing a purplish cast, and from its delicate appearance recalling the downy coat of a humble bee or a burying beetle! Along the back, the hair of *R. lasiotis* is very scanty and of a pale whitish-straw colour. A rhinoceros hybrid (*R. sumatrensis*, male $\times$ *R. lasiotis*, female) born at the Calcutta Zoological Gardens many years ago was covered all over with soft woolly hair; so that one may, on evolutionary grounds, assume that formerly rhinoceroses were coated like other mammals, and have lost their coat on assuming more or less aquatic habits. A similar denudation has taken place amongst elephants; but there is in the National Collection a young calf of the Indian species thickly

covered with hair, and a well-haired example of the African elephant is preserved in the Paris Museum.¹

Although first described in 1817 by Cuvier in his "Règne Animal," the Sumatran rhinoceros had been imperfectly known to Europeans long before that date; it was, indeed, the Sumatran unicorn of Marco Polo. Bell, a surgeon to the East India Company at Bencoolen, described and figured the "double-horned rhinoceros of Sumatra" in the "Philosophical Transactions" in 1793; while Mr. Miller, a friend of Thomas Pennant, had met with it apparently earlier than Bell. It is significant of the shy habits of this rhinoceros that Miller only saw two specimens during a long residence in the island; one of these, however, was within a distance of twenty yards. The first museum specimen seems to have been a skull of a young rhinoceros sent to England by Mr. Bell not later than 1793, and said (though this is doubtful) to be the same as that figured in the "Philosophical Transactions;" Sir Stamford Raffles afterwards presented to the museum of the Royal College of Surgeons the skeletons of three individuals.

The first living specimen at the Zoological Gardens was not received till August 2nd, 1872, when an example which had been taken in the Sunghi-njong district of Malacca was deposited in the collection by Mr. Jamrach. The beast was afterwards purchased

1. Renshaw: "On the young of the African elephant:" Proceedings of the Zoological Society, 1904.

by the Society for £600. An old female which had shed her lower incisor teeth, she proved a disastrous speculation, dying six weeks afterwards; some recoupment was however effected by selling the skin and skull to the British Museum.¹ On December 7th, 1872, another female arrived in London, and gave birth to a calf while still on ship-board at the Victoria Docks. At a few hours old the enterprising youngster was found walking about the deck in spite of the cold and rain; the exposure almost paralysed its limbs, though use was restored by rubbing it all over and placing it in warm blankets. Indeed, by the next day the little rhinoceros was so vigorous that its attendants had quite enough to do to prevent it from running all over the room in which it had been temporarily placed. The animal was exceedingly quaint in appearance, having a long almost donkey-like head, and long legs, and an ample coat of crisp black hair. The anterior horn was $\frac{3}{4}$ inch long, but the posterior one was represented only by a smooth spot; height at shoulder 2 feet, length 3 feet. This rhinoceros was very thin and bony, and soon died; the mother and the carcase of the young one were shipped to America. In July, 1875, Mr. Jamrach deposited another female at the Zoo, which he afterwards sold to the Society for £600.

Distributed throughout Burmah, the Malay Penin-

1. Although as a rule long-lived animals, rhinoceroses are liable to die after a very short illness; thus a Javan rhinoceros at Calcutta died of pneumonia in twenty-four hours.

sula, and Siam to Sumatra and Borneo, the present species is a dweller in dense forest, hiding hermit-like in the depths of the hill jungles, and climbing the mountains as far as 4,000 feet. Deep dark virgin forest, here and there bright with scarlet fruit; tangles of rattan palm and belts of banana trees; glowing masses of flowering ixoras and fields of mountain bracken—these adorn the home of the Sumatran rhinoceros. Like the hippopotamus, the rhinoceros constantly uses the same track; it sleeps every day in the same bedroom or “rhinoceros house,” a sheltered lair in the depth of the thicket.

The Sumatran rhinoceros is fond of bathing, and wallows like a pig; sometimes it immerses the whole body in the mud, so that only a part of the head is visible.¹ Most active early in the morning and in the evening, it retires in the middle of the day for a prolonged siesta. Leaves of the jack fruit are a favourite food of the Asiatic rhinoceroses, and they also feed freely on those of the yalher fig (*Ficus glomeratus*); they ravage crops which may be growing in the neighbourhood, the Javan species (*R. Sondaicus*) attacking coffee and pepper plantations. In spite of their size and strength these animals are not very brave, and a single wild dog has been known to put one to flight.

1. A two-horned rhinoceros is said to have been seen swimming in the sea in the Mergui Archipelago; similarly it is said that Flacourt, the discoverer of the African black rhinoceros, first saw one in the “Bay of Saldaghne” near the Cape.

The name "Banda Api" (or fire rhinoceros) applied to the Sumatran animal has been held to indicate its red appearance after rolling in the mud; but another and much more interesting explanation may be the true one. It is said that fire has a peculiar attraction for these animals, which will approach one lighted in the jungle and even endeavour to extinguish the blaze—curious enough if true, and quite inexplicable. Similar tales have been recounted of the African species; thus one of the older writers relates how a black rhinoceros once rushed into a party of soldiers bivouacked on the banks of a river, injuring them and putting out the fire; and the Hon. W. H. Drummond has recorded how in Zululand a black rhinoceros once made an unprovoked attack on his camp fire, scattering it in all directions and stamping it out with its feet as it squealed with rage. The white species has been known to approach within twenty yards of a camp fire, only retreating when a brand hurled at it struck its snout.

The Sumatran rhinoceros is extensively taken in pitfalls, the horns being bartered to the Chinese, who use them as medicine; in Canton the druggists exhibit them for sale amongst other strange *materia medica*. For some diseases the horns are ground into powder, for others fragments are worn amulet-fashion about the person. Rhinoceros horns are divided into four classes: *Sumbu lilin* (wax-coloured), *Sumbu api* (fire-coloured), *Sumbu nila*

(blue), and *Sumbu itam* (black). These animals defend themselves not with their horns, but with their enormous *razor-edged teeth*; an elephant's foot bitten by one of these furies has been cut to the bone before now.

The hairy-eared variety of the Sumatran rhinoceros was first described on August 16, 1872, at the Brighton meeting of the British Association, from an individual then living in London.¹ It differed from the typical race in the drooping plume of hair ornamenting the ear conch, in the greater development of the hairy covering, and in its larger size and shorter tail. Moreover, the texture of the hair was finer than the bristly coat of the typical Sumatran race; the hide was smoother and also paler. The anterior surface of the fore and hind feet, and also the outer aspect of the limbs, were clothed with a considerable quantity of black hair.

