

ANIMALS OF THE WORLD FOR YOUNG PEOPLE



CHARLES R. KNIGHT
TUDOR JENKS

ANIMALS OF THE WORLD



2. Chimpanzee
(*Anthropopithecus niger*).

3. Orang-Utan (*Simia satyrus*).

4. Agile Gibbon
(*Hylobates agilis*).



5. Proboscis
Monkey
(*Nasalis larvatus*).

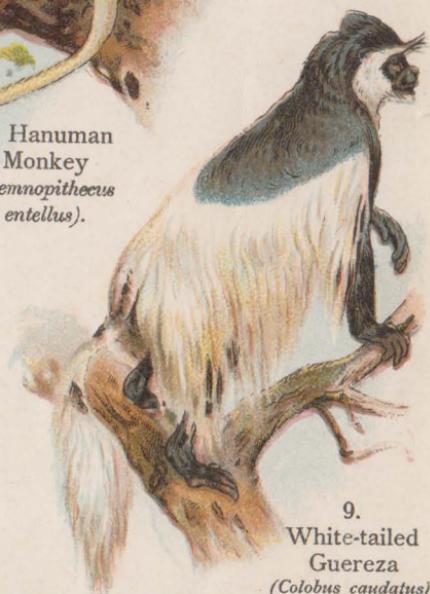
7. Vervet
(*Cercopithecus
pygerythrus*).



6. Hanuman
Monkey
(*Semnopithecus
entellus*).



8. Barbary Ape (*Macacus inuus*).



9.
White-tailed
Guereza
(*Colobus caudatus*).

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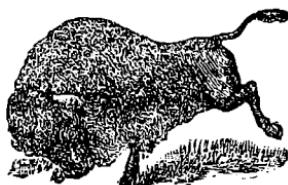
BY

CHARLES R. KNIGHT

WITH AN INTRODUCTION BY

TUDOR JENKS

WITH 40 COLOUR PLATES



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PUBLISHER'S NOTE

The colour plates for this work have been engraved after designs by a German artist. Since they were printed, with the accompaniment of the common and scientific names, careful verification of these names has been made; in consultation with some of the leading zoological authorities. As a result, the attention of the reader is called to the names of the animals mentioned in this note. The forms here given are those sanctioned by the best scientific usage of to-day. The list includes, also, certain names correcting slight typographical errors in the same names as they appear under the pictures to which they belong. The correct forms of both common and scientific names are, in all cases, printed in the text of the book.

Plate	3, Fig.	13:	<i>Midas leoninus</i>
"	5, "	24:	<i>Verpertilio murinus</i>
"	6, "	29:	<i>Nasua rufa</i>
"	8, "	39:	<i>Mustela zibellina</i>
"	8, "	42:	<i>Conepatus mapurito</i>
"	18, "	86:	<i>Dipus aegypticus</i>
"	21, "	103:	<i>Llama pacos</i>
"	24, "	113:	<i>Cervus canadensis</i>
"	25, "	110:	<i>Cervus dama</i>
"	27, "	120:	<i>Oreamnos montanus</i>
"	27, "	121:	<i>Tetraceros quadricornis</i>
"	28, "	122:	<i>Oreas canna</i>
"	33, "	142:	<i>Dicotyles tajacu</i>
"	36, "	152:	<i>Rhinoceros sumatrensis</i>

There is authority for several of the discarded captions, such as *Cervus vulgaris*, *Mazama montana* and *Taurotragus oryx*; but the preferable forms seem to be those followed in the text.

Similarly, while Pygmy Chevrotain is frequently used, it appears that Chevrotain is the preferable form for the common name of the animal shown in Plate 22, Fig. 106. This animal is often erroneously called Pygmy Musk Deer.

A BRIEF BIBLIOGRAPHY

Brehm's "Thierleben." (Best popular natural history.)

The Standard Natural History.

The Royal Natural History.

The Cambridge Natural History.

Lydekker's Cattle, Sheep, Deer, Antelope. (Very fine and detailed.)

Selous's Travels in Africa.

Sir Samuel Baker's Travels in Africa.

C. G. Schillings's Travels. (Truthful and exciting accounts of encounters with wild beasts.)

Proceedings of the London Zoölogical Society. (Accurate accounts and good pictures of all the animals, birds, etc., in the gardens of the Society during the past fifty or sixty years.)

Sanderson's Book of Elephants. (Relates to the Indian Elephant.)

Audubon's (Animal Section) North American Mammals.

"Living Pictures of the Animal Kingdom," by Dr. L. Heck. (A German publication containing some excellent reading matter in connection with each photograph.)

Nansen's "Farthest North."

LIVING ANIMALS OF THE WORLD. (Containing most excellent photographs, and the text is written by various specialists of high standing.)

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INTRODUCTION

THIS book is meant to give to young readers all the really important facts in regard to the existing Mammals of the world, describing them accurately and carefully, pointing out the features that distinguish one from another, without going into the merely technical details that are chiefly of importance to professional naturalists and those who have charge of museums and zoölogical collections. The work brings the information into line with the more recent authorities, discarding much that is either doubtful or of little value, in favour of what is most certain and most useful. Such technical terms as are really necessary in order to describe the animals are retained, and are explained so far as is necessary for a right understanding of the subject. But the scientific names are furnished mainly for the purpose of identification, and so that the young reader may make use of larger works of reference without danger of confusing the descriptions of nearly-allied species.

Though this book is confined to the Mammals, it will be followed by another volume devoted to the Birds, and the series may be further extended to cover all important classes of the animal kingdom. The present volume is virtually a complete account

of all the orders and the principal families, only the very rarest animals being omitted as exceedingly unlikely to be met with by the younger readers, for whom this volume is intended.

It is perhaps most important, in a work upon natural history, that the plates should be coloured, since colour is so often the readiest means of distinguishing animals that are not approached near enough for other than an eye-examination. It will be noticed that an unusual amount of attention is given to the question of colouration, which, by the aid of the attractive illustrations, will help to fix the characteristics of the animals in the reader's mind and memory.

Although the range of the book is unusually wide, yet there has been a careful observance of the right proportion in the length of treatment accorded to the various groups. Special attention and more space have been given where either the importance of a group or the probability that information about it will be sought, has made a very full treatment desirable. This applies, for example, to the great Cats—the lions, tigers, jaguars, leopards, and so on—to the Bears, the varieties of which should be well distinguished, and to the Quadrupeds whose claim to attention lies not only in their close resemblance to the animal Man, but also in the superior intelligence of the higher types. The Seals also receive fuller attention than usual, and for similar reasons.

Besides the general information that is desirable in a book of this kind, it contains the record of many personal observations by Mr. Knight, whose facilities for the study of animal life, and especially of animal

anatomy and character, have been most unusual. Mr. Knight has the advantage also of having acquainted himself fully with the many fossil predecessors of modern types, and is thus able to appreciate the bearing of evolution upon the forms of the animals existing to-day.

The greater part of the anecdotal Natural History that is most likely to be presented to young readers is apt to come from the experience of hunters, and to depict the life of animals under circumstances entirely unrelated to their normal life and habits. In this book the attempt has been made to give mainly those traits that may fairly be said to make clear the character of the animals discussed, and therefore to be significant of their true life, their general disposition, and their normal habits. For this reason doubtful "travellers' tales" are conspicuous by their absence, as the effort has been to admit no accounts of animals and their ways except such as may be entirely relied upon as coming from the best authorities.

An important feature to which it may be allowable to call attention is the careful statement of the average size and dimensions of the animals treated, to prevent those distorted ideas so often given to the young by books in which this matter is neglected, with the result that a child reader may well be surprised at finding a vast difference of bulk between the opossum and the tapir! To particulars of this sort space has been given, rather than to such details as the formulas of dentition—a matter in which the young reader may well postpone his interest. Neither has there been made the mistake of excluding from these pages ani-

imals that do not furnish picturesque stories, though quite as important to the young student desiring a complete view of the Mammal world as their more commonly exploited fellows. To the domestic animals is given the place that belongs to them by virtue of their rank in natural history, as it is believed that in making use of this book the young student will seek to know the natural history facts, rather than matters more interesting to the farmer or merchant than to the student of animal life.

The general plan of the work—to which it is, of course, not possible to adhere with entire strictness—is to begin with the orders that have been evolved into the higher forms, and from these to pass downward to those less highly organised. This would seem to be the natural as well as the scientific order, since it is to begin with Man, the highest and most complicated of all animals, to proceed to that Order which most nearly resembles him, and thence to reach by gradual steps those creatures that from their unfamiliarity are least understood.

It is believed that the use of this volume as a reference book will give the young reader all the general knowledge of the subject that he will find desirable or that he will be capable of holding in mind. Those who by special aptitude are able to go deeper into any branch or specialty will, naturally, have to consult works that can afford the space necessary to treat each species more minutely.

In order that young readers should be reminded of certain general facts that apply to all the animals told of in this book, we give here a brief sketch of some of

the more important things about the structure of the animals and their anatomy.

In the first place, all mammals are vertebrates; that is to say, they belong to that part of the animal kingdom named from having a backbone, or spine, since the Latin name for the bones that join to make it is "vertebræ." This backbone is the main part of the skeleton, or bony framework that supports the softer parts and makes the machine that, moved by muscles, enables animals to perform bodily actions. The muscles are the animal's flesh, and often, at the ends, are hardened into tendons and sinews. They move the bones by their power to become shorter or longer. Thus, a muscle thickens, becoming shorter in contracting, and thus *pulls*. Or it is relaxed, and thus ceases to pull. All motions may be thus produced. The bones, besides acting as levers and stiffeners, are also of use in protecting soft portions of the animal, as, for example, the skull is the bony box safeguarding the brain.

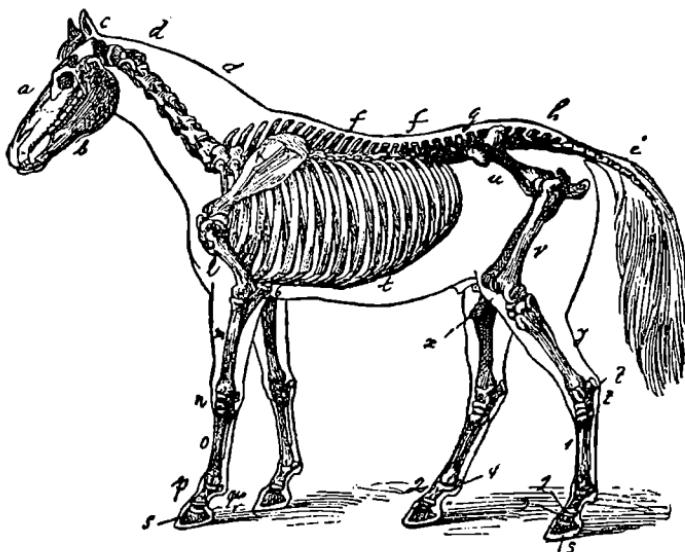
It is believed that all the bones of the body are formed from the separate pieces that make up the backbone, since, in studying animals from the lowest to the highest, we find at first little else than the backbone, and as we go higher see other bones being added as outgrowths from this. Thus the skull is made up of a number of such pieces that have become flattened out and then curved so as to fit together into the globe-like box we see in the higher animals.

The fitting together of the bones throughout the body is most marvellous, giving us examples of nearly every possible kind of joint known to mechanics.

The nature of the bone material is such as to combine enormous strength with wonderful lightness; and with all its hardness, it is a living substance that grows from youth to age, and that has even the power of repairing itself when injured. By comparing the skeletons, or bony frameworks, of different animals, we shall soon see how, in general, the same parts exist, but exist in wonderfully different forms, adapting them to the animal's needs. A comparison, for example, between the skeleton of a horse and that of a man, will show that the two answer almost exactly to one another bone by bone, but differ greatly in the developing of the different parts. To take a well known example, the legs of the horse end in a single toe tipped by a hoof, but anatomists, by studying different forms of horses that have existed in the past, are able to show that the earliest forms of horse-like animals had five toes, as have so many other quadrupeds to-day, and we find the same five-toed, or five-fingered, limbs in ourselves.

The bones, where they move upon one another, are joined together by softer tissues, which are known as ligaments. This unites them firmly, but yet allows some motion. Where there is an absolute joining, and no motion is necessary, bones may be closely dove-tailed together, as in the plates of the skull. Such joinings are named "sutures." The ribs, though connected in front by cartilage, the "sternum," have some freedom of movement, as is seen when breathing expands and contracts the chest, and the ribs rise and fall. We give a picture of the skeleton of a horse, below which are the names of

the bones making it up. These names are, in general, the same in all vertebrates, so that we may compare one skeleton with another without confusing different bones together. Sometimes certain bones will seem to be absent in various animals, but often the apparently missing bones will be found to exist in an undeveloped state, or the history of the ani-



SKELETON OF A HORSE

a. Skull. *b.* Lower jaw. *c.* Atlas. *d-d.* Cervical vertebræ. *f-f.* Dorsal vertebræ. *g.* Lumbar vertebræ. *h.* Sacral vertebræ. *i.* Caudal vertebræ. *k.* Scapula. *l.* Humerus. *m.* Radius. *6.* Rudimentary ulna. *n.* Carpal bones. *o.* Metacarpal or cannon bone. *p.* Os suffraginus or large pastern. *qu.* Sesamoids. *r.* Os coronæ or small pastern. *s.* Hoof, containing os pedis or coffin bone. *t.* Ribs. *u.* Pelvis. *v.* Femur. *y.* Tibia with rudimentary Fibula. *x.* Stifle joint. *z-z.* Tarsus. *1.* Metatarsus. *2.* Os suffraginus. *3.* Os coronæ. *4.* Sesamoids. *5.* Hoof containing os pedis.

mal will show that the bones once existed. Thus in horses and cows there is no collar-bone, as it has be-

come unnecessary, while in man the collar-bone is well developed.