This individual was secured in the following circumstances:—

In December, 1867, some natives found a female rhinoceros embedded in a quicksand at Chittagong, in Eastern Bengal; quite exhausted with struggling, she fell an easy prey. Two stout ropes having been attached to her neck, the unfortunate beast was hauled out by the combined efforts of about two hundred men; kept taut between the

1. Dr. Anderson had, however, described the specimen—supposing it to be a typical *sumatrensis*—early in 1872.

ropes, she was then tethered to a tree. The natives next applied for assistance to the magistrate at Chittagong; Captain Hood and Mr. H. W. Wickes came to the rescue with eight elephants, after a tough march of sixteen hours. Terrified at the sight of the rhinoceros, all the elephants bolted forthwith; but, having been rounded up again, a leg of the captive was made fast to an elephant. At this critical moment, the rhinoceros unluckily gave a roar, upon which the chicken-hearted elephant again made off; had not the rope slipped the limb would probably have been torn out of its socket. Finally, the rhinoceros, roped securely amongst the elephants, was marched off towards Chittagong. She had sometimes half a mile of people trailing after her, the journey being almost a royal progress; thousands of natives thronged the route, even breaking down the bamboo bridges with their numbers. The rhinoceros had to cross two rivers; but nevertheless safely arrived at Chittagong, where she was freed from the ropes and turned into a stockade. A bath and a covered shed were provided, and the animal soon became very tame, feeding from the hand. In November, 1871, "Begum" was purchased by Mr. W. Jamrach, and was sold by him to the Zoological Society for £1,250, arriving in England on February 15, 1871. Safely lodged in the elephant house in Regent's Park, the new animal was presently seen to be quite

different from and much larger than the typical Sumatran specimen obtained later in the year; and, although anatomical points could not be settled till after death, the animal was prized as a great rarity, being the only hairy-eared rhinoceros known.¹

In 1882 Begum Latifa Khatum presented to the Calcutta Zoological Gardens the second known specimen of the hairy-eared rhinoceros. Some peasants working in paddy fields near Chittagong had noticed an unknown animal come out of the jungle into the fields, and mentioned it to a shikaree, who applied to the Begum for assistance to capture the animal. A crowd armed with sticks then surrounded the hill to which the beast had retired, and the shikaree having climbed a tree, made out that the animal was a rhinoceros. Noosed ropes were then tied to the branches of the trees, so that in a short time the animal became entangled. The rhinoceros having torn the ropes from their fastenings, rushed off with them trailing after it; but fell into a muddy hollow, and was promptly secured and dragged into a neighbouring village. The animal soon became tame, and the children of the Zenana used to ride on its back. This individual was a female; her consort was seen

1. About this time the Hamburg Zoological Society acquired a small rhinoceros about two years old, which may have belonged to the hairy-eared variety. This individual was as big as a small horse, and very tame; it is said that it would allow one to place one's hand in its mouth and take it out again.

about three days after the capture, but unfortunately an attempt to take him was unsuccessful.

A hybrid between the hairy-eared form and the typical Sumatran race was afterwards bred in the Calcutta collection. The little animal was born early in the morning of January 30, 1889, and at first resembled a lump of animated clay. It got up after an hour and a half, and made a plucky attempt to walk, though it could not go three yards without stumbling. At one o'clock the mother was given some oatmeal gruel, and the infant a quart of cow's milk; at six o'clock in the evening, and again at ten o'clock the calf received some more cow's milk. During the night the mother began to suckle it, so that it became active and playful. The skin of this interesting little animal was soft pinky brown (contrasting with the dusky grey of the young pure-bred *sumatrensis*) and became darker with age; its body was covered all over with soft woolly hair.

The Sumatran and hairy-eared rhinoceroses at Calcutta were found to be much fonder of water than the Indian and Javan specimens in the same collection. The former liked to lie in muddy water, and were constantly digging new holes or undermining the banks of their tank; the anterior horn was used as a pickaxe to detach the earth, which was then scraped backwards with the forefeet and beaten down into soft ooze. Two Sumatran rhinoceroses in the Gardens fought so continually

that they had to be separated. In captivity this species is liable to tuberculosis of the lungs and liver.

On April 27, 1886, a hairy-eared rhinoceros was received in exchange at the London Zoological Gardens; the new animal had a much better front horn than the type specimen. The two lived together for many years, and the writer repeatedly examined and photographed them. On August 31, 1900, the type specimen died; the following account of the survivor is based on notes made by the writer on May 11, 1906:

Day dull; animal moving slowly about paddock, heavy head carried at an angle of 45° , and tail swinging loosely about, as if it had been tacked on to the body. The animal kept wagging each ear alternately, the extrinsic auricular muscles acting very freely in bringing the ear to and from the middle line of the head; sometimes both ears were simultaneously approximated to the middle line. The pencilled tufts of hair were directed backwards, and gave quite a graceful finish to the ear. The upper part of the body was roughly tessellated; three well-defined folds of skin were seen on the buttock as the animal walked, and the tail was deeply incised with several transverse furrows recalling the segmentation of a worm. The footsteps of this heavy animal were almost noiseless; when standing still the hind legs were so

SUMATRAN RHINOCEROS.

Hairy-eared variety. The second example seen in England. Note the tufted ears and the skin-folds about the shoulder.

May or August 1900.

much bent that a vertical line dropped from the hock to the ground would not touch the foot, or any part of the limb below the hock.

The skull and head skin of the original type specimen of the hairy-eared rhinoceros are now in the National Collection; the animal lived over thirty years in captivity, and was so much diseased that the parts above mentioned were all that was worth keeping. It was found that this race was by no means so distinct from the normal Sumatran rhinoceros as had been supposed; the once conspicuous ear tufts had apparently become worn with age, and were not noticeably longer than in old *sumatrensis*; the colour differences had also vanished, and its larger size alone gave the hairy-eared phase a doubtful distinction from the typical race. The anterior horn was much abraded, and the posterior one chipped; the former differed strikingly from the well-developed weapon carried by the survivor still in the Zoological Gardens. For the present, the hairy-eared rhinoceros ranks as a large northern sub-species of the Sumatran animal; and with this remark is now dismissed.

THE EUROPEAN BEAVER.

"Of all the rivers of Wales, this alone possesses beavers."

Giraldus Cambrensis on the River Teivi, A.D. 1188.