In studying closely the anatomy of animals we shall often find such differences; but the important thing to remember is that all vertebrates are believed to have begun with the same plan, but to have become different by gradual changes in this general plan. A point in which there has come to be much difference, is the character of the teeth, which have changed according to the use made of them. In general, we shall find three kinds of teeth: those used for grinding, those used for holding or piercing, and those used for cutting. The names of these are: the molars, the canines, and the incisors. According to the food of the various animals, we shall find the teeth modified by including more grinders or more cutters. The canine teeth are pointed, like those so prominent in the cat and dog families, in the boars, and the gorillas. There is a way of setting down a list of the teeth of any particular animal, and this method is known as the formula of dentition. For example, the teeth of a full-grown man are indicated in this way: $I_2 C_1 PM_2 M_3$. Now, these letters and figures indicate the teeth found in one-half of the upper and one-half of the lower jaw, the two sides being alike. Thus we should read the symbols as showing that a man had incisors 2, canines 1, premolars 2, and molars 3, on each side, in both upper and lower jaw. "Premolars" simply means the smaller kind of teeth that come before the molars. If a certain kind of tooth is missing, a cipher is put instead of a number. The squirrel's dentition would

be: $I_1 C_8 PM_2 M_3$, showing, at once, that the squirrel has *no* canine teeth in either jaw, and only half as many incisor teeth as man. We all know that there are usually two sets of teeth, the second coming after the first (or milk teeth) are pushed out by the growth of the second set.

The muscles act because of orders sent them from the brain, or from the spinal marrow, of which it is believed that the brain is a highly improved part. These orders are conveyed by nerves, which extend like a most complete telegraph system throughout the body, even to the internal organs. Of these orders, the brain is conscious in most cases in the higher animals, but even in them a large part of the impulses are not controlled by the will. The lower animals are less conscious of such impulses than the higher ones. Certain of the impulses come, as already stated, from the spinal marrow, and of these the animal is unconscious.

All nerve fibres extend from brain or marrow to termination without communicating with one another. They are of two kinds: one reports sensations to the brain, the other delivers orders from it. This in both cases takes time, though a very short time. What our senses receive is brought to the brain along the sensory nerves, and what the brain commands goes back along the motion nerves.

The skin is of two parts. The outer skin is a mere covering, has no nerve ends and no feeling; the inner is thicker, and is sensitive. In the thicker skin are blood vessels and sweat glands, the latter opening through the outer skin. From changes in the outer

skin, it is believed, arise such different things as hair, scales, nails, claws, horn, and such bony outside covering as is found, for example, in the armadillo. While the hair is rooted in the inner skin and nourished by it, nails, claws, hoofs, and horns are formed from the outer skin, hardened, and hence these, too, have no sensation.

It is believed that all the senses have grown up from the sense of feeling, made, in the case of the eye, sensitive to waves of light; in that of the ear, to waves of sound; in taste and smell the sense of touch has become so delicate as to appreciate qualities to which the general skin is insensible.

Life is carried on by renewing what is used up, the material being supplied by taking in food. This food the interior organs change so that it may be taken into the blood and supplied in the shapes needed to renew wasted portions. In general, this process is partly mechanical and partly chemical; that is, food is first ground up and dissolved, and then by digestion is separated into the elements of which it is formed. These elements are then put together into new substances where necessary. All this is done without our knowledge or direction. The blood acts as carrier of food material and a remover of waste.

Breathing is the taking in of air for the purpose of affecting the blood so as to remove waste from it and to supply it with oxygen, an element which enters into nearly all substances useful in animal life.

Depending upon the kind of food taken, is the form and structure of the internal organs. Thus

creatures that live upon grain have stomachs different from those that eat animal food, since more processes are required to convert grain into the substances needed by the body than are required to prepare flesh for the same purpose. In brief, we may say that the digestive organs, taken altogether, are like a chemical laboratory, each having its office in changing the food into the substances that will nourish the animal.

The blood is made up of a fluid containing two kinds of particles, in animals, red and white, the red being hundreds of times most numerous. The purpose of the white particles is to purify the blood by gathering up or destroying waste, or harmful, substances. The blood is kept in motion by means of the heart, which is a force-pump. When filled, it contracts, driving the blood through the arteries to all parts of the body. The blood then passes through the fine ends of the arteries into similar fine ends of veins, and returns along the veins to the heart, having on its way been passed through the lungs for purifying by coming in contact with the oxygen of the air. There is another circulating system found throughout the body called the lymphatic circulation. This supplies to the blood much of its fluid part.

A very large part of the waste products of the body is evaporated from the skin or is contained in the air breathed out from the lungs.

From this very brief general sketch of the life of an animal it will be seen that each one is a combination of organs having very different offices. An ani-

mal, then, besides being an intelligent creature, is outwardly a marvellous piece of machinery, inwardly a chemical laboratory, and, in addition, has the power of producing young, so as to increase in numbers. It has resulted that the history of animals upon this earth has, for the most part, been the history of battling for existence. Now one kind, and now another, would become very numerous; and the individuals since the beginning have been busied in striving either with other animals or with those of their own kind, in the struggle to secure food and to protect life. In this great battle some forms have been entirely overcome, driven from the field, and have disappeared; others—those that we see in existence to-day—are the descendants of victors in the long struggle, and in fighting their way their species have been changed greatly from the form in which their forerunners once existed on the earth. The supreme victor over them all is, of course, the animal, man. Though far inferior to many of the others in strength, swiftness, and other bodily qualities: though unable to fly like the bird, to dive like the whale, to climb like the monkey, to live under water like the fish, man's intelligence has taught him to outwit, destroy, or enslave, all other animals. And his intelligence has taught him to recover the story of the great struggle of life, and in the forms and qualities of other animals to see the results of their long battle for existence.

The study of natural history, therefore, is not only the making of an acquaintance with what we now see about us, but it is the acquiring of the power to read

back into the most distant ages, and to understand the great laws that have brought things into the shape they have to-day. By studying thus the history of the world about us, we may hope to learn much of the laws by which we ourselves are governed, and may even know something of the Creator's purposes and at least dimly guess something of the outcome.

ANIMALS OF THE WORLD

ANIMALS OF THE WORLD

THE living things of the world are divided into two large groups called the Animal and the Vegetable Kingdoms, or Animals and Plants. The Animal Kingdom is again divided into several classes—mammals, birds, fishes, reptiles, and so on—mammals occupying the highest place and including even man.

For convenience in naming and classifying different groups, they are sub-divided into orders, families, genera, species, and varieties, and are known scientifically by the names of the genus and species, the former being placed first. Thus the domestic cat is called *Felis domesticus*; other species more or less resembling the cat belong to the same genus, such as *Felis leo* (the lion), *Felis tigris* (the tiger), and so on, while tortoise-shell and tabby cats are varieties of *Felis domesticus*.

The following arrangement of orders has been followed in this work:

- I. Primates: Man, Monkeys, and Lemurs.
- II. Chiroptera: Bats.
- III. Dermoptera: Flying Lemurs.
- IV. Insectivora: Insect-eaters.
- V. Carnivora: Cats, Dogs, Weasels, Bears, Seals, etc.

- VI. Rodentia: Gnawing Animals.
- VII. Ungulata: Hoofed Animals.
- VIII. Sirenia: Manatees.
- IX. Cetacea: Whales and Dolphins.
- X. Edentata: Toothless Animals.
- XI. Marsupialia: Pouched Animals.
- XII. Monotremata: *Ornithorhynchus* and *Echidna*.

Mammals differ from the lower orders of the Animal Kingdom in several important characters. All have warm red blood; all, with the exception of certain aquatic, or water, forms, are provided with two pairs of limbs; and they differ from birds, reptiles and fish, in that (with the exception of the duck-billed platypus and one or two other small Australian animals) they do not lay eggs, but produce their young alive and nourish them with milk secreted in glands called *mammæ*, or teats—from which the name, mammal, is derived. In man and the larger monkeys, the babies are helpless for a long time, but in many other mammals they very soon develop into strong and active little creatures. As a rule, this class takes great care of its young, and exhibits much courage in defending them against the attacks of other animals. The different families show considerable variation in form, size, and general characters. For instance, it is hard to believe that the tiny creature known as the mouse and the huge beast called the elephant belong to the same general family, but a comparison of the skeletons of these two animals shows that they closely resemble each other in the number, shape, and arrangement of the bones.

In the matter of intelligence, mammals easily lead all the rest of the living forms about us, and such animals as the elephant, the dog, the seal, and some of the larger monkeys, exhibit almost human characters in the degree of their sagacity.

They are spread over the entire world, and are mainly confined to the land, a few exceptions such as the otter and seal being semi-aquatic, and the whale and the manatee completely so.

Nearly all species are covered with fur or hair in order to keep the body heat at an even temperature and to protect them from changes of weather. In some, the hair or wool is of enormous thickness, in others it is very sparsely scattered over the body, and in a few, such as the elephant and rhinoceros, there is practically none. In the far north where the climate is very cold, the heat of the body necessary to life is kept up by a layer of fat, or blubber, under the surface of the skin, and in the whale this blubber is present to a thickness of several feet.

As a rule, individuals of different species will not breed with each other, and for this reason species are preserved separately and not interbred to any great extent. But through centuries of domestication, man has been able to develop what we know as varieties of animals, differing in form, size and colour, from the original stock from which they sprang. For instance, it is difficult to realise that all the different breeds of dog that exist to-day have been developed from the common wild dogs which are now found only in India and certain other parts of Asia. In horses, too, owing to the constant breeding and selection of differ-

ent individuals, a wide variety of forms has been obtained, the great Percheron, or heavy dray horse, and the little Shetland pony originally coming from an animal which must have resembled somewhat in size and colour the almost wild horses of our Western plains.

Some of the animals which man has domesticated throughout the ages for his own use are the horse, ox, dog, cat, sheep, and certain forms of birds, such as chickens, pigeons, and ducks. In the early days of their captivity, horses were probably not used as beasts of burden, but as food for the wild and savage man of the period, and it was not until later that the idea of putting them to service in other ways came into his mind. The amount of assistance given by domestic animals to man is almost impossible to estimate, and without them it would be hardly possible to explore and occupy many wild and strange countries. In India and other Asiatic countries, elephants have been put to work from time immemorial in much the same way that others have employed horses and cattle; in the sandy deserts of Africa the Arabs make use of the camel as a beast of burden; while in the far north the Eskimos capture the wild reindeer and tame them to draw sledges over the frozen snow. Thus we see what great service many different forms of animal life have been to man in his development; while others, perhaps because they lack intelligence, have never been domesticated, and are to this day as wild as they have ever been.

In looking over the various forms of animals found in different parts of the world we are impressed by

the fact that there is a much larger number of grass-feeding, or herbivorous, than of flesh-eating, or carnivorous, animals. In a way this seems difficult to understand, since the herbivorous forms are almost defenceless against the attacks of the carnivorous; but if we look more deeply into the matter, we shall see that it is simply a question of food supply. In other words, the carnivorous animals cannot increase beyond the point where they can get other animals to prey upon, whereas the herbivorous, feeding as they do upon grass and bushes, have an almost unlimited supply of food, and so are able to increase without check.

ORDER I.—PRIMATES

THE Primates include Man, the Apes and Monkeys, and the Lemurs.

SUB-ORDER I.—BIMANA (Man)

Man naturally heads the list of mammals, standing at the top in the line of evolution, but his general bodily structure resembles the highest apes so closely that he is separated by zoologists from other forms of the order simply as a “family,” with a single genus and species: the *Hominidæ* (*Homo sapiens*). With the exception of the elephant, man has the largest brain of any of the mammals, and he is the only one of the higher animals that stands completely erect in walking.

In the early history of the world, man was regarded as being a separate creature from the rest of the animal kingdom, but scientists of a later day have decided that as an animal he in no wise differs from them except in the degree of his development; that in all his characters—in skeleton, general structure, blood, and so on—he is essentially a mammal. Man stands with his feet firmly planted on the ground, and, without the assistance of his arms as a means of support, is able to maintain the upright position; whereas, the higher apes, which most nearly ap-

proach him in this particular, are able to stand erect for but a limited time, and then only by raising the arms over the head, or by grasping the branches of trees. Man can, on the other hand, walk with some ease upon all-fours, and we often see how young children assume this position in creeping about. When in this attitude the resemblance to the four-handed animals is very marked, and we are able to recognise the fact that in animal form he is separated from them by no wide gap.

For many years scientists have been seeking for fossil remains of man which will connect him more closely with the creatures around him, and in different parts of the world a few such remains have been found. These bones seem to indicate, much as we might expect, a somewhat more monkey-like character than the human being at present exhibits: the jaws are larger and heavier, the forehead more retreating, and altogether there is a closer resemblance to such types as the gorilla, chimpanzee, and orang. However, interesting as these discoveries are, they are still incomplete, and more important material must be found before the links connecting man with his remote ancestors are fully determined.

It is not proposed to include in this volume a study of the different races of man.

SUB-ORDER II.—QUADRUMANA (Apes, Monkeys and Lemurs)

All Quadruped, or four-handed, animals, including the apes, monkeys, gibbons, and lemurs, are so called because the large toe is set so as to be oppos-

able to the other four, while, in most cases, the thumb in the fore limbs has the same character. As a rule they live in trees, are herbivorous in their diet, and larger apes are able to walk partially erect by balancing with their arms or by grasping the branches over their heads. Although so like man in their general physical structure, they do not, of course, approach him as nearly in mental capacity; and while such monkeys as the chimpanzees and orangs can do many things after the manner of a human being, it is more their man-like appearance that makes them seem intelligent than any real ability they possess. On the contrary, monkeys, with a few exceptions, are much less intelligent than dogs, elephants, or seals.

SECTION I.—ANTHROPOIDÆ

In the apes and monkeys the thumb is short compared to man's, and all the fingers and toes are provided with flat nails, and not claws, except in the marmosets. They are divided into two main groups.

GROUP I.—CATARRHINI

This group contains the Apes and Monkeys of the Old World. In these, the thumb is always opposable (except in the few cases when it is lacking), the nostrils are placed close together, and the tail, if present, is not prehensile—that is, adapted for grasping, as a hand.

CATARRHINI—FAMILY SIMIIDÆ

The great Apes are those which most nearly resemble man, and include the four genera that are repre-

sented by the Gorilla, the Chimpanzee, the Orang-Utan, and the Gibbon. All are tree-dwellers, and most of them climb and run in their leafy abodes with great facility. In walking, the long arms enable the hands to touch the ground while the animal is nearly erect, and the creatures advance by placing the knuckles of the fingers and the soles of the feet on the earth at the same time. The gait is a curious shambling one, not at all resembling the firm and elastic tread of man, and when the animal is excited or in a hurry, even this mode of imperfect walking is abandoned and it gallops along in an irregular manner much as any four-footed animal would do. The hind-legs in all four genera are comparatively weak, much shorter in proportion, and more curved than in man. In fact, the creatures often walk on the outsides, or outer edges, of their feet, and not on the soles themselves. The arms are immensely powerful, and are used to a great extent in moving about among the branches of trees. None of these animals have tails, and all are more or less covered with hair. Owing to their great size and strength, the man-like Apes, particularly the Gorilla, are well able to defend themselves against the attacks of their enemies, and the pointed or canine teeth, which are much more developed than in man, serve them in good stead in these encounters. The Gibbons, the smallest of the Anthropoid Apes, are gentler in character than the others, and their arms and hands are much more slender.

Gorilla (*Gorilla Savagei*)

This largest and strongest of all the Anthropoid Apes has a very restricted range, inhabiting, so far as is known, only the region of the Gaboon in Western Africa.

The Gorilla is an animal about which many stories centre. The earliest mention of it is made by Hanno, the Carthaginian General, who, more than two thousand years ago, commanded a fleet that made a voyage along the west coast of Africa, during the course of which he met with a family of apes that his interpreters called "Gorillas," but which, from the fact that he says they ran in great troops and threw stones at his men, would seem rather to have been baboons.

In general form, particularly in the skeleton, the Gorilla closely resembles man, and the young animal is singularly like a child. The adult male is a very large and formidable-looking beast, measuring as much as five feet eight inches in height and three feet across the shoulders. He has enormously long, heavily-built arms and powerful hands, and legs shorter, in proportion, than those of man, with the big toe greatly developed and opposable to the other four. The head has a fierce and forbidding aspect, the top being extremely flat, with bony ridges projecting forward over the eyes, and the jaw is enormously developed, giving a very brutal appearance. The female is much smaller than the male and not nearly so repulsive, while the young are gentle and affectionate little creatures, quite without any of the hideous characters of the male parent. See Plate 1, Fig. 1.

Numerous stories have been told of the ferocity and courage of the Gorilla, which, however, seem to be disproved by recent hunters. Paul Du Chaillu, the French traveller, some years ago gave a thrilling account of his experiences with this animal, but it was afterwards declared that the skins he brought from Africa had been pierced in the back of the neck by spears, instead of the animals having been shot, as he asserted. In his book we read that the Gorilla, when wounded, advances in a threatening manner, uttering growls of rage, but if this were so when Africa was less explored, later explorers agree in saying that this animal is extremely shy and difficult to get sight of, hiding in the thickest parts of the woods on the approach of man.

The colour of the hair is almost black, sometimes grizzled over the shoulders of the older animals, and the body is somewhat more evenly covered than it is in the other species of Anthropoid Apes. The skin is black and shiny-looking, as if it had been polished with stove-polish. The ears resemble those of man more closely than those of other monkeys, being much smaller in proportion to the size of the head than are those of the chimpanzee. The males have enormous canine teeth, or tusks, which are probably used as weapons in protecting themselves against attacks of leopards.

It is said by those who have studied the habits of this animal that, no doubt owing to its heavy build, it does not climb trees with as great facility as other monkeys, and that the male usually rests at night with its back against a tree in the branches of which the

female and young repose. Specimens have been shot that weighed four hundred pounds; and when it is considered that this weight represents bone and muscle with almost no fat, one realises what an enormous animal the Gorilla is. In walking, in a semi-erect attitude, the hands touch the ground and the soles of the feet are planted more squarely than are those of the chimpanzee or orang; but though it walks with some facility, it is not able to assume the complete upright position of man without aiding itself by grasping overhead branches of trees.

But little is known of the habits of this animal, owing to its very limited range and the dense character of the forests in which it makes its home. From time to time specimens of the young have been taken to Europe, and some years ago one was brought to this country, but none have lived except for a very short time in captivity, and no adult male or female has ever been captured alive. The young are rather intelligent, and, as has been said, are gentle and amiable, but as they grow older they become morose and savage and really seem to become less intelligent.

Chimpanzee (*Anthropopithecus niger*)

Next in size to the gorilla is the Chimpanzee, old males sometimes attaining a height of five feet. Its range is much greater, however, extending over several sections of Africa, in each of which it is, of course, known by the natives under a different name. For this reason the older naturalists believed there must be many species; but it is now generally admit-

ted that there is but one or, at most, two, species of this animal, though there are a number of varieties.

The mode of progression is much the same as with the gorilla, the knuckles of the closed hands being placed on the ground in walking. The back is flatter than that of the orang-utan, and the head is carried more in line with the body. In the wild state the Chimpanzee is a very active creature, swinging from branch to branch in the trees which it inhabits, and in this respect it differs from the orang, which creeps about in a sluggish manner. See Plate 1, Fig. 2.

The colour of the hair is blackish, but the skin, particularly in the region of the mouth and over the breast, is sometimes of a light pinkish hue. The ears are very large, much larger than in the gorilla or orang, and stand out from the sides of the head; the upper lip is long. The whole expression is much less brute-like than that of the gorilla. The young are extremely docile and intelligent, but as they grow older, like the rest of the Ape family, they develop more brutish characteristics.

Some years ago one of the large circuses of this country possessed two very fine specimens named "Chiko" and "Johanna." The male was an unusually large animal, probably the largest ever seen in captivity, and of a sullen and morose disposition. At one time he and his mate figured in an exciting incident that took place in the old Arsenal in Central Park, New York. These were confined for the winter in a large cage in one of the rooms, and a special keeper was detailed to take care of them. One night, when he approached the cage to see if they were in

good condition before he retired, he was suddenly seized by the male and drawn up to the bars of the cage, where he was also grasped by the female. In spite of his efforts to escape, and his cries for assistance, which were not heard for some time, he was severely injured by the two monkeys, losing several of his fingers in the encounter.

Chiko lived for some years in captivity, Johanna surviving him, and exhibiting until she died an exceedingly fierce and treacherous disposition. She would sometimes throw oranges at people through the bars of her cage. Grasping one in her hand, she would run up and down the cage uttering a kind of coughing roar, and suddenly throw the orange with all her force, in an underhand throw, but without appearing to take any definite aim. Other individuals that I have seen have not had these vicious characteristics, and the Chimpanzees that at different times have been in the Bronx Zoölogical Park have all been remarkably gentle and interesting pets. These animals seldom live long in captivity. They take cold easily and seem to have very little power of recovery, dying usually from consumption or disorders of the digestion. In the wild state their food consists of fruits, and of insects which they obtain from the bark of trees or on the ground; but in confinement their diet is varied. They drink milk with avidity, and even become fond of spirituous liquors. The Chimpanzee is very imitative and can be trained to use its hands with much cleverness, to eat from a table with knife and fork, drink from a glass, and so on, exhibiting a high degree of intelligence. When

young, these animals are extremely affectionate, and become much attached to their keepers. When denied anything they want, they will cry like children.

Orang-Utan (*Simia Satyrus*)

In general form both the Orang and the chimpanzee closely resemble the gorilla, all three more nearly approaching man in structure than any of the other monkeys. This extraordinary Ape is a native of the swampy forest regions of Borneo and Sumatra. In appearance it is extremely grotesque—the back much arched in walking, being bent almost in the form of a bow, the arms very long and thin, legs short, fingers and toes curved, and the thumb almost lacking, a small digit taking its place. The head is high and somewhat pointed, the upper lip long and protuberant, the ears smaller than in the gorilla and chimpanzee, and the ludicrous expression of the face is enhanced by the light-coloured eyelids which are shown to advantage when the animal casts down its eyes in a coy manner. Old males have curious huge callosities—hardened naked places—on either side of the face, and a kind of collar about the neck which they are said to inflate when angry. These callosities are lacking in the females and young, being seen only in the fully adult males: Plate 1, Fig. 3.

In movements the Orang is extremely lethargic, creeping about slowly, though powerfully, through the branches of the trees in which it dwells. It is somewhat smaller than the chimpanzee, the body and hind legs are weak in construction, and it assumes a

partially erect attitude with difficulty, balancing with its long arms.

In captivity this strange animal is full of interest. It is usually remarkably gentle and evinces the greatest affection for its keeper, throwing its long arms about his neck, kissing and caressing him on all occasions. The keepers, on their part, often become much attached to them, in times of illness sitting up all night and attending to them with as much solicitude as if they were children. As usual with the larger monkeys, the Orang does not live long in confinement, although a young female brought to the Bronx Park lived for five years. Its mother, however, died soon after her arrival, apparently of a broken heart, moping in her cage and refusing all food, her expression and attitude most pitiful to see. This young animal developed into a splendid specimen, and was of much interest to visitors, swinging back and forth in its cage and exhibiting great strength and activity.

In its own country the Orang is somewhat feared by the natives, who tell numerous stories of its strength and ferocity, which, however, are discredited by white hunters. These describe it as unsuspecting and say that it is easily captured. Naturally, when wounded it will attempt to defend itself, but even then in a half-hearted manner. It climbs slowly about, feeding on various large succulent fruits, and is much more arboreal, or tree-living, than either of the foregoing species of Apes.

Agile Gibbon (*Hylobates agilis*)

The Gibbons form somewhat of a connecting link between the true anthropoid apes and the lower monkeys, in that like the former they are practically tailless and without cheek pouches, but on the other hand, unlike them, they have small callosities on the hindquarters. Gibbons are characterised by small, rounded heads and large eyes, and have very long arms by which they swing from tree to tree with the greatest agility. It is a truly remarkable sight to see one of these active creatures in captivity literally flying about his cage, simply touching various spots in it with his fingers as he swings from bar to bar. There are several varieties of the Gibbon, but they differ little from each other except in the matter of colour, which is either blackish or greyish, usually with a white band about the face. See Plate 1, Fig. 4. They go about in large troops, and are found chiefly in Assam and Sumatra, although by some writers they have been reported as far west as Canton. The Gibbons are practically tree-living forms, seldom coming to the ground at all except under dire necessity, living on fruits and insects, and even on birds which they are able to catch on the wing in their flying leaps. Some species have very loud voices, so that when calling, or howling, in chorus, they make a noise that can be heard at a great distance.

Vervet (*Cercopithecus pygerythrus*)

The Guenons include a large number of species in-

habiting Africa south of the Sahara Desert. Perhaps the two best-known forms are the Diana (*Cercopithecus Diana*) and the Green Monkey (*C. callitrichus*), both of which are often seen in captivity. They are rather small, with long, curved tails, which, however, are not prehensile, or used as hands are, for grasping and holding. The Diana Monkey is very beautiful in colour. It has a beard somewhat like a goat, which, with the chest, throat, and inside fur on the hind legs, is a pure white, that of the rest of the body being a rich, shining black. The Green Monkey is olive-green in colour, which becomes darker on the head, hands and feet, the whiskers around the head a kind of yellowish-white, the under part of the body and throat also white. The skin on the breast and other parts of the body is a delicate bluish-green, which shows through the rather sparse hair. Both the species mentioned live in Western Africa.

The species figured is common in Southern and Eastern Africa, and is yellowish-grey above and white beneath, with black feet. See Plate 2, Fig. 7.

Barbary Ape (*Macacus inuus*)

Between the larger anthropoid apes and the true baboons there are a number of species of monkeys, prominent among which are the Crested Baboon, or Black Ape, from the Celebes and the Philippines, and the Macaque Monkey very often seen in confinement. These are common in the southern parts of India, and with a smaller species of this genus freely roam the streets and climb about the buildings of that country. In particular, the Barbary Ape, a

native of Northern Africa, is an interesting form, found also on the island of Gibraltar at the entrance to the Mediterranean Sea. See Plate 3, Fig. 8. The Macaques are monkeys with variable tails—they may be either long, short, or lacking altogether, and one species, called the Pig-tailed Macaque, carries the tail curled up over the back somewhat like that of the animal from which it derives its name. All these monkeys live in large troops and are extremely mischievous, creating great havoc among crops. Many of the smaller monkeys that we know best and see most frequently in zoölogical gardens, are members of this genus.

Yellow Baboon (*Cynocephalus babuin*)

The next important group is known as the Baboons, the generic name, *Cynocephalus* (dog-headed), being given them on account of their somewhat dog-like appearance, which is increased by their general habit of walking on all-fours. The face is lengthened into a dog-like muzzle, and the canine teeth are very long. The Baboons live on the ground, usually in a rocky country, and go in large troops. Their food consists of various fruits and vegetables, as well as insects and grubs, which they obtain by turning over stones and logs. Nearly all have very grotesque features, either in the matter of colouring or in the growth and disposition of the hair over the body.

Among the more interesting species may be mentioned the Yellow Baboon, which derives its name from the greenish-yellow colour of the fur. This

animal has a rather long tail, which is carried in the curious manner characteristic of many of the Baboons, rising for several inches abruptly from its junction with the body, then hanging straight down, forming a kind of loop. See Plate 3, Fig. 11. In character all the species are extremely fierce and aggressive, old males particularly being dangerous antagonists, and it is said that even leopards will not attack them. The males are very much larger than the females and nearly always act as guardians to them and the young, running forward at the first intimation of danger.

The Hamadryas (*C. hamadryas*), from Eastern Africa, is one of the larger and better known Baboons, chiefly remarkable for the thick, furry cape of hair of a light-greyish colour which falls over the shoulders. The long tail is tufted at the end and carried like that of the species just mentioned. The face and the naked hindquarters are a brilliant pinkish colour, and the animal presents a very grotesque appearance as it sits in an upright position on the rocks, taking observations.