Many of the most useful tools manufactured by man have long ago been anticipated in the animal kingdom. The spade-like hand of the moles and mole-rats; the teeth of the kangaroos, close-cropping the grass with scissor action; and the rake-like claws of the antbear, are typical examples. The attenuated finger of the aye aye lemur, used forceps-like to extract grubs from tree-trunks, may also be mentioned here; as also the rough tongue of the lion, employed in rasping meat from bones; and the conical snout of the armadillo, used as a drill in boring for worms. Before the English file was introduced amongst the Indians, these ingenious people used to cut bone with the chisel-like tooth of a beaver fixed in a handle; thus, in the swarming beaver population, they had a natural instrument store, a backwoods repository always available. Once the beaver was as abundant in Europe as in America; and the European form will be dealt with in this Essay.

The largest rodent of the Old World, the European beaver (*Castor fiber*) measures about 30 inches in length (head and body) with a ten-inch tail. The head is large and rounded; the ears are small

and scaly ; and the legs are short. The hind toes are webbed like a duck's ; the tail is of moderate length, flattened like a trowel, and covered with scales. The fur is thick and soft, and of a reddish or greyish brown hue.¹ Anatomically, the European beaver is distinguished from the American species (*Castor canadensis*) by the narrowness of the anterior portion of the skull and the backward prolongation of the nasal bones ; the two forms are, however, very closely allied, and many naturalists consider the Transatlantic form to be merely a well-marked variety of the beaver of Europe.

To-day, the European species is, alas ! a vanishing animal tending to extinction. Formerly it inhabited the British Isles, France, Holland, Scandinavia, Germany, Switzerland, Austria, Turkey, and Russia ; but in England, at least, it seems to have been very rare even as early as the ninth century. According to Pennant, the pass of Nant Françon and a locality on the River Conway, a few miles above Llanwrst, were probably former haunts of these animals in Wales ; while the names of Beverley, Beverstone, Beaveredge, and Beaverbourne indicate English localities where they once occurred.² Sir Richard Owen has noted the discovery of a beaver skeleton in the bed of the Old West Water, a

1. The museum of Sir Ashton Lever contained white, cream-coloured, or spotted beavers.

2. Beaverbourne is the name of a small brook discharging into the Severn about a mile north of Worcester, near Beaver Island ; higher up the Severn is the flat green island of Bevereye.

choked-up channel in the Fens ; while discoloured bones and teeth have frequently been found in the superficial deposits of Lincolnshire and Cambridge-shire. The date of the extermination of the beaver in England will probably never be known ; the animal was, however, recorded from South Wales (Cardiganshire) as late as 1188, and from Scotland in 1150.

On the continent of Europe the present species has been known from very early times. Herodotus states that it inhabited a large lake in the country of the Budini, a Scythian tribe who lived on the Upper Don ; Aristotle and Pliny both notice the beaver. In Latium, the River Fibrenus was so named from the beavers (*fiber*) which frequented it ; and the map of Europe is dotted over with names bearing similar significance. Biberach or Biberbach in Swabia ; Biberha, Biber, Bebra, Beberbeke and Bever in Germany ; Bober in Silesia and Lithuania ; and Bièvre in France are cases in point. People were even named after the animal ; witness the surnames of Bobroff in Russia, Bobrowski in Poland, Bieber in Germany, De Bièvre in France, Beever and Beever in England. Probably no wild animal was so widely diffused or so well known in the old days as this valuable and interesting creature ; Napoleon himself did not mark the map of Europe as did this timid and obscure rodent.

The usefulness of the European beaver proved its

undoing ; it was diligently pursued for long centuries on account of its many virtues. To begin with, the thick soft felt was employed as early as the day of Herodotus as a trimming for cloaks ; Howell the Good in the ninth century fixed the price of a Welsh beaver skin at the then considerable sum of a hundred and twenty pence. Adam of Bremen in the eleventh century and Olaus Magnus in the sixteenth record that the pelts were much prized ; Belon (assassinated 1564) notes that the French of his day employed beaver cloaks and gloves in inclement weather. Then again, the fur was employed in making hats even before the Norman Conquest ; Chaucer's merchant, "on his head a Flaundrish beaver hat," appears in the Canterbury tales. In the reign of Charles I. beaver hats were first manufactured in England, previous to which time they had been "fetched from beyonde the seas." In 1638 the Government limited hatters to two materials only, beaver fur and wool ; the hats thus made were called "castors," and were in high estimation.

Furs intended for felting are treated with nitrate of mercury after the long coarse hairs have been removed, and the fur is then clipped from the skin. In 1858 a new machine was introduced by which the fur was shorn off in an improved method. The white wool from the underparts of the animal appears about this date to have found a ready market in

France; the better-class fur obtained by the new process was exported to various parts of Europe and the East. The pelt of the coypu rat having come into fashion about this date for second-rate hats, fewer beavers were required than formerly, and as a consequence their numbers, which had become markedly thinned, began to increase; these remarks apply to the Canadian species. The finer quality of beaver fur was formerly known as "frix," but silk has long ago superseded the art of felting, and the hideous chimney-pot hat of the City man shines with a gloss of size and shellac, bestowed by a revolving machine.

Considerable faith was formerly placed in the beaver as a "complete armoury of physic." The medical practitioner can well understand that beaver oil may have benefited rheumatism, though more than doubting its efficacy in apoplexy, convulsions, and asthma; but beaver blood for epilepsy, beaver gall for eye affections, and beaver teeth (hung round the neck) for delay in teething seem strange remedies indeed. Like the more familiar cobweb, beaver fur was long used to stop, bleeding and no doubt acted mechanically; beaver-skin slippers, stockings, and gloves for gouty patients anticipated the chamois leather used to-day for swollen joints.¹ Castoreum was an orange-coloured secretion

1. The Rev. Edward Topsell, in 1658, recommended "for giving great ease unto the gowt the skinnes of beavers burned with drie oynions."

supposed when rubbed on the hand to induce sleep ; to benefit epilepsy and sciatica, dyspepsia and paralysis, earache and toothache. As late as 1866 a druggist bought the castor pouch of a beaver taken in Transylvania for £36! Castoreum was then selling in Vienna at 1s. 6d. per grain, so that the proceeds of the transaction would amount to £261. Modern research has shown that castoreum really has some therapeutic action, being moderately stimulating and antispasmodic. It is occasionally used in hysteria, either as a powder or made up into a tincture with rectified spirit.

The flesh of the beaver was formerly eaten, the beast on fast days being reckoned a canonical "fish." In Holland the paws and tail only were used ; but the worthy monks of Chartreux not only accounted the whole animal as *maigre*, but made the flesh into sausages, which they sold in considerable quantities! Albertus Magnus states that the whole flesh, save the tail, was abominable ; but Gesner describes a Swiss method of rendering the animal savoury, and states that the choicer portions were sweet and tender. The Lorrainers of the sixteenth century ate beaver tail in Lent ; Belon states that this delicacy, which often weighed four pounds, resembled in flavour a well-dressed eel. The flesh of the American animal, wastefully cooked Indian fashion by roasting in the skin and thus singeing off all the valuable fur, is said to resemble pork ; the

lean being dark-coloured, and the fat oily and nauseating. Captain Cartwright has, however, termed the beaver "the most delicious eating of any animal in the known world," so that there is no accounting for tastes!

The hearty appreciation of the European beaver resulting in continual persecution, has rendered this once wide-spread animal a mere shadow in point of numbers; it is already practically extinct, lingering as a wild animal in the Rhone Valley and (under protection) on the lower Danube and in Norway.¹ Formerly large colonies existed on the Moselle, the Maas, and the Lippe rivers; in the Elbe basin; on the Upper Danube and its tributary the Amper; and in Livonia. The last Dutch beaver was killed in 1825; the last Laplander about 1830; the last Livonian in 1841; in fact the history of this unfortunate species seems to be nothing else but a record of slaughter, and hardly anything has been observed of its habits. On the other hand, full accounts of the life of the *American* species are accessible; its hut-building and dyke-making; its food—tree bark and water lilies; its gregarious disposition, and nocturnal habits. So little were the habits of the European species known that Buffon and Cuvier even suggested that it never constructed huts; nor would it seem wonderful that so

1. A Norwegian specimen from Arendal, presented by Professor Collett in 1897, is in the National Collection.

harrassed an animal should prefer to skulk in a mere burrow, like a rat. It is now ascertained, however, that these animals do live in societies, build huts, and construct dams, when they get a chance of doing so ; Bechstein in 1801 stated that the beavers of the Elbe built dams when the water was calm, cutting down the willows and poplars ; the colonies were, however, less numerous than in Canada. A beaver hut on the Yesil was six feet high, with a three-celled chamber above, and a four-celled chamber below ; colonies of beavers existed on the Ammer as late as 1837.

Perhaps the best description of a European beaver colony is that of Meyerinck, who, in 1829, communicated his account to the Transactions of the Berlin Natural History Society. The colony had been settled for upwards of a century on the Nuthe, a small tributary of the Elbe. In 1822 it only consisted of some fifteen or twenty individuals ; but the members of this tiny republic carried out the full programme of a much larger community. Their burrows penetrated the bank for a distance of thirty or forty paces, on a level with the stream, opening under water ; there were also land entrances to these runs. Their huts, eight or ten feet high, were rudely constructed of branches and tree trunks, and covered with earth ; their dyke was eminently successful, being so well made as to raise the level of the water a foot and more—a very

CANADIAN BEAVERS.

June 1907.

In swimming the body is carried high out of the water; the tail is seen trailing astern. Note the flatness of the tail in the upper specimen : its scaly covering will be observed on holding this book about two feet from the eye.

rat. The mother follows them when they first take to the water, apparently as anxious as a hen that has reared ducklings ; for she takes the youngster out of the water and returns it to the nest. At present (July, 1907) there are three Canadian specimens in the collection, but only one of these belongs to the old stock. The writer saw it out about 7.15 p.m. on May 30, 1907 ; it swam with a good deal of its body above the surface, and held its snout up clear of the water. When on land, it recalled a heavy, clumsy rat, and moved slowly, as if weak from old age ; such might well be the case, as it had been born in the collection as long ago as September 2nd, 1888, being the last of the specimens mentioned by Mr. Bartlett. It had a curious habit, when cleaning itself, of pressing the throat with both paws, just below the larynx.

THE CANADIAN PORCUPINE.

The class Mammalia includes many odd-looking creatures, unconscious humourists. The staring eyes of lemurs (especially loris lemurs) seem to indicate a mental attitude of perpetual surprise ; the melancholy faces of hartebeest antelopes appear to reprove all skittishness and vivacity ; the weird anteater, swaying its preposterous snipe-head to and fro, seems more consonant with the adventures of Alice in Wonderland than the world of real life. The rodents perhaps afford relatively few forms of amusing appearance ; but amongst these examples may be found in the pert little prairie "dog" and the solemn, clumsy tree-porcupine of Canada.

The Canadian porcupine (*Erethizon dorsatus*) is a comical-looking beast, whose general untidy appearance suggests that he has turned out of bed in a hurry. The total length is about 29 inches (head and body) plus $8\frac{1}{2}$ inches of tail. The head is small and short, with a broad flattish nose ; the ears and eyes are small ; the incisor teeth are large. The clumsy body is thick, broad, and cylindrical, with a strongly-arched back ; the upper surface is covered with a thick coat of long coarse hair, mixed with sharp minutely-barbed spikes. The legs are stumpy ; the toes have tufts of hair between them ; the tail is short, thick, and spiny,

like a burr. The colour of this quaint porcupine is blackish brown above, the long hairs being tipped with white ; the spines, which may attain a length of four inches, are almost entirely white, the points being generally dark brown or black. The under surface of the animal is dark brown. The general hue varies from light yellowish brown to dull white, according to the paleness or intensity of colour in the superficial furry covering. Those from Lower Canada are black, those from the Far West light grey ; all, however, are but varying phases of one mutable species.

The Canadian porcupine may well be termed the sloth of the northern hemisphere. Secure in its bristling armoury of bayonets, it troubles little about its enemies ; the most sluggish of all the North American wild animals, it will spend days methodically rifling the branches of a single tree. Although the tail is not prehensile, its long claws enable it to climb readily ; once up, it stays up, and will not leave the tree till it has stripped it bare ; then it descends to attack the next one, and so on. The porcupine feeds chiefly on the bark of the hemlock spruce, but also on slippery elm, cotton tree, bay tree and basswood ; young trees are chosen for preference, the dainty creature only eating the soft inner fibres. Nearly a hundred trees may be ruined in a single winter by the depredations of one animal ; destroyed as perfectly as if by fire, acres of saplings may be

seen standing gaunt and lifeless in the ravines of the West. The slender green twigs are reached by the animal distributing its weight over several branches, which are then bent back so as to bring the tender shoots through the mouth; the Canada porcupine also feeds on beech mast like a squirrel, and on water lilies like a vole.