The Gelada (*Theropithecus gelada*) is another singular form of the Baboon, from the same region in Africa as the Hamadryas. It also has a cape over the shoulders, but instead of being grey, the whole back is dark brown, almost black. It has the long tufted tail, and on the breast are very curious patches of bare skin, one a crescent shape and light salmon in colour. A large Gelada Baboon kept at the Bronx Zoölogical Park for some years had a strange habit of drawing the skin tightly back from its eyes, caus-

ing the bony ridges above them to turn from black, the natural colour of the skin, to white, owing to the pressure of the skin on the bony ridges surrounding the eyes. It was a very ferocious animal, easily irritated almost to frenzy.

All in all, the Baboons constitute a singular group of monkeys, whose general appearance is quite different from the rest of the order, that is, from either the larger, man-like apes or the smaller succeeding forms. All are noted for remarkable keenness of vision and general alertness and ferocity. Unlike the rest of the monkey tribe, they seem possessed of an enormous amount of vitality and strength, and under favourable conditions live for many years in captivity.

The Mandrill (*Papio maimon*)

Besides the preceding forms, there are several other well-marked species, prominent among them being the great Mandrill, considered the most formidable of all the baboons. This is certainly one of the most grotesque-looking creatures in existence, owing to the extraordinary colouring of the face and hindquarters. In the adult male two enormous ridges rise on both sides of the nose, brilliant blue in colour, the centre and end of the nose is a bright scarlet, and the hindquarters are decorated most lavishly in prismatic colours, red, blue and violet. This colour is of course in the skin itself, not in the hair, which is a deep, rich olive, shading to black on the feet and darker about the head and face. The whiskers, which project below the chin in a double point, are a light yellow, and the hair just behind the small

ears is pure white. The small, brilliant eyes are almost hidden under heavy projecting brows. A very unusual feature is the short stubby tail which sticks up apparently almost from the middle of the back; and, altogether, the appearance of this creature is grotesque in the extreme. Its strange and hideous features are not found in the female and young, and, as is the case with most monkeys, the female is much smaller than the male. See Plate 3, Fig. 10.

I had occasion at one time to study closely a magnificent specimen of this animal in the Pittsburg Zoölogical Gardens, and became much interested in the character it developed. In order to hold its attention, during the course of each visit I presented it with some favourite food, such as nuts or bananas. On this account he grew rather fond of me, and one day when a companion approached and attempted to take a book from a satchel I had with me—in which the food was usually carried—the monkey sprang fiercely at the bars of its cage in the direction of the intruder, much as a dog would have done under similar conditions, evidently in an attempt to defend my property. In character this Mandrill was a strange mixture of ferocity and affection, and in order to keep him in subjection his keeper had to make him feel the weight of authority.

This particular animal and other members of the Baboon tribe confined in the same enclosure, had a curious trick of waiting until a number of people were gathered in the circular house, and then at a given signal each would leap to some loose bar in its cage and shake it violently, creating at the same time

as much noise as possible. This always had the effect of frightening the women and children, whose alarm seemed to amuse the baboons immensely; but always before the scared observers could escape from the room, the monkeys would with one accord cease the disturbance and march up and down their cages in a most indifferent manner. This performance was repeated a number of times while I was in the house, and there was no mistaking the malicious or mischievous intention.

Nearly allied to the Mandrill, but smaller, and lacking the bright blue and red colours of that ape, is the Drill (*Cynocephalus leucophæus*). It has much the same general form, with white whiskers surrounding the almost black colour of the face. The edges of the lips are a brilliant red, and the tail is short, stubby, and carried erect.

SUB-FAMILY SEMNOPITHECINÆ

This sub-family, the last of the Quadrumanæ of the Old World, is easily distinguished by the long tail, the legs longer than the arms, and the absence or very slight development of cheek-pouches. We have figured representatives of three of the principal genera.

White-Tailed Guereza (*Colobus caudatus*)

There are nine species represented in this genus of African monkey, not differing greatly from each other except in colour, which may be black, black-and-white, or yellow. In all of them the thumb is totally lacking. They are tree-living in habits, feeding on fruits and vegetables, and are said not to be so

destructive to plantations as many other monkeys. The back is covered with a long silky mantle of hair, which in the species figured is white, as are the tail and the ring of hair around the face, contrasting sharply with the black fur of the rest of the body. Plate 2, Fig. 9. This long shining hair is much admired by the natives of the region in which the Guezezas live, and it is largely exported to other countries for manufacture into furs.

Hanuman Monkey (*Semnopithecus entellus*)

Many species of the genus *Semnopithecus* are found in the Oriental countries, being especially numerous in India and the adjacent islands. These are small, slender monkeys, covered with rather long glossy hair, in general greyish in colour. The hair grows in a very peculiar manner on the head, radiating from a point on the forehead and forming a cap, with stiff black edges projecting over the brows. The face, ears, hands and feet are black, and the thumb is short, but the big toe is greatly developed. One of the best known forms is the Hanuman, or Langur. See Plate 2, Fig. 6. These creatures are protected by the natives of India, who, believing that they embody the souls of departed ancestors, allow them the utmost liberty, never on any account molesting them. So numerous did they become at one time, and such a nuisance because of their mischievous habits, that the English Government interfered, capturing and sending away from the country many hundreds of them.

Proboscis-Monkey (*Nasalis larvatus*)

This extraordinary-looking monkey is a native of Borneo, where it is found in the trees in small companies. It is reddish-brown in colour, with the sides of the head, the shoulders, and the limbs more or less inclining to yellow, the tail, which is very long, yellowish or white. But the most noticeable feature in its construction is the long nose, which is greatly developed in the adult male and gives it a most ludicrous appearance—making it seem a caricature of a human being. See Plate 2, Fig. 5. This monkey is very delicate, and seldom lives long in captivity. In the wild state it feeds on young leaves and shoots.

GROUP II.—PLATYRRHINI.

This group embraces the Monkeys of America. In them the nostrils are wide apart, the face is not projecting, and they have neither cheek-pouches nor callosities. The thumb is not opposable, and is sometimes absent, but the tail is long, and often prehensile, which is never the case in the Monkeys of the Old World.

The American Monkeys are divided into many genera and species, one or two of the most interesting of which we shall describe. They are nearly all very much smaller than the Apes and Monkeys of the Old World.

FAMILY CEBIDÆ

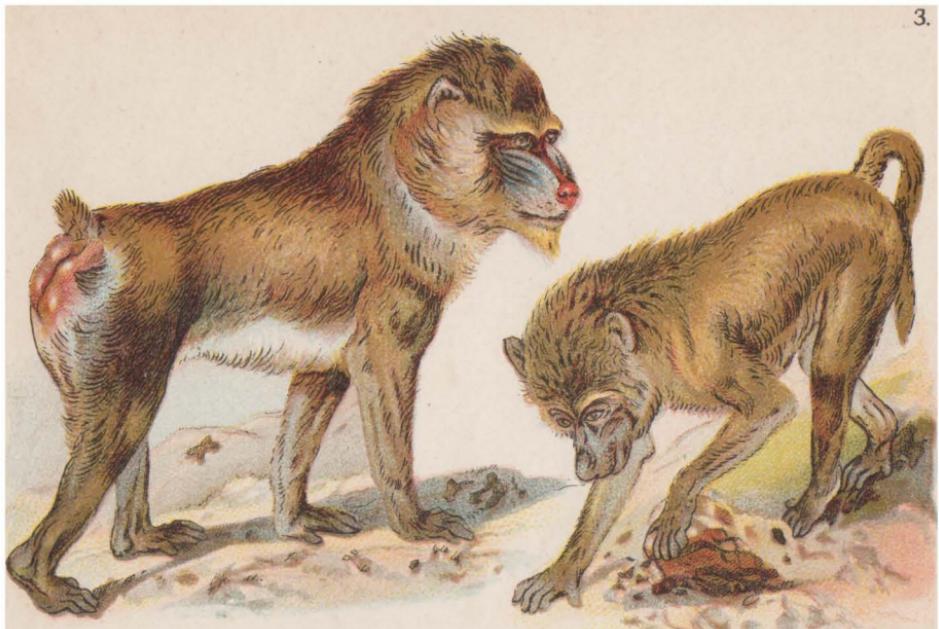
In the Monkeys of this family the fingers and toes are furnished with nails, not true claws, and the tail is often prehensile, or used as a hand.

Capuchin Monkey (*Cebus capucinus*)

There are many species of the Capuchin Monkeys found throughout South America, living in small troops in the trees. They are of small size, not much more than a foot in length, and are variable in colour, the species here represented being yellowish-brown. The forehead is bare and wrinkled, and the hair on the head is not raised in a crest as it is in some of the other species of the genus *Cebus*. See Plate 4, Fig. 15. These Monkeys bear captivity well, are gentle in disposition and easily tamed, and are more often seen about the country with organ-grinders than any others of the tribe.

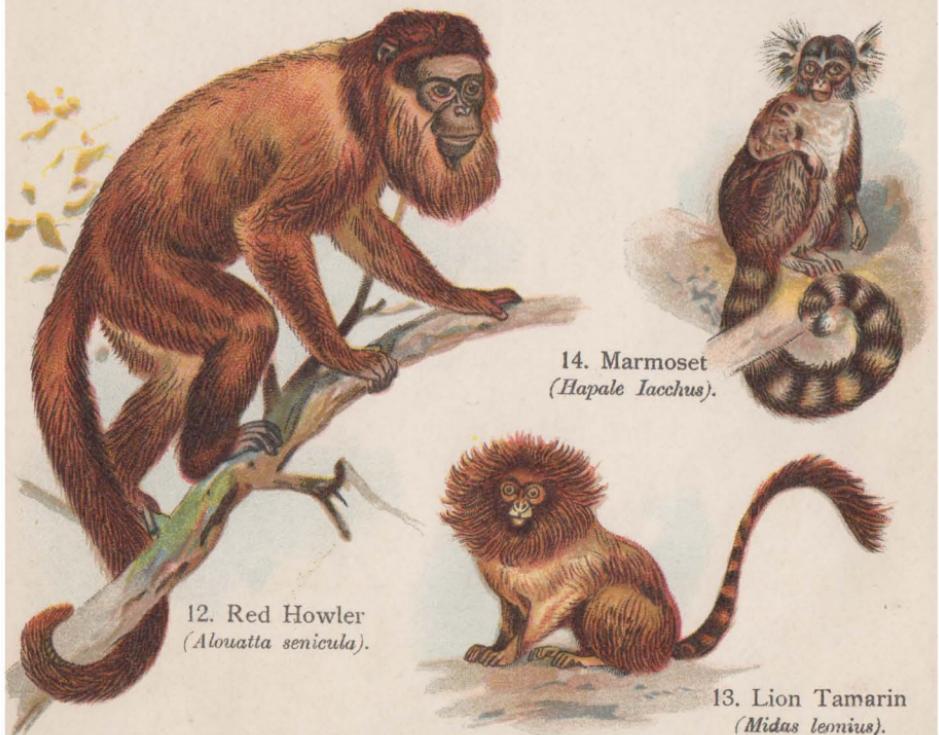
Red Howler (*Alouatta senicula*)

The Howling Monkeys are so called from their habit of uttering loud cries, or howls, which are made possible by a peculiar formation of the throat and tongue. There are several species, the two principal ones being the Red Howler and the Black Howler, the first of which is here figured. They are larger than the capuchins, more ungainly in form, and have longer muzzles, but like the others, they are tree-living, feeding on fruit and leaves, and have long prehensile tails, which are used as a fifth hand. The colour varies considerably in the different species. The Red Howler has long coarse red hair, paling to yellow, with a heavy beard about the face. See Plate 3, Fig. 12.



10. Mandrill (*Papio maimon*).

11. Yellow Baboon (*Cynocephalus babuini*).



12. Red Howler
(*Alouatta senicula*).

14. Marmoset
(*Hapale Iacchus*).

13. Lion Tamarin
(*Midas leoninus*).

FAMILY HAPALIDÆ

The Marmosets agree with man, with the Old World apes and the monkeys in the number of teeth, but have true claws, not nails, on their feet, and their tails are rather large and bushy, but not prehensile. Indeed, they are rather catlike in their general appearance, just as baboons have a superficial resemblance to dogs. They feed on fruits and insects, and live in trees. They are timid, but easily tamed, and are often made pets of in their native country. Marmosets are the smallest of the quadrupeds, not much exceeding six inches in length without the bushy tail, which is considerably longer than the body. They inhabit various parts of Central and South America.

*Marmoset (*Hapale Jacchus*)*

This species, which is common in many parts of South America, is rather variable in colour, but the typical form is slaty grey. There are broad, black bands on the tail, and less distinct ones on the back. In front of the ears are large tufts of white hairs, and the face is more or less variegated with black. See Plate 3, Fig. 14.

Some years ago a lady living in New Haven possessed a pair of these monkeys, and the female gave birth to two young—tiny creatures not more than two inches in length, exclusive of the tail. They uttered curious little cries, very like the call of young robins in a nest. In the same cage with the mother lived a female Marmoset of another species, who took a violent fancy to the little ones, and when al-

lowed the use of the room in which they lived would run happily about with the foster babies clinging to her. These monkeys were carried around by their owner in a small basket and often taken on her daily excursions about the town. On one occasion, while visiting a circus, one of the Marmosets escaped from its basket and ran to the top of the circus-tent pole, refusing to be coaxed down. Several men had finally to remove the pole, but before it touched the ground the monkey leaped a considerable distance to the earth, and took refuge under a leopard's cage. It was at length recovered with much difficulty.

In captivity Marmosets exhibit none of the disagreeable habits of the larger monkeys, being somewhat bird-like in character, uttering peculiar cries and poking about with their sharp little fingers in search of small objects that might be eatable. Although the creature is so diminutive, it can inflict a rather severe bite, the teeth being enormously large in proportion to the size of the head. They do comparatively well in confinement, some specimens having been kept in good health for seven or eight years. The pair mentioned were very fond of bananas and of boiled tapioca. They were never fed upon bread, a usual diet for monkeys in captivity, but one that is highly unnatural, inducing disorders of digestion, which are often fatal. Starchy food when given in a form that is not chewed thoroughly is indigestible. In a natural state, animals get starchy food either in very small quantities, or in such form that it has to be thoroughly masticated before it can be swallowed.

*Lion Tamarin (*Midas leoninus*)*

The Tamarins are about the same size as Marmosets, measuring about seven or eight inches to a foot in length. They are found in many parts of South America, but seem to be most abundant in the forest regions along the Amazon, living in the high trees and feeding on fruit and insects. In general habits they resemble the marmosets, with whom they are closely allied. The face is naked, and the fur on the body varies in colour, being usually mottled with grey or brown. Several species, including the one represented, are distinguished by a large mane which falls back from the forehead and about the neck, giving the little creature the curious lion-like appearance to which it owes its name. See Plate 3, Fig. 13.

SECTION II.—LEMUROIDÆ

The true Lemurs are confined to Madagascar, allied species, however, being found in Africa and various parts of India and neighbouring islands. They feed on fruits and insects, but will also eat lizards and small birds. Their thumbs and big toes are large and opposable, and at least the second finger or toe is furnished with a large claw, the others being generally provided with nails. On account of its habit of feeding at night, the Lemur does not see well in the day-time, when it is usually quiet, becoming restless and walking about as evening approaches. It can, however, on occasion, exhibit remarkable activity. In captivity they may sometimes be seen turning back-somersaults over and over in their cages with most amazing rapidity. The eyes are large and round, and

have a curious unseeing expression as the animal gazes sleepily about.

Native to Madagascar, only, is a form of this order that is of much interest to naturalists because of its strange characters. This animal, the Aye-Aye (*Chiromys madagascarensis*) has very long, slender fingers and toes, the third finger, especially, being extremely long, and all except the thumb and big toe ending in claws. It is a rather large animal, measuring about forty inches including the tail, has large black ears, and long stiff bristles that project from the head and face in various directions. It lives in dense forests, is nocturnal in habits, and is of a low order of intelligence, but is regarded by the natives as a supernatural animal, perhaps because of its rarity and curious appearance. Specimens are difficult to obtain and it is seldom seen in zoölogical collections.

Ruffed Lemur (*Lemur varius*)

This species is remarkable for the sharply contrasted black and white markings of its fur, although most of the Lemurs are of a red colour more or less varied with grey or white. The face is black, and the ears are almost concealed by the ruff of white hair surrounding it. The Ruffed Lemur is one of the largest species, none of which exceed a common cat in length of body. A peculiar characteristic is the attitude of the tail, which is held erect, slightly drooping at the tip, like that of a house cat, when pleased. See Plate 4, Fig. 17. This animal is nocturnal, sleeping during the day and becoming active at night. Its cry is loud and penetrating.



15. Capuchin Monkey
(*Cebus capucinus*).



16. Colugo (*Galeopithecus volans*).



17. Ruffed Lemur
(*Lemur varius*).



18. Slender Loris
(*Loris gracilis*).



19.
Tarsier
(*Tarsius spectrum*).

Another form of this family, common in captivity, is the Ring-tailed Lemur (*Lemur catta*), so called from the alternate rings of white and black on its tail. This species is less arboreal than the others, living more in rocky country.

Slender Loris (*Loris gracilis*)

This is a slender little animal, found in Ceylon, Java and Sumatra, distinguished from the true Lemurs by the absence of a tail, its shorter muzzle, and long, delicate limbs. The colour is grey tinged with red, the under parts of the body paling to white. The nose is made conspicuous by a streak of white running down it, and the fur surrounding the eyes is darker than that of the rest of the body. See Plate 4, Fig. 18. It is found in low-growing forests near the sea, sleeping during the day "rolled up in a ball, with its head between its legs, grasping its perch with its arms," says one authority, and coming out at night to feed on birds, insects, and lizards.

Tarsier (*Tarsius spectrum*)

This grotesque-looking little creature, only six or seven inches in length, inhabits the same general region as the preceding form. It is eminently adapted for a tree-living existence, being provided with cushions, or "suckers," on its fingers and toes somewhat like those of the tree-frog. The hind legs are very long, the second and third toes on them being furnished with claws instead of nails like the others, and it leaps from tree to tree with remarkable agility.

The tail is longer than the body and bears a tuft at the end. See Plate 4, Fig. 19. The Tarsier is allied to the lemurs, like them in habits, being a night animal, and is often called the Spectral Lemur—probably on account of its large round yellowish eyes.

ORDER II.—CHIROPTERA

THE second order of mammals includes the Bats, or Chiroptera, literally hand-winged animals, of which it is estimated that there are between four and five hundred species. They have four limbs and a tail, the fingers of the front limbs being enormously lengthened and used as a support for the skin-like membranes serving as true wings, from which project the short thumbs armed with strong hooked claws which are used in climbing. The hind limbs are small and weak, and are connected with the tail by a membrane, the feet, however, remaining free from it. As in the Primates, in which order the Bats were formerly included, there are four kinds of teeth, incisors, canines, premolars, and molars, the milk-set being followed by the permanent. The teeth are much modified in the different families and serve to distinguish them from each other. They are night animals, becoming active at twilight, sleeping during the day and hanging head downwards by the claws of their hind feet from the branches of trees, ruins, and various places of concealments. Some Bats feed entirely upon fruit, some upon insects, and a few suck the blood of other animals. Certain species that inhabit cold climates hibernate, like other animals that would find it difficult, or even impossible, to obtain food during this time of the year.

Many species are known in this country. The commonest form in the eastern parts of the United States is the Red Bat (*Atalapha novaeoracensis*), the species usually seen flying about at night and which frequently enters houses, not, as many people suppose, attracted by the lights, but by the various small insects that the lights draw. There is a common belief that Bats, when disturbed, will fly at once for a person's head, grasping the hair with their claws and refusing to be dislodged. Should one of these little creatures be so unfortunate as to come in contact with one's head in its efforts to escape, it would hold on tenaciously, but it does not by any means singe out the cioulsy, but it does not by any means singe out the head as the object of attack, endeavouring, rather, to avoid all obstacles. The mouth of the Red Bat is comparatively large and filled with strong sharp teeth, and the bite is rather severe.

The Pteropidae, or fruit-eating Bats, commonly called "flying-foxes" are confined to the tropical regions of the Old World, and differ from other families in several important characters. The muzzle is long and pointed, resembling that of a fox, the ear is small, having no tragus, or inner ear, and the margin being attached to the head; the second finger usually has a claw at the end. The fur is a lighter or darker red, some specimens being almost black, and the neck is clothed with thick hair. See Plate 5, Fig. 20. The species figured is the largest known, measuring at

Kalong (*Pteropus edulis*)

Four of the principal families are figured here. Many species are known in this country. The commonest form in the eastern parts of the United States is the Red Bat (*Atalapha novaeoracensis*), the species usually seen flying about at night and which frequently enters houses, not, as many people suppose, attracted by the lights, but by the various small insects that the lights draw. There is a common belief that Bats, when disturbed, will fly at once for a person's head, grasping the hair with their claws and refusing to be dislodged. Should one of these little creatures be so unfortunate as to come in contact with one's head in its efforts to escape, it would hold on tenaciously, but it does not by any means singe out the head as the object of attack, endeavouring, rather, to avoid all obstacles. The mouth of the Red Bat is so small, having no tragus, or inner ear, and the margin being attached to the head; the second finger usually has a claw at the end. The fur is a lighter or darker red, some specimens being almost black, and the neck is clothed with thick hair. See Plate 5, Fig. 20. The species figured is the largest known, measuring at

least a foot in length and four or five feet between the tips of the wings. During the day these Bats hang head downwards from trees, wrapped in their wings to keep the light from their eyes, scattering in the evening to their feeding-grounds. They are extremely voracious, doing much injury to fruit plantations. The Kalong, and probably other allied species, are eaten by the natives of some of the countries in which they are found.

In all the following families of Bats the margin of the ear is attached to the head at its lower extremity.

Greater Horseshoe Bat (*Rhinolophus ferrum-equinum*)

The Rhinolophidæ, or Horseshoe Bats, are so called from the presence of a series of nose-leaves, the first of which is generally shaped like a horse-shoe, spreading out around the nostrils. Back of this is a central ridge, and behind it another leaf-like membrane, pointed in shape. Like the preceding family, these Bats are found only in the Old World, where they are widely distributed. In colour it is reddish-brown above, tinged with grey, and pale grey on the under part of the body. The ears are large, the tail rather short and contained entirely within the wing membrane. See Plate 5, Fig. 22. Hiding during the day in caves and ruins, these Bats come out rather late in the evening, flying about trees and feeding upon various insects, upon which they live exclusively. They are small, measuring rather less than two and a half inches, but the wings expand about a foot.

A still smaller and browner species, the Lesser Horseshoe Bat (*Rhinolophus hipposiderus*) is found in the south of England and Ireland, and extends farther north on the Continent of Europe than the larger species.

Long-Eared Bat (*Plecotus auritus*)

This species and the following represent the most typical family of Bats, the Vespertilionidæ, which are found in both the Old World and the New. They differ from the preceding in being without the nose-leaf, and in having extremely long and delicate ears which may be wrinkled or folded back, leaving the tragus, or inner ear, standing. The Long-Eared Bat measures four inches in length, including the tail (which is almost entirely included in the membrane) and the wings expand at least thirteen or fourteen inches. The fur, which is very soft, is grey or brown above, but the base of the hairs is black. See Plate 5, Fig. 23.

Mouse-Coloured Bat (*Vespertilio murinus*)

This is the largest of the Central European Bats, measuring two and a half inches in length without the tail, which is somewhat shorter than the body. It is a representative of the Short-Eared Bats, which are more numerous in species than the genera previously noticed. The present species, however, which is greyish or reddish-brown above, with the base of the hairs black, and yellowish-white beneath, is



20. Kalong (*Pteropus edulis*).



21. Vampire Bat
(*Vampyrus spectrum*).



22. Greater
Horseshoe Bat
(*Rhinolophus ferrum-equinum*).



23. Long-eared Bat
(*Plecotus auritus*).



24. Mouse-coloured Bat (*Vesperugo murinus*).

very rare in England, though abundant on the Continent, where it lives in church towers, vaults, and ruins. Unlike other species it is not found in hollow trees. See Plate 5, Fig. 24. This Bat is also found in Northern Africa, and in Western and Central Asia. These bats hibernate, but are seen earlier in the spring and later in the autumn than the Long-eared Bats.

Vampire Bat (*Vampyrus spectrum*)

The large family of Phyllostomidæ, or Vampire Bats, is confined exclusively to South America and the West Indies. In all the species the middle finger of the wing is three-jointed, and there is present either a well-marked nose-leaf or folds of skin on the chin. The one figured is the largest, being about six inches long, the wings expanding to two feet or more, and is brownish-grey in colour. See Plate 5, Fig. 21. In spite of its evil reputation and hideous aspect, this particular Bat is absolutely harmless, and so far as is known feeds entirely on fruit and insects.

There are, however, one or two species of the family Phyllostomidæ that are blood-suckers, and in these the incisor teeth are curiously modified, being pointed, and set close together. When the Vampire alights on the shoulders or back of a horse, a favourite animal to attack, the sharp teeth pierce the skin and the blood is then drawn out by a peculiar sucking motion of the lips. The interior anatomy is specially adapted in order to enable the animal to digest this rather unusual food. For many years it was not definitely known whether this creature ex-

isted or not, but Charles Darwin actually saw one engaged in this operation of blood-sucking, and Theodore Gill, the American naturalist, was fortunate enough to witness the same performance while on an expedition in Chili.

ORDER III.—DERMOPTERA

THE singular animals of this order were formerly classed as Lemurs, and are often spoken of as " Flying Lemurs," though they are now either placed in a separate order, Dermoptera, or " skin-winged " animals, or are treated as a sub-order of the Insectivora. The number and formation of the teeth are peculiar, the incisors being sharp and saw-like in appearance, the upper jaw containing sixteen teeth and the lower eighteen.

FAMILY GALEOPITHECIDÆ

There is but one family and genus of these curious animals, and it is doubtful if there are more than one species.

Colugo (*Galeopithecus volans*)

The common Colugo, found in Sumatra, Borneo, and Malacca, is about the size of a domestic cat, and varies in colour from grey to brown. The limbs are long and thin, with five toes on each, ending in short curved claws, and the front limb is joined to the hind one on each side by means of a membrane, which, while it enables the animal to take extremely long leaps from tree to tree, is not a true wing, as in the bats. The head is long and somewhat fox-like in

appearance. See Plate 4, Fig. 16. The Colugo is nocturnal, sleeping during the day, and hanging head-downwards from trees, like the bats. Its habits are not very well known, but it is supposed to feed on leaves and fruit, and, possibly, insects.

An allied form found in the Philippine Islands is regarded by some naturalists as a separate species, under the name, *Galeopithecus philippensis*.

ORDER IV.—INSECTIVORA

THE Insectivora are mammals of small size that derive their name from the fact that they live chiefly upon insects, the order including Hedgehogs, Moles, and Shrews, and other allied but less well-known forms. Many of them live on the ground, some inhabit trees, others burrow in the ground, and still others live in the water, but all are more or less night animals. They usually have long, narrow snouts, five toes terminating in claws, on each foot, and walk with the soles of the feet on the ground. Some are covered with spines, others with fur, hair, or a mixture of fur and spines. The Insectivora are widely distributed over the Old World and North America, but are not found in South America.

FAMILY ERINACEIDÆ

Hedgehog (*Erinaceus europaeus*)

The largest of these animals, the Hedgehog, is about the size of a large rat, has a pointed black muzzle, short legs and tail, and the whole back is covered with sharp spines, which, on the face and lower part of the body, are replaced by coarse hair, the under parts being nearly naked. The colour is brown above, with whitish spines bearing a dark ring

about the middle, and yellowish-white beneath. See Plate 6, Fig. 28. The young, of which there are from four to eight in a litter, are pink, with undeveloped white spines, and are born blind. The Hedgehog sleeps during the day, coming out at night to feed upon insects, worms, slugs, and small animals, such as birds and snakes, and throughout the winter is completely torpid, the body being nourished by the fat which has been stored up for this purpose. When alarmed, it rolls itself up into a tight ball by means of powerful muscles beneath the skin, the spines sticking out in every direction, and in this state it may fall from a considerable height without injury.