The puma, the lynx, and the fisher-marten prey upon this porcupine—that is when they can; for an old porcupine is a tough customer to tackle, standing with his vulnerable nose carefully sunk in between his forelegs and his formidable spines abristle as he lashes out with his armed tail. The quills are but loosely fixed in the skin and, being barbed at the points, are readily dragged out, fixing themselves instead into the flesh of the assailant. Sometimes predatory animals are taken full of porcupine quills; Audubon has recorded the finding in the woods of a lynx in a dying condition from this cause. The animal was quite helpless, its head was greatly inflamed, and it was nearly blind, while its mouth was full of the terrible spines of its intended victim; the lynx would probably in any case have expired in a day or two. Dogs and wolves have also been found dead from quill wounds. The fisher-marten is said to kill the porcupine by biting it in the belly—probably tunnelling underneath it, as it sits unsuspecting on the thick-fallen snow.

The Canadian porcupine was the "*hystrix pilosus*

Americanus" of Catesby (1740) and the "porcupine from Hudson's Bay" first figured by Edwards; it is often kept in zoological collections, where its placid contentment constitutes it a highly respectable, if undemonstrative exhibit. Audubon had one alive at Charleston for six months, and found that it became quite tame and gentle, feeding from the hand and sitting up squirrel fashion to devour its food. It would rub its spiny sides against his legs like a cat—a somewhat unpleasant attention one would think! and look up as if begging for supplies; its accommodating appetite included almost any kind of vegetable—cabbage, turnips, potatoes—in the bill of fare. The animal bore teasing without resentment, never raising its quills; but on the approach of a dog it at once bristled up, and with lowered head and swinging tail awaited attack. On one occasion a ferocious and troublesome mastiff that had gained access to the garden made open-mouthed for the porcupine, which instantly swelled up to double its size, and dealt the dog a lateral blow with its tail that filled the unfortunate mastiff's mouth with quills. The dog could not close his jaws and howling, retreated; although the spines were at once removed his head swelled up tremendously, and it took him two months to recover from his injuries. He had learnt a lesson; and ever afterwards gave both garden and porcupine a wide berth. Apparently the present species cannot stand

much heat ; as spring advanced Audubon's porcupine began to lie panting in its cage all day, lost its appetite, finally refused food, and died.

Many years ago a Canadian porcupine that had been kept in a garret over Peale's Museum in Broadway, New York, gnawed a hole in the corner of the garret. It is supposed to have climbed on to the roof ; at any rate, it somehow managed to tumble into Murray Street. None the worse for a fall which would have killed most creatures outright, this happy-go-lucky beast made for the Park, where it presently attracted a crowd of people, none of whom could catch it. A watchman finally secured the animal in a basket ; and on payment of half a dollar the porcupine was once more installed in his old quarters, sheet tin being nailed from time to time over those parts of the room on which he exercised his chisel-edged teeth.

One of these animals recently studied by the writer was a rich dark chocolate colour all over. The eyes were small ; the muzzle continually quivered with a flickering movement, as if sniffing ; the long hair on the head radiated out, as if it wanted a good brush. On the floor of its cage this porcupine looked remarkably like a small bear—the term “woolly bear” applied to tiger moth caterpillars best expresses its appearance! When perched on a branch the spines cause the animal to resemble a flat spiky doormat ; the broad-soled

feet and broad body doubtless assist it to cling closely to the trees. Stress has been laid on the tail being non-prehensile though the owner is aboreal ; but the writer is convinced that this flat muscular organ is of real service in helping to steady the animal as it climbs.

THE SPOTTED PACA.

“Mus Brasiliensis magnus, porcelli pilis et voce, Paca dictus.”

John Ray on the paca, A.D. 1693.

The high level of intelligence attained by many animals in itself constitutes a distinct field of zoological research. The half-human reasoning of anthropoid apes has repeatedly been the subject of comment and observation; the wily fox, the cunning rat, and the versatile armadillo are further instances. Conversely, many forms—especially amongst rodents and marsupials—are dull even to stupidity, leading a life of respectable blankness, an existence of mere eating and sleeping. These exhibit a paradox, for they are interesting precisely because they are *uninteresting*; examples may be found in the well-known guinea pig, and in the spotted paca.

The spotted paca (*Cælogenys paca*) pag of the Brazilians—gualilla of the Ecuador natives—distantly resembles a smartly-spotted guinea pig. It measures about two feet in total length; the head is broad and flattened, with a wide face. The muzzle is long, very mobile, and provided with well-developed whiskers; the eyes are placed high in the head and prominent, as if starting out of their sockets; the ears are small. The body is stout and, from the

shortness of the legs, almost touches the ground, suggesting an over-stuffed sausage; the tail is a mere tubercle. The ground colour is blackish umber (hence, perhaps, the term "sooty paca" formerly applied to the animal) varying to fawn; it is handsomely marked with from three to five longitudinal rows of spots, so that the general coloration forcibly recalls that of the Indian chevrotain, the so-called "mouse deer" of the dealers. The lower rows of spots often tend to form continuous bands; the last, on either side, frequently uniting with the white of the belly. The type in which the spots form continuous bands is perhaps the primitive one; at least, it has been suggested that spotted animals have been derived from striped ones by the stripes breaking up into spots, hence those pacas which have confluent markings are less advanced, evolutionally, than those which are spotted throughout. The paca curiously resembles in coloration the young tapir of the same regions.

The spotted paca was the *Mus paca* of Linnæus (Syst. Nat. 12 ed., 1766). In 1802 Dr. Shaw, in his "General Zoology," gave a very fair figure of the "spotted cavy." It was represented by an incomplete skeleton and a skull in the famous collection of John Hunter, now in the Royal College of Surgeons' Museum. At this institution may also be seen a very interesting exhibit, consisting of a paca skull (presented by Mr. Charles Stokes) which

has been longitudinally and vertically bisected to show its structure. The face is remarkable for the enormous development of the zygomatic or cheek arches, which are expanded into a bony shield almost concealing the lower jaw. This shield is convex externally, and beautifully sculptured on its outer side in a delicate tracery; the sculpturing seems to show individual variation. The skull of the paca is only one quarter less in width than in length.

The death of a paca in the menagerie of the Jardin des Plantes, about 1805, enabled Geoffroy St. Hilaire to demonstrate the existence of extraordinary cavities in the faces of these animals. Daubenton had already noted the great size of the cheek bones and their position, descending much lower than usual; while Buffon had observed a longitudinal fold near the lower part of the upper jaw, forming, as it were, a second mouth. St. Hilaire showed that the fold was the opening of a fairly large sac, passing right inside the face behind the zygomatic arch; it was lined by a continuation of the skin, which was afterwards reflected outwards. The sac was thus quite external to the mouth, and resembled the outer pockets of a gopher rat rather than the cheek-pouches of a monkey. These gophers, it may be observed, have large receptacles lined with hair and opening at the lower edges of the cheeks, supposed to be used as

pockets for carrying food to their winter storehouses ; but a similar use cannot be assigned to the sacs of the paca, as the opening of the sac is both narrow and unyielding, while even if the aperture were dilatable the sac itself, enclosed by firm bone, could not be expanded to receive any cargo. However, the animal also has *true* cheek pouches of considerable size, so that it is probably a "packer" in more senses than one.