The flesh of the Hedgehog is said to be very good eating, but it is not a common article of diet at the present time.

FAMILY TALPIDÆ

Mole (*Talpa europaea*)

The Mole is another very interesting little animal, both in structure and habits. It measures about four inches in length, without the short tail, the fur is very thick, soft and silky, and generally blue-black, though light-coloured specimens are occasionally met with. The long, pointed muzzle extending beyond the under jaw, and the large bare feet are generally pink, the fore-feet formed for digging and armed with strong claws, but otherwise having a curious resemblance to hands. See Plate 6, Fig. 27. The eyes are beneath the skin, and probably are only sensitive



25.
Water Shrew
(*Crossopus fodiens*).



27. Mole (*Talpa europaea*).



26. House Shrew (*Crocidura aranea*).



28. Hedgehog (*Erinaceus europaeus*).



29. Coati (*Nasua narica*).

30. Brown Bear (*Ursus arctos*).

to changes in the amount of light. The Mole lives entirely underground, where it burrows long and complicated galleries, with occasional wider chambers forcing up small mounds of loose earth known as "mole-hills." It feeds chiefly on worms and insects, is extremely fierce and voracious, and is said to starve to death if deprived of food for even a few hours. This animal is common in most parts of Europe and throughout northern and western Asia and Japan. It does not hibernate in winter, like the hedgehog, but only burrows deeper into the ground.

In the eastern parts of the United States is found a web-footed Mole (*Scalops aquatus*), which is not a water animal as one might suppose from the webbed hind-feet, but burrows in the ground like the common Mole.

The Star-nosed Mole (*Condylura cristata*) is so called from the peculiar star-like arrangement of cartilage at the end of its long snout. The fur is dense and fine, dark grey in colour, and in habits this Mole agrees with the others. It is common in the northern part of the United States and in Canada.

FAMILY SORICIDÆ

Water Shrew (*Crossopus fodiens*)

The Shrews, or Shrew-Mice, as they are often called, are small animals with long and pointed snouts and long tails. They resemble mice in general appearance, but are at once distinguished by the snout and by their teeth, which are not rodent-like in

character, the upper incisors being hooked, while the lower lie almost horizontal. The Water-Shrew, one of the largest species, is upwards of three inches in length without the tail, which is nearly as long as the body. It varies considerably in colour, but is usually black above and white below, the feet and under-surface of the tail being fringed with long white hairs. See Plate 6, Fig. 25. The Water-Shrew is widely distributed throughout the Old World and North America. It lives in burrows on the banks of streams, swims and dives with great activity, and feeds on water insects, fish and frog spawn, and even on small fish.

House Shrew (*Crocidura aranea*)

The House Shrew, or Musk-Shrew, as it is sometimes called, is common in Europe and parts of Asia, and is distinguished by its white teeth, in this respect differing from other members of the family in whom the teeth are a reddish colour. It is greyish-brown above, and pale grey below, and measures rather less than four and a half inches including the tail, which is more than half the length of the body. See Plate 6, Fig. 26. This little creature is often seen about mills and granaries, but it will not eat bread or meat, feeding upon insects, and is said to consume daily about as much food as its own weight.

ORDER V.—CARNIVORA

THE Carnivora are animals of large or moderate size. Most of them feed largely, and often exclusively, on flesh. They have four or five toes on each foot, armed with strong claws, but never opposable. The teeth are very characteristic. There are usually twelve incisors (three on each side of the upper and lower jaws, the tooth furthest back being the largest). Behind these is one very large curved and pointed canine tooth on each side, and the premolar teeth are generally compressed and pointed. The true molars are often reduced to a single pair, or may be even rudimentary or absent. The skin is generally soft, and thickly clothed with hair or fur; the mammae are abdominal, and the young of many species are born blind or helpless. They are highly organised animals, and are divided into numerous families, as follows—Felidæ (Cats), Viveridæ (Civets and Ichneumons), Hyænidæ (Hyænas), Canidæ (Dogs, etc.), Mustelidæ (Weasels), Procyonidæ (Raccoons), Ursidæ (Bears), and Phocidæ (Seals). All these live on the land except the Phocidæ (Seals), which are amphibious, spending part of the year on rocky islands, and part in the sea.

FAMILY FELIDÆ (CAT)

The largest and most important group of the Carnivora is the Cat family, all the members of which

are essentially flesh-eaters, marvellously adapted by nature to prey upon other creatures. They have, in general, short, rounded heads, rather large ears, and on the upper lips stiff bristles, or whiskers, which have bases set in very sensitive nerves and are of great service in going through jungle, or thick under-growth, when they are used as feelers to avoid obstacles. In the lion and many of the larger Cats the pupil of the eye is round, whereas in the smaller species, such as the lynx and the domestic cat, it is linear, and when contracted reduces to a narrow upright slit in the iris. In all, the pupil can be opened widely, enabling the animals to see well in darkness—a necessity, since they commonly hunt prey by night.

The Felidæ have five toes on the front feet, four on the hind ones, all armed with strong "retractile claws"—that is, claws that when not in use are drawn back by the ligaments into horny sheaths that protect them from wear. When the animal springs upon its prey, or becomes excited, they are thrust forward, ready to be used as weapons of offence or defence. One great benefit derived from this power of retraction is that it enables the animal to approach its prey noiselessly, the sharp points being raised from the ground in walking. The upper surface of the tongue is covered with small hook-like projections by means of which every particle of flesh can be scraped from the bones of the creatures upon which it feeds. The tail is long, except in the case of the lynxes, and that of the lion bears a tuft, or ball of hair, at the end. The skin is loosely attached over the whole body, and

the muscular development is of very high order, all motions being executed with ease and grace, and, on occasion, with astonishing rapidity.

The Felidæ are among the most beautiful animals in existence. All have more or less long, soft fur, usually bearing spotted or striped markings. The lion, the puma, the jaguarondi, and the caracal, however, are monotone in colour, or nearly so, though the young of the lion and the puma are spotted, and even upon the adult lion faint spots are visible just under the elbows on the front legs.

The various species differ little from each other in disposition and general characteristics. We may be sure that the actions of the common house-cat are those of all its relatives—such motions as “washing” the face, watching for prey, crouching and springing, being done by all this great family in precisely the same way. They approach their prey by stealth, keeping concealed as much as possible until they can reach their intended victims at a single bound, which is often of extraordinary length. In this stealthy character they are unlike other groups of the Carnivora, many of which will, if necessary, openly follow a scent for miles in order to overtake their prey.

The cats are spread over a wide range of country, being found as far north as Siberia and Canada and in the extreme south of Africa and South America.

Remains of fossil cats have been discovered in nearly all parts of the world. One species, in particular, called *Smilodon*, was about the size of a lion and had a very short tail like a lynx. The fore paws, however, were much larger and heavier than those of

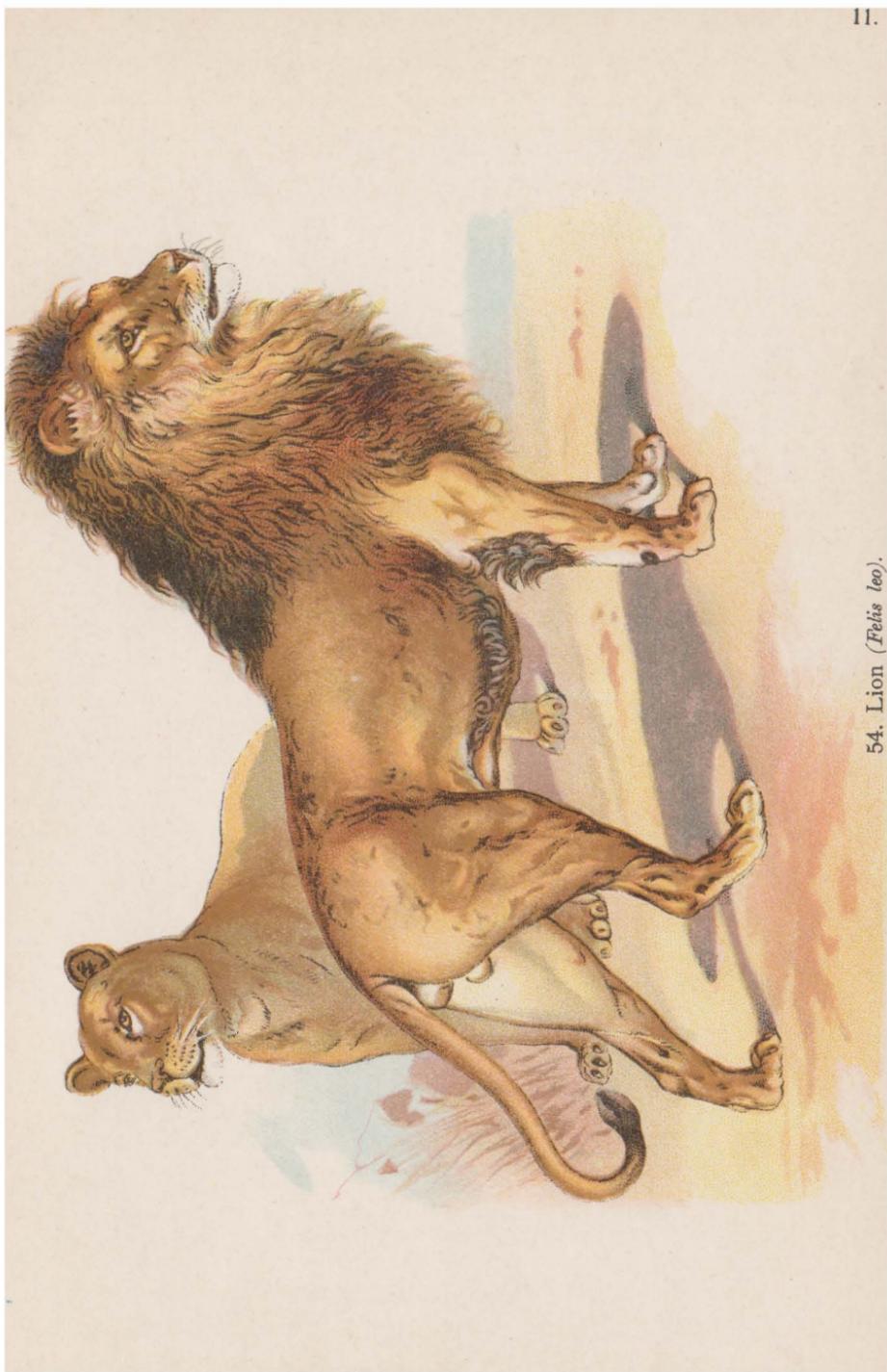
any lion, and the upper canine teeth were very long and flattened into a sabre-like form—hence the name, Sabre-Tooth Tiger. These teeth were so large that they passed outside of the mouth, somewhat like the tusks of a walrus, and it is supposed that they were used to pierce the thick hide of the gigantic ground sloths of the period in which they lived. The Sabre-Tooth Tiger would leap upon these creatures, burying its fangs in the tough hide, and by a tearing, ripping motion, cut through into the flesh.

Besides this large and formidable cat, the fossil remains of others have been found, some resembling leopards in proportions, but nearly all having canine teeth longer than those of any living forms. From the bones and implements found in caves, it is known that Cave Tigers lived in the time of primitive man, and they were probably his most dreaded foes.

Lion (*Felis leo*)

In point of size there is not much difference between the Lion and the Tiger, though the male lion appears larger on account of the heavy mane which covers his head, neck, and shoulders. This begins to grow about the end of the first year, and reaches its full length in three or four years more. The Lion lives as a rule in open desert country, where his tawny or dun colour blends with the landscape and protects him from being easily seen. The young are covered with a soft, woolly fur, thickly spotted, and are without the tuft at the end of the tail, which appears later in life. See Plate 11, Fig. 54.

In captivity Lions vary considerably in character,



54. Lion (*Panthera leo*).

some being docile and affectionate, others savage and stubborn. The Lioness takes care of her cubs much as the house cat does of her kittens, carrying them about in her mouth, licking them, and playing with them. She is a strict disciplinarian, however, cuffing them with her paws when they annoy her too much, and holding them down and "washing" them in spite of their protests. In defence of her young the Lioness is very courageous, and is a foe to be reckoned with.

The Lion is a very noisy animal in captivity, often roaring from hunger and excitement, and for other reasons difficult to understand. When a pair are in a cage together they roar, as a rule, alternately, the roar of the Lioness being shorter, sharper, and not so deep as that of her mate. She usually crouches in roaring, placing her head close to the ground, whereas the male stands upright. She is much the more restless, when caged, exercising a great deal, while he seems averse to exerting himself more than necessary. Contrary to the habit of going only in pairs, common to the other Felidæ, Lions have frequently been seen together in larger numbers, as many as seven having been noticed by hunters in company at one time—probably an old male and female and their two successive litters of cubs.

In the wild state, the Lion usually hunts at night, but is occasionally seen prowling about in the day-time. In Africa, where they are more numerous than in any other part of the world, their food consists principally of zebras and some of the slower antelopes, but when hard pressed by hunger they will eat

carrion. When the Uganda Railway was under construction in Africa, some years ago, the Lions of that region were a constant menace to the labourers, lurking about and striking them down as opportunity offered.

Although the Lion and the tiger are so different in external appearance, their skeletons are almost undistinguishable except for the shape of the skull. In the Lion the profile is almost straight from front to back, whereas the tiger has a decided angle between the face and the back of the head.

The eye of the Lion is one of his most beautiful characters, being large, round, and of a splendid golden-brown colour. The mouth is very large, and the lips are full and loose. In anger, the lips are drawn up, the nose wrinkles in great creases, the ears are laid close back against the head, and the tail is held stiffly out behind. When in this mood, with fire seeming to flash from his eyes, the Lion is indeed a terrible and awe-inspiring sight.

The great African missionary and explorer, David Livingstone, supplies us with one of the few absolutely authentic stories we have, telling how a man feels in the very jaws of a lion. Livingstone, while living with one tribe, decided to join them in a lion hunt, hoping to kill at least one of the troop that was attacking the native herds; for he says that the death of a single one of the troop is enough to make the rest abandon that part of the country. Because of the cowardice of the natives, an attempt to surround the lions failed more than once, and Livingstone, deciding to abandon the hunt, was on his way home, when

a single lion was met with. At this animal Livingstone fired both barrels of his gun, and while reloading, was warned by a shout of the natives. He turned too late to avoid the attack, was seized by the shoulder and brought to the ground.

With terrible growls, the lion shook Livingstone, as a terrier shakes a rat. This produced "a sort of dreaminess in which there was no sense of pain nor feeling of terror," though the victim was conscious of all that was passing. Being asked afterward of what he was thinking while being held by the lion, Livingstone answered, "I was thinking what part of me he would eat first!" The injury received in this encounter left Livingstone maimed for thirty years, for ever afterward he found it difficult to raise his left arm higher than his shoulder.

Other accounts from the lips of men who have escaped, after being seized by lions, seem to show that the lion is so entirely confident of holding his prey, and so fearless, that he satisfies himself with keeping the victim still until the animal is either angered by being wounded, or begins to drag his prey away.

In fact, he acts as a cat does with a helpless mouse. Many escapes from the lion have been due to this lack of ferocity after the prey has once been secured. Stories telling of the actions of wild beasts while being hunted, or while fighting for their lives against a number of enemies, should always be considered with caution. All such circumstances are entirely unusual, and general rules can hardly be drawn from the action of a wild animal when in great excitement or

terrible danger. This is especially true of the larger animals that are more used to hunt than to be hunted.

Tiger (*Felis tigris*)

The Tiger is the largest of all the cats, and is generally considered the most beautiful on account of its splendid colouration. The upper parts of the body are a brilliant orange colour, crossed at irregular intervals with black stripes, the under parts white, relieved by large patches or blotches of black, and the tail is ringed with black bands. The head is distinguished by long whiskers which come down on either side of the jaw, just under the ears, and are continued underneath the throat. As a rule the females have longer whiskers than the males. See Plate 12, Fig. 56. Except for the fact that the front teeth are larger in proportion, the Tiger in form very closely resembles the domestic cat.

The principal home of this animal is India, although it is found in some of the islands of the Indian Archipelago and as far north as Siberia and northern China. The fur of the Indian Tiger is very short and smooth, with numerous broad black stripes over it which give it almost the appearance of being painted, while that of the northern animal is much longer and lighter in shade. So far as is known, however, there is but one existing species. The northern Tigers are often of very large size, and, judging from the accounts of travellers in those regions, they are not nearly so fierce and therefore are not so much feared by the natives as are their more southern relatives. Native hunters have been known to follow these ani-

mals into caves and spear them to death with very clumsy weapons. Although they often live close to villages, they seldom, if ever, molest the inhabitants. In Sumatra, on the other hand, the people live in great dread of the Tiger, which hides in the thick jungle and is hunted with difficulty.

When, for any reason, Tigers in India find it hard to obtain their natural prey, they take to man-eating; and finding human beings comparatively easy victims, persist in this practice as long as they live. Often whole districts are terrorised and dozens of people slain before some foreigner, usually an Englishman, succeeds in shooting or trapping the man-eater. These Tigers live in the immediate vicinity of villages and good-sized towns, and women, especially, who go to the rivers for water are often struck down and carried off by them.

Tiger-hunting in India is conducted in several different ways. Sometimes a very rich prince, or Rajah, will have an enormous hunt, using dozens of elephants and many "beaters," whose business it is to make loud noises and drive the Tigers towards the hunters, who then shoot them from "howdahs," little houses on the backs of the elephants. At times these hunts are attended by considerable danger and excitement, owing to the fact that the elephants sometimes become suddenly panic-stricken and dash wildly about under the overhanging boughs of trees, crushing the howdah and its occupants.

A much less spectacular and more dangerous method is to hunt on foot, accompanied by one or two men as gun-bearers, tracking the Tiger through the

jungle. Another way is for the hunter to make a platform in the branches of a tree, tie an ox or a sheep under it, and shoot the Tiger when it comes out to seize the victim.

The Tiger feeds on the smaller and larger game as he can find it—deer, wild boars, domestic cattle, and probably some of the smaller buffaloes. It is especially fond of the peacock, whose home also is in the jungle. The Tiger in attacking large animals springs upon its prey, seizes it by the back of the neck, and by a quick wrench dislocates the vertebræ, thus causing almost instant death.

In captivity this feline is much more savage and untamable than the Lion, possibly because it is less intelligent. Many men and women who engage in the business of lion-taming fear to enter a cage with Tigers, which they consider far more treacherous and more difficult to handle.

Although lions have a decided dislike to entering the water, Tigers, on the other hand, owing to the fact that many of them live on islands and in swampy places, are often obliged to swim long distances in pursuit of their prey. Many of the islands in the Ganges are thus inhabited by Tigers who make long excursions through the water in search of food. In zoölogical gardens they are often provided with tanks filled with water for their enjoyment. In the Jardin des Plantes I have seen two Tigers swimming in a large pool that had been made in their cage, and there is an old Tiger in the Washington Zoölogical Park that in summer remains for hours in his tank and upon emerging is careful not to shake the water off, simply allowing it to drip from his skin.

While this animal is much less noisy in captivity than the Lion, its infrequent call is like the magnified growl of the house cat, with the addition of a peculiar blood-curdling ring.

Jaguar (*Felis onca*)

Next in size to the Lion and Tiger of the Old World, comes the largest and most ferocious of the American cats, the Jaguar. While bearing a general superficial resemblance to the leopard, it yet has many characteristics that distinguish it at once from the members of that species. In Leopards the spots are simply dark rings set quite close together on the lighter ground-colour of the fur, but in the Jaguar, particularly on the sides of the body, the spots are larger and angular in shape, with a smaller spot in the centre of each. Generally of greater size, some individuals being almost as large as a Tiger, the Jaguar is broad-chested, bow-legged, and of a more stocky, solid build than the leopard. It is, in reality, the stiffest and least active of all the cats. The fore legs are enormously strong, the hind ones comparatively weak and short; the tail is not nearly so long as the leopard's and is carried in a different manner, somewhat elevated over the back like that of a dog. See Plate 12, Fig. 57. The voice of the Jaguar is not unlike that of a small Lion—a short, sharp roar, differing considerably from the call of the Leopard.

It is not generally known that the Jaguar is found as far north as Texas. It has a wide range, however, being common in many parts of South America, in the region of the Amazon, in Patagonia, and also

high up in the Andes, where it attains great size and has fur of a lighter colour.

For so large a cat, it climbs trees with facility; nor does it hesitate to swim wide and deep rivers in search of food. The Jaguar preys upon the capibara, a very large and sluggish rodent found in South America along the banks of streams, on tapirs, peccaries, monkeys, birds, fish and turtles—a diet sufficiently varied to suit the most fastidious carnivorous palate.

Judging from the individuals that have come under my personal observation, the Jaguar is extremely savage and morose in captivity, never becoming at all tame, and the creature exhibited in travelling animal-shows under this name usually proves to be a Leopard of extraordinary size. The magnificent specimen now in the Bronx Zoölogical Park is a remarkably fierce and unmanageable beast, although he has been as well treated as the other great Cats in the collection, many of which have become very gentle and affectionate toward their keepers. Another and smaller feline of this species in the Philadelphia Zoölogical Garden exhibits the same savage traits, sitting quietly at one side of her cage until some unwary person approaches too closely, when she will suddenly strike out in the vain hope of reaching him.

Of the enormous strength of the Jaguar many stories are told, some of which may well be doubted—such as the killing and dragging to a considerable distance of a pair of horses that had been harnessed together. It is, however, a powerfully-built animal and a very dangerous antagonist. One was killed in Texas, a few years ago, after a terrific fight for its life.

in which several members of the hunting party were injured, the horse ridden by one of them killed, and some of the dogs despatched, before it was finally shot to death.

Leopard (*Felis pardus*)

The colouration of the Leopard varies, but, in general, the fur is yellowish and covered with a greater or lesser number of black spots, or rosettes. The head is flat, and long from the eyes to the back part, the face short, and the throat of the male hangs somewhat in the form of a dewlap, giving it a thick and heavy appearance. The ears are quite short, the eyes cold and cruel-looking, owing to their pale yellow colour and the very small round pupil, which in a strong light reduces to a dot in the centre of the iris. The legs are short, the tail extremely long and graceful, and often trails the ground in walking. See Plate 13, Fig. 58.

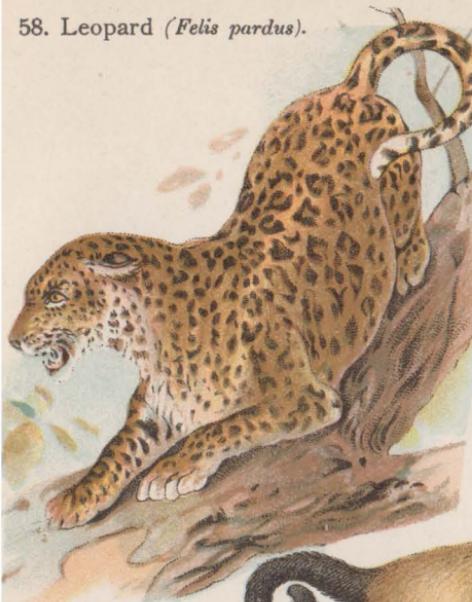
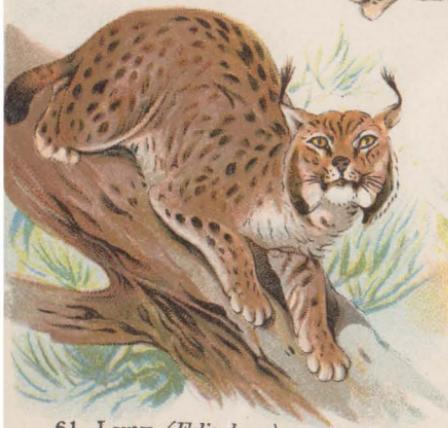
The Black Leopard was long thought by naturalists to be a separate species, but is now thought to be simply the melanistic, or black, form of the common species, though for some unknown reason this variety is more abundant in the Islands of the Indian Ocean and the Southern part of India than elsewhere. It is generally believed that Black Leopards are born in the same litters with normally-coloured individuals; and, indeed, although at first glance this animal appears to be wholly black, closely observed, especially in sunlight, the rings and spots on the body become plainly visible, showing darker than the surrounding fur.

In Africa is found a Leopard of a pale straw-

colour, covered with innumerable small black spots set very close together. The most northern variety of these animals, found in China, is lighter in colour, and, like the tigers of that region, has long, soft fur.

The Leopard is regarded by those who have hunted it as the most courageous and crafty of all the Cats; hunters like Sir Samuel Baker and Gordon Cumming agreeing that they would much prefer to hunt the lion or tiger. Though not so large as the American jaguar, it is probably the most intelligent of the *Felidæ*, as well as the most agile, and it adopts many tricks in order to secure prey. It feeds on many of the smaller animals, and does not hesitate to attack women and children, its method being to lie concealed in a tree overlooking a stream, usually, and leap on the back of the victim's neck, killing it with one bite through the backbone. It seldom attacks men, unless it has been wounded.

While Leopards in captivity are at times gentle and docile, their temper is variable, and they will in a moment, from sudden irritation or some fancied danger, turn and scratch and bite terribly. One that I saw frequently in the Washington Zoölogical Garden some years ago, would apparently court attention, coming up to the bars of her cage and purring like a cat, evidently anxious to be stroked. She was, however, entirely untrustworthy. In the same cage was a rather old male Leopard, and her chief diversion seemed to be in teasing this inoffensive animal, sneaking up behind him, clawing him viciously, and then jumping quickly away. After this persecuted cage-mate died, another and more powerful male was put

58. Leopard (*Felis pardus*).59. Wild Cat (*Felis catus*).60. Siamese Cat (*Felis domesticus*, var.).61. Lynx (*Felis lynx*).62. Cheetah (*Cynaelurus jubatus*).

in his place. At first she was much afraid of him, crouching timidly away in a corner of the cage, but after a little while she gained confidence and resumed her old tricks of biting and clawing, from which her new companion, in spite of his greater strength, did not seem any better able to defend himself. She at one time bit off about four inches of his beautiful tail.

Owing to its smaller size and superior intelligence, the Leopard can be trained to do many things that are impossible to the lion or tiger, and on this account is always desirable in wild animal shows.

In a book of travels there is an incident illustrating how the colouring of a leopard may make it invisible, even to a hunter gazing directly toward the animal and being instructed by a native as to where to look for it. In this case the hunter says: "I saw only a mass of light and shade under a dense overgrowth of greenery, dead leaves and grass, vivid yellowish where the pencils of light broke in upon the gloom. All that I looked upon in that green-wood tangle was equally leopard. I could pick out no particular object as being any more so than the rest. Of head or tail I made out nothing, where all was equal to the other, and still that native of keenest vision besought me to see details of its anatomy." While he was gazing toward the thicket, there came a roar, a rush, and the hunter was knocked down by the animal's charge. When the creature could thus escape the gaze of a searching hunter, it may easily be understood how little likely it was to be discovered at a casual glance.

Ounce or Snow Leopard (*Felis irbis*)

This is a comparatively rare cat, owing to the fact that it lives in almost inaccessible parts of the world, usually above snow-level in the mountainous regions of Asia. In form and proportions it is closely allied to the common leopard, although the fur is longer, is of a greenish-grey hue (much of the colour of lichens) and is covered with large but indistinct rings and spots of darker colour. The profile of the head is quite different from that of other cats, having a decided notch or jog over the eyes, like a dog. The orbits are very prominent, and the ears are so small that they look as if they had been clipped off. While the eyes of most of the Cat tribe are yellow, those of the Snow Leopard are greenish-grey, much the same in colour as the fur.