The spotted paca is widely distributed in South America, from Surinam to Paraguay, and also occurs in Tobago and Trinidad in the West Indies. It inhabits forests and damp, low lying-regions, where it burrows to a depth of four or five feet ; there are said to be three openings to each burrow. Strictly nocturnal, the paca goes solitary, or at most in pairs ; it swims and dives well, and can run fast. Its thin skin and harsh pelage render it commercially valueless ; but in February and March the animals become very fat, and are then taken for food, the flesh being first scalded like a sucking pig's and then roasted. The paca subsists on leaves, fern-roots, and fruits, sometimes attacking sugar plantations ; it grunts like a pig, and roots in the earth like that animal.

Perhaps the first paca brought alive to Europe was the individual which Buffon kept for some time in his house, and became tame and familiar. A specimen was living in the London collection as

early as 1829; it was some months in the menagerie, but died during a spell of severe weather at the beginning of the winter. Frédéric Cuvier has given an account of the paca in captivity, in which condition, he says, no animal can discover less intelligence. It wears, indeed, "the white flower of a blameless life," for when not eating it is sleeping. When irritated, however, it throws itself at the offending object and makes a grumbling noise ending in barking; this is almost the only manifestation of intellect shown by the dull-witted creature.

The interest attaching to the paca is anatomical and academic rather than bionomic and practical; certainly Cuvier did recommend its introduction into Europe as a delicacy for the table, but roast paca is not yet included in the *menu* at the Carlton.

"Remote, unfriended, melancholy, slow,"

would perhaps best describe the present species; from the museum standpoint, however, the remarkable dilated hollowed face and sculptured skull, the curious spotted fur and the colour theories it suggests, are both interesting and important.

TASMANIAN DEVIL.

Note the enormous gape and strong teeth, the indented wavy edge of the ear, and the black coat

May 1906.

THE TASMANIAN DEVIL.

“The Tasmanian method of taming it is to blow it into space with a heavy charge of buckshot ; and this seems to be the only way of rendering it quite harmless.”

*Mr. Arthur Morrison on the Tasmanian devil,
in the Strand Magazine, 1893.*

Stupid and savage, quarrelsome, merciless, and bloodthirsty ; these adjectives sum up the moral—or immoral—attributes of the subject of this Essay. Few animals indeed are hopelessly untamable, relentlessly vindictive, unceasingly ferocious ; almost every species which the liberal policy of Zoological Societies has enabled the naturalist study in captivity are capable of first enduring and afterwards appreciating, contact with civilized man. The young gorilla learns the meaning of a stick—let him but see it and he retreats, barking like a terrier : lions and tigers, leopards and hyaenas, become tame and often affectionate towards their keepers : wolves will follow their owners in the street like collie dogs. Even the more stupid animals at last make friends ; tapirs have been kept as household pets, the young anteater whines to be caressed, the dull-witted manatee learns to look to his keeper for food. Therefore a singular interest attaches to the truculent subject of this Essay, a beast whose hand (or jaw) is against every man's, and every man's

against his—a fourfooted Ishmael—the ursine dasyure or Tasmanian devil.

The Tasmanian devil (*Sarcophilus ursinus*) is fortunately but a small beast the size of a badger; the combined measurement of the head and body is about twenty-eight inches, with a twelve-inch tail.¹ The head is very large, with a broad, short muzzle; the ears are small and rounded; the body is very squat and stoutly built. The “great toe” is missing from the hind foot; the tail is slightly bushy; the under fur is abundant, soft, and woolly. The coloration of this implacable little brute is as nearly as forbidding as its disposition, being black or blackish brown with a white spot on the chest; other whitish markings may occur on the neck, shoulders, and rump, but are very inconstant.² The iris is brown.

The Tasmanian devil is entirely confined to the island from which it takes its name. In the daytime it sleeps in its burrow, but at night goes out marauding and is extremely destructive, killing anything that it can overpower; even sheep fall a victim to the persistent ferocity of these little vermin. Armed with a terrible pair of natural shears, a single animal is a match for the pluckiest dog; the

1. The writer once read an absurd sensational account of a meeting with several of these animals, from which the reader might suppose them to be as big as haystacks.

2. The specimen in the Liverpool Museum has *no white spot* on the chest, though there is one at the junction of the fore limb and shoulder; otherwise, it is blackish brown all over, unspotted.

Tasmanian devil seems insensible to pain and, though easily trapped with a bait of raw meat, will readily bite off its own limb to effect its escape. One of these amateur surgeons was retaken, and his skin—the biggest in the Australian (Sydney) Museum at that time—had only three legs, and not a trace of a stump! These animals will, on occasion, excavate their own burrows; doubtless with their long claws it is an easy task.

The Tasmanian devil was first described in 1808 by Mr. G. P. Harris, who states that it was then very common near Hobart Town. Many were destroyed on account of their depredations on poultry; the animals abounded in the neighbouring woods, which were then unexplored. The convicts ate the flesh, which was said to resemble veal. A pair kept by Mr. Harris were very quarrelsome, and when awake were always fighting, from dusk to dawn. Perhaps the first live specimen seen in Europe was the animal trapped on the Derwent River by men in the employment of Mr. Davidson, Superintendent of the Government Gardens. Still untamed after eleven months of captivity, it was sent to the Surrey Zoological Gardens in England, under the care of Capt. Riddell, at some time previous to 1839. Dr. J. E. Gray's catalogue of the mammalia in the British Museum in 1843 not only includes a specimen presented by Mr. Ronald Gunn, but also two given by Edward Cross, the well-known

menagerie proprietor.¹ Similarly, the Leyden Museum contains an example formerly in the menagerie of Van Aken, in his day a famous showman.

An amusing story is related of some specimens received at the Dublin Zoological Gardens. The animals being expected to arrive at Southampton, a gentleman interested in them—a certain archbishop by the way—wired from Dublin “Meet the devils for me.” His message aroused the curiosity of the telegraph operator; and having been assured by the waggish archbishop that it was a Fenian move, she afterwards went to “lay information” at the Castle. The box containing these obscure marsupials was met on landing by a detachment of police—a suitable reception truly, even considering the actual nature of the passengers—though perhaps the archbishop, armed with candle, bell, and book, would have received them even more appropriately!

Many, years ago, the late Mr. Krefft, of the Australian Museum at Sydney, kept a Tasmanian devil; which, having escaped, in two nights killed *fifty-four fowls*, besides six geese and an albatross. To ensnare so greedy an animal was probably only a matter of time; anyway, he was finally retaken in a strong trap. Retaken, but by no

1. Probably one of these specimens was the animal brought over by Capt. Riddell.

means secured; for although the door of the trap was grated with bars as thick as a lead pencil, this iron-jawed terror sturdily wrenched them aside—almost doubling up the door—and vanished! The blacksmith afterwards attempting to repair the damage could not bend back the bars without the aid of tools. An examination of the skull and dentition of the present species at once explains its biting powers. Somewhat flattened above, the skull is expanded laterally; the zygomatic arches are strong and heavily ridged, and the lower jaw is deeply hollowed, so that the powerful temporal and masseter muscles have firm attachment to the bone. The canine teeth are trenchant like those of true carnivora, and even the molar teeth are sharpened into cutting cusps. Few greater contrasts could be found than the powerful biting machinery of the Tasmanian devil and the weak herbivorous dentition of the leaf-eating koala or native “bear”—both members of the same natural order—the marsupials.

A Tasmanian devil was received in exchange at the London Zoological Gardens on October 12, 1903, and a second specimen was deposited in the collection on April 24, 1906. The writer carefully examined both these individuals and took several photographs, one of which is published in this book. Regarding the soft parts during life, the lachrymal caruncle (third eyelid) was well marked, and of a red hue; the ears inside and outside, the

eyelids, a semicircular area just behind the muzzle, and the underside of the tail dull flesh tint. The fur in the centre of the forehead was scanty and somewhat furrowed, as if a half-hearted attempt had been made to part it with a comb; any person attempting such a task would probably have had several fingers amputated free of cost. The body fur was quite sleek and glossy, shorter than the tail hairs, and recalled the pelt of a black cat. The insteps of both fore and hind feet were but sparsely haired, and the under surface of the tail was naked. The fur of the tail was rough and staring, not neatly smoothed down; however, one would never suppose the Tasmanian devil to be proud of his personal appearance! The ears were fringed with a border of very fine hairs, and shell-like in contour, the inferior fourth of the pinna being delicately scalloped along the border. A spray of tactile hairs adorned each cheek.

In spite of statements to the contrary, the present species is not so strictly nocturnal as might be supposed. It will *bask* in the sunshine, lying flat on its stomach with its throat on the ground, fore legs extended before it, and hind legs stretched out behind; there is no ceremony with this son of the bush. An individual moving about during the daytime stood shivering (apparently quite voluntarily) silent, and dim-sighted; the tail was held out behind, just clear of the ground. The animal

stretched itself; then stood again in practically the same position, stupidly resting its nose against the cage front. Still quite silent, it moved waddling to its water-vessel; then took a drink with a loud lapping noise. Next Weary Willie dragged himself about on his stomach, with throat and jaw applied to the floor; after a very short settling down he lay flat on his stomach, as if about to go to sleep. Although silent, the creature on this occasion was uneasy and restless, and it was quite depressing to watch it; there was plenty of food and water, so that it could not have been hungry. The writer finds in his note-book a record of this species active at 6 p.m. on May 11, 1906; about 7.20 it was reared up against the bars, snuffing and occasionally uttering a short coughing note. When irritated the Tasmanian devil utters a ferocious sobbing growl and bites severely.

A specimen which lived for a year in the Calcutta Zoological Gardens never took any exercise. It was tempted with live prey which, however, it was never noticed to kill. For about a fortnight before its death it refused all food; the autopsy revealed an enormous diseased liver about six times the normal size, which perhaps explained everything.

THE DUCKBILLED PLATYPUS.

“Then comes a quadruped as big as a large cat, with the eyes, colour, and skin of a mole, and the bill and web-feet of a duck, puzzling Dr. Shaw, and rendering the latter half of his life miserable, from his utter inability to determine whether it was a bird or a beast.”

Sidney Smith.

This amusing description by a witty divine well sums up the external characters of the extraordinary duckbill or ornithorhynchus. Bat and hedgehog, giraffe and okapi, great anteater and tree-kangaroo, may well be instanced as singular creatures: but amongst the monotrematous mammals—echidnas, proechidnas, and duckbill—one finds natural marvels equalling if not exceeding anything known amongst the higher groups.

The duckbilled platypus (*Ornithorhynchus anatinus*)—mullingong of the Australian natives—measures about nineteen inches in total length, and a good specimen weighs at least five pounds. The extraordinary beak-like muzzle really does recall the bill of a duck; it is expanded and flattened, and during life is bordered by a sensitive vascular membrane, though after death this dries to a hard blackened skin. The eyes are small and placed high on the head; the ears have no external conch; the aural orifice can be expanded and contracted by muscular action. The mole-like body is depressed and oval; the limbs are strong and short; the feet are expanded, and

webbed like a duck's; the tail is broad, flat, and often nearly bare underneath. The fur of this amazing creature is dense, crisp, and woolly, with a scanty admixture of longer hairs; it is often disreputably ragged, especially on the underside of the tail. The general colour of the duckbill is dull blackish brown; the eyes are brown, and are encircled by a ring of whitish or yellowish fur.

Male duckbills are armed on the heel with a spur an inch long, moveable, and traversed by a delicate canal which opens near the apex by a longitudinal slit; this spur seems to be no mere ornament, being connected with a large spongy gland at the back of the thigh; young females (though not adult ones) also carry a rudimentary spur. The weapon is probably used by the animal in fighting in the breeding season, but it appears capable also of inflicting a wound on the human skin, by means of a lateral and inward movement of the hind legs.¹ Many years ago a fisher boy on taking up some nets on the Murray River found an unfortunate duckbill entangled in them; the animal grasped his hand convulsively with its hind feet, inflicting a wound which persisted in festering for many months. Again, a gentleman who recaptured an escaped duckbill received a severe punctured wound on the back of the hand, in addition to a

1. It is said that a yellowish fluid (? poison) has been expressed from the crural gland through the opening in the spur.

slight tear in the palm ; the pain was intense, almost paralysing the sufferer, and causing him to feel faint, so that it was half an hour before he could stand unaided. The arm swelled up to the shoulder, and the pain in the hand continued very severe. The wounds themselves healed up quickly ; but a week afterwards the hand was still very tender, though the swelling had subsided. The patient gradually improved ; the duckbill got away after all !

The flattened beak of the duckbill forms a very efficient trowel ; it is covered with sensitive skin and crowded with minute tactile organs. Perhaps the hilt-like fold at the base of the beak protects the eyes by preventing the instrument from being thrust too deeply into the mud when feeding. The under-surface of the bill is very beautiful translucent pink, showing a congeries of delicate bloodvessels. These animals have very capacious cheek-pouches ; in young individuals a few molar teeth occur in each jaw. The teeth are evanescent, however, being replaced later by two pairs of horny plates ; of these cornules the anterior is sharp and narrow, the posterior flat and expanded. The palate is ribbed like a duck's ; the small tongue cannot be protruded from the mouth, in marked contrast to the taper organ of the related echidna.

The duckbill inhabits Southern and Eastern Australia, as far as the 18th degree of south latitude, and Tasmania. It is aquatic and nocturnal,

frequenting broad deep rivers which flow slowly, and are well-grown with water plants ; from twenty to eighty individuals may occur in a single pool. This quaint beast resembles a duck even in its food. It lives on worms and insects, and is very destructive to salmon spawn ; its diet also includes a hardshelled mussel (*Corbicula nepeanensis*). The food is first grubbed up and stored monkey-fashion in the large cheek-pouches ; the animal then rests from its labours, drifting on the surface like a black bottle, with head and beak held vertically, and chewing and swallowing the supplies it has already obtained. The duckbill then paddles along for a few moments, using the fore paws almost entirely ; then dives once more to dig fresh dainties out of the mud. These animals are *almost entirely aquatic* and are strong swimmers ; the pictures in popular natural histories give quite a false impression of their habits. They merely leave the water to retire to their sleeping apartments by a submerged entrance, and to figure them as creeping about the herbage like a watervole is absurdly inaccurate.

The burrows of the duckbill are constructed in the banks of streams. There is a land entrance—which is little used—and also a water entrance, the two passages uniting into a terminal tunnel, at the end of which the sleeping compartment is situated. This terminal portion is smooth, from twenty to fifty feet long, and runs obliquely upwards ; oval in

shape, the bedroom is luxuriously carpeted with dry water-weeds, roots, grass, etc. It has been suggested that the little-used upper entrance acts mainly as a ventilator to the burrow. Lieutenant the Hon. Lauderdale Maule once took two young duckbill and their mother from a nest on the Fish River. The young ones were four inches long; their stomachs only contained coagulated milk—no worms, etc., were found, though they were carefully examined with a lens. Individuals of this age (fourteen days) have the beak very short and provided with ample fleshy edges for sucking; the tongue extends well forward in the mouth, and the lower jaw is very flexible. The situation of the eye is merely indicated by a few furrows in the skin; the neck, body, limbs, and tail are all wrinkled.

The duckbill is one of the few mammals that *lay eggs*. The yolk is large as compared with the embryo; the shell is strong, flexible, and leathery. Two eggs, about the size of a house-sparrow's, are usually laid; they are about three-quarters of an inch long, and are deposited on the dry root-carpet of the sleeping apartment. The female broods them like a sitting hen, her body temperature, normally below that of most other mammals, becoming raised for the purpose. The young are at first naked, but specimens that have attained a length of ten inches are covered with handsome, sleek, unworn fur, soft, bright, and almost white below.

The duckbill was first noticed by Dr. Shaw—the describer of the apteryx or wingless bird of New Zealand—in the “Naturalist’s Miscellany” for 1799. The first specimen of each was declared to be a fraud; naturalists would not allow that the beak of the duckbill was really attached to the body until the genuineness of the creature was established by Sir Henry Holford. Shaw’s original specimen of the duckbill—a young individual—is now in the National Collection, having been presented by Mr. R. Latham; the apteryx which he described in 1812—brought over by Captain Barclay and then the only specimen known—is in the Derby Museum at Liverpool. “On a subject so extraordinary as the present,” observes Dr. Shaw of the duckbill, “a degree of scepticism is not only pardonable but laudable.” Determined to investigate the real character of the beak, Shaw macerated it in water to render every part completely movable, of course with satisfactory results. This individual skin measured thirteen inches in extreme length, the beak occupying an inch and a half; the palate had been removed. Two more specimens sent by Governor Hunter to Sir Joseph Banks during 1779-1801 confirmed the genuineness of Shaw’s specimen. In 1812 an ornithorhynchus was exhibited in Mr. Bullock’s Museum at the Egyptian Hall; probably it was one of the two sent to Sir Joseph Banks, since that gentleman’s name figures amongst the donors to the museum. For a long time

the Nepean River and its neighbourhood remained the only known haunt of these animals. The duckbill has never yet been brought alive to Europe, though one did survive a portion of the journey; perhaps this was the individual intended for the Frankfort Zoological Gardens some four years ago, which failed to reach its destination. These animals have been kept in the Zoological Gardens at Melbourne in a fenced pond well supplied with insects and water plants; and could a sufficient quantity of natural food—say water mussels—be taken on the voyage, a living ornithorhynchus might yet be seen in this country. Many years ago Mr. Bennett had some young duckbill alive in Australia. If disturbed when asleep they growled, but when awake they were good tempered, playing together like young puppies, and pretending to bite. In spite of every care they died in a few weeks.

These words conclude this Essay; and this Essay concludes the present work; and the present work completes a series of three volumes dealing with the mammalia. Written on the same plan throughout, the Essays will, it is hoped, serve as some introduction to the class of which they treat. A brief review of the subject may not be out of place; let us call some of the actors before the curtain. The tiny fennec fox steals across the sand dunes, preying on the jerboa rats in the moonlit desert; the long-extinct blaauwbok stands at gaze, its handsome horns

sweeping backwards in a bold curve, and its dun coat tinted with velvety blue. The white rhinoceros grazes over the sunbaked veldt, its three-foot horn almost sweeping the ground; sable in the silver moonlight, the antbear attacks the termite citadel. The spectre tarsier, round-headed and goggle-eyed, leaps from bough to bough like a mammalian frog; the clouded tiger, in its robe of sable and fulvous, dozes unnoticed in the tree-tops. The Arctic fox ambushes the lemming on the frozen hillside; strong troops of bison wallow in the Russian marshes; clouds of blesbok bedeck the green veldt in purple masses. The Polar landscape, cold and white in the moonbeams, lies icy under a spangle of stars; from a sky of brass the torrid sun of noonday beats unceasingly on the glowing Sahara. Fast there crowd upon the vision the actors in Nature's drama; handsome ocelot and grim hyæna, giant walrus and sturdy musk ox, quaint bubal and bristling porcupine. For one moment they stand out vivid and distinct, then flicker into dimness. The story is ended, the series completed, the curtain rings down upon the players,

“And I beheld and saw them one by one
Pass, and become as nothing in the night.”

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