The few specimens of this animal in captivity are extremely gentle in disposition. It is remarkably silent, apparently having no definite call like the ordinary leopard or the jaguar, although it is occasionally heard to growl.

The skin of the Snow Leopard is in great demand on account of its beautiful fur, especially in Persia and the countries round about, where it is used by the royal families for robes, saddle-bags, and other purposes.

Puma (*Felis concolor*)

Next in size to the jaguar, of the Cats in North and South America, is the Puma, an animal inhabiting as a rule rocky or open country in preference to forests. It is much less courageous than the jaguar,

but vastly more active, rivalling even the Leopard in agility. The head is very small, the limbs long and heavily made. It is lithe and wiry in construction, and has been known to make from an elevation enormously long leaps upon its prey.

At one time the Puma was quite common in the eastern part of the United States, and it has been known under many different names, some of them being Panther, or "Painter," Mountain Lion, Cata-mount, and Cougar.

The colour is tawny, somewhat like that of the lion, fading into white on the under part of the body. See Plate 12, Fig. 55. The cubs are very different in appearance from their parents, the fur being darker brown and covered with large spots, which gradually disappear as the animal grows older. They are very charming, playful little creatures.

The food of the Puma varies with the locality in which it is found. In Montana and other parts of the country inhabited by the wild sheep, that animal forms its principal diet. It also feeds on deer and small mammals, and is a great enemy to domestic sheep and cattle. It has the reputation, however, of being harmless to man in the wild state, and the Gauchos of South America will enter a cave where one has taken refuge and deliberately stab or shoot it to death—a method of hunting practically impossible in the case of a leopard or jaguar. In the western parts of the United States it is hunted by means of dogs, who track it out and drive it up into a tree, where it is shot. There are many terrible fights on record between Pumas and pursuing dogs, and often

a number of dogs will be killed by a Puma before it is despatched by the hunters.

The call resembles the scream of a woman or child in distress. Even in zoölogical collections, the illusion is almost perfect when the captive animal screams, or gives its call, which it does at very rare intervals. Like most other cats, it growls a great deal, and when more than one animal is in the same cage, they keep up a continual growling and fighting, which, however, never seems to amount to anything, as they seldom injure one another.

The Puma is rather intelligent, and is quite easily tamed, but is a very nervous cat, and for that reason seldom figures in shows of trained animals.

Lynx (Felis lynx)

The Lynx is found in all the continents of the World except Australia and South America. The common European Lynx is the largest species, measuring sometimes as much as forty inches in length, including its short tail. The colour varies in different individuals, but is usually of a pale or rufous (reddish) colour, covered more or less thickly with spots. The ears are tufted, and the hair around the neck is developed into long whiskers, somewhat after the manner of the tiger's ruff. See Plate 13, Fig. 61.

The two well-defined species of Lynx found in North America are the Canada Lynx and the Red or Bay Lynx. The Canadian is distinguished from the other by its much longer fur and very large, round feet, which undoubtedly serve it as snowshoes in tracking prey through the snow of the region in

which it lives. The colour is a beautiful silver-grey, tipped with black, the tufts on the ears black, and there are a few bars of black hair in the whiskers at the sides of the head. The nose is exceedingly short, and the eyes are very large and catlike in construction.

The Red or Bay Lynx inhabits the more southern portions of North America, and is about as large as its northern relative, though it does not give the impression of being so on account of the shorter fur and much smaller feet. The ears also are less tufted, and the whiskers are not so distinct in character, and the fur is covered more or less thickly with spots.

All Lynxes climb easily, and when pursued by hunters and dogs will always take refuge in trees, from which they are dislodged with difficulty. They are rather bold and courageous when pressed, and can use their paws with lightning-like quickness in encounters with dogs and other animals. In general disposition and method of hunting, the two species closely resemble each other. Having very long legs, the Lynx hunts its prey in a more dog-like fashion than is usual with cats, and will often track another animal a considerable distance before springing. It usually prefers more or less open country, though Florida Lynxes are found in the thick palmetto scrub of that region.

This creature is known under many names in the United States, the most common, perhaps, being Catamount and Wild Cat. The cry is a piercing scream much like that of the puma.

As a captive animal, the Lynx is rather uninterest-

ing, being timid and averse to exercise, and growling and snarling at visitors when approached. They differ in character, as do other cats, some being gentle and others extremely savage and untamable. They have not nearly so much intelligence as the leopard, and on the whole are a somewhat quiet and undemonstrative cat.

In Africa and India are found two species of cats, which, while they cannot be called lynxes, resemble them in form and proportions. The Caracal (*Felis caracal*), which is found in portions of Africa and India, is a fawn-coloured, unspotted cat, somewhat like the puma, with the usual tufted ears, short tail, and long legs of the lynxes. In habits it resembles other members of the genus, capturing and killing small mammals and birds. The Serval (*Felis serval*), while it has very long legs and small feet, is without the tufts at the tip of the ears. This beautiful cat has a light-greyish body colour covered with dark brown spots. The tail, though not as short as that of some of the lynxes, rarely exceeds six inches in length. The Serval is found in thick and bushy country, as a rule, and is perhaps more of a ground animal than any of the lynxes. It leaps upon its prey, and strikes it down with a single blow.

Clouded Leopard (*Felis nebulosa*)

This beautiful, but little known, species is slightly smaller than the common leopard. The tail, however, is extremely long and somewhat heavier in form than that of the true leopard. The markings are quite marvellous, rendering the animal the most bril-

liant and strikingly coloured of any of the Felidæ. The fur is extremely short, usually of a golden-yellow, merging into white beneath, over which are scattered irregularly very large cloudy-looking spots and bands. The whole appearance is much like that of some of the larger pythons of India, where it is chiefly found. The head is extremely flat on top, and very long, the canine teeth are longer in proportion to the size of the head than those of any other cat, and the general proportions make it resemble very closely some of the fossil cats.

The habits of the Clouded Leopard, owing to its retiring nature, are comparatively little known. It lives in trees most of the day, seldom coming to the ground except at night when it thinks itself free from observation.

I have had frequent opportunity to observe a handsome specimen that is in the Philadelphia Zoölogical Garden. When first acquired it was extremely shy, lying for hours in its cage without moving. Gradually, however, it lost fear of the keepers and became comparatively docile, coming to the front of the cage and playing about, though never entirely losing its timid disposition. It seldom growled or snarled, like other cats, but when very much alarmed would give the usual growling cry common to most of the family. Many attempts were made to photograph this rare animal, but for a long time without success, as it was very suspicious of the camera and resisted all efforts to entice it into the sunlight of the outer cage. By the exercise of much patience and the use of considerable strategy, however, it was finally in-

duced to come out, and some excellent photographs were secured.

Another specimen, added to the same collection more recently, is either younger or a different variety,—which it is has not been determined. The colour of this later arrival, instead of being the beautiful golden-yellow of its predecessor is a greyish-green, covered with the usual bars and spots, and may easily be the younger colouration of the animal.

Ocelot (*Felis pardalis*)

The Ocelot is considerably smaller than the clouded leopard, averaging perhaps twenty-five pounds in weight. It is found in both North and South America, and has a somewhat extensive range—as far north as Arkansas and southward to Patagonia. The short, soft fur is beautifully marked, the ground colour a light silvery-grey or fawn over which runs an irregular arrangement of spots and lengthwise stripings. The form, however, is not particularly graceful, as the body is very long and thin and rather shapeless, the tail short and carried in a stiff manner, unlike the gracefully curved tails of many cats. It is an extremely agile cat, and a good climber of trees, in which it procures most of its food—birds, usually, and when possible, monkeys.

The Ocelot has certain characteristics that distinguish it from other cats—the broad, fleshy tip to the end of the nose, which, instead of being dark, is a light pinkish-grey, and the eyes, instead of being the usual light yellow colour, are a very dark brown, almost black.

It resents captivity, and, like many of the smaller cats, is usually savage, though there are instances of better-natured individuals. As a rule, it lies closely in a corner, or else paces nervously up and down its cage, often uttering the peculiar long-drawn growl characteristic of this animal.

The Ocelot has much the same general range as the jaguar, and is really not unlike a small edition of that animal, though it differs somewhat in colour and in the shape of the markings.

Of still smaller size, but closely allied in form to the Ocelot, is the Margay (*Felis tigrina*) found in certain parts of South America.

Jaguarondi (*Felis jaguarondi*)

This remarkable Cat, which is found as far north as Texas and whose range extends into South America, is one of the strangest forms of its order. For many years the creature known as *Felis Eyra* was considered to be a different species, although closely allied; but it has been recently proved by the best authorities that the *Eyra* and the *Jaguarondi* are but varieties of the same animal. The colour of the fur is nearly uniform, varying from a grisly-grey to a reddish-brown in different individuals. It was formerly thought that this reddish-brown colour distinguished the *Eyra*, but of late years specimens in all stages between these two in colour have been found, some more reddish, others more greyish, as the case might be.

The *Jaguarondi* has many peculiar characteristics, its general proportions differing widely from the

other members of its order. The neck is very long and thick, the head flattened in profile, the nose very stout and thick, and the chin receding. The ears are short and rounded, and set close against the head, giving a somewhat weasel or ichneumon-like appearance to the creature. The total absence of markings on the face also serves to differentiate it from cats in general. The feet are small and compact, the hind legs much longer than the forward pair. In walking the back is arched, the head carried low, the long, thick tail dragging the ground. The nostrils are set wide apart, giving the nose a thick, fleshy appearance unlike that of other cats, and it is, in fact, the most uncatlike of all the species in this class of animals.

A number of *Jaguarondis* have been captured in the vicinity of Brownsville, Texas, in the low sage-brush and cactus which abound in that neighbourhood. They hide so successfully that they are difficult to shoot, but are quite easily trapped. Their food consists of small mammals and birds caught on or near the ground.

The two young specimens in the Washington Zoölogical Park, one of which is reddish-brown and the other grey, exhibit the traits of cats in general, remaining very quiet most of the time, probably through fear, and spitting and snarling at visitors. They show little intelligence, and in walking, especially, give one the impression of being a rather low and primitive type of this family.

European Wild Cat (*Felis catus*)

This animal is slightly larger than the domestic cat and differs from it in having a thicker, shorter, and more bushy tail. The colour, in general, is much the same as that of the common tabby cat—a mixture of stripes and spots on a greyish or brownish ground. See Plate 13, Fig. 59.

Not many years ago the Wild Cat was found throughout the British Isles, but it is to-day confined to Scotland and to the wilder parts of Europe and Asia, where it still has rather an extended range. It should not be confounded, as it frequently is, with the so-called Wild Cat, or Bob Cat, of this country, which, as has been said, is simply the red, or bay, lynx, and differs from the true Wild Cat in many characteristics.

The Wild Cat is, without exception, the most savage in captivity of all cats, large or small. Several specimens that are now in the Philadelphia Zoölogical Garden look at first sight like large and ferocious tom-cats of the domestic species, but are a thousand times more surly and vicious. They sit quietly in the cage until someone comes near, when they suddenly fly at the bars, spitting and snarling as if possessed. This is not at all due to fear, as they have been a long time in confinement and are accustomed to the presence of people, but seems due simply to inherent ferocity, which, so far as I have observed, remains unchanged throughout life.

The Wild Cat is a great foe to birds, and also to rabbits and poultry, among which it creates great havoc.

Domestic Cat (*Felis domesticus*)

The house Cat is thought by many of the best authorities to have come in direct descent from the Egyptian Cats, which were objects of worship and whose mummified bodies have been found in the tombs of Egypt. The commonest form is the tabby, but many others exist, probably as the result of centuries of careful breeding. The tabbylike colour is more or less striped and spotted, and closely resembles the ancestral type, all other forms being varieties of this.

Angora, or Persian, Cats are larger than the common species, and have much longer hair, as well as larger and rounder eyes. They are held in great esteem by fanciers, and bring high prices. There are many variations in colour, some being a beautiful smoke-colour, while others are pure white, jet black, or yellow with tabby marking. They are perhaps more intelligent than the common Cat, but as a rule are very delicate and difficult to rear.

One of the most curious Cats in the world is the Manx, which resembles the ordinary variety, but has little or no tail. Still another and very handsome form is the Siamese, which is very short-haired, the body a light yellow, or fawn colour, the tail, legs, and head dark brown or black. The eyes are a beautiful purple or amethyst colour. See Plate 13, Fig. 60.

In common with many other animals, the domestic cat often assumes the black, or melanistic, form, and the pure white, or albinistic. The latter often have either blue or pink eyes, and are not infrequently deaf.

As a rule, this animal seems to have a greater attachment to places than to people, and its homing instinct is extraordinary when taken many miles away from home, the animals often finding their way back in what seems a truly marvellous manner.

The Domestic Cat hunts by stalking and catches mice and birds in exactly the same method employed by the tiger in its pursuit of deer and antelope. Its muscles are very pliable, combining extreme elasticity with the maximum of strength, so that it can turn and twist in almost any direction. It also has the power of remaining perfectly still for what often seems an unendurable time, a character that is of great value in watching for mice and other animals whose hearing is extremely acute.

Cheetah (*Cynaelurus jubatus*)

The cat which differs most from all others, and which, in, fact, is not a true cat, being placed in different genus although included in this family, is the Cheetah or Hunting Leopard of India and Africa. This singular creature has a very small head, long, slim legs, and a very narrow chest; indeed, the whole body has a generally squeezed-in appearance. The tail also is flattened vertically, and possibly serves as a rudder when running at great speed. The feet, too, differ from the feet of the true cats, in that the claws are only partially retractile. The ground colour of the fur is tawny, thickly sprinkled with small dark spots. See Plate 13, Fig. 62.

The Cheetah is also less catlike in disposition than any of the other species, and is often used as a dog

might be to hunt game. The animal is hooded, placed in a cart, and driven to within as short a distance as possible of a herd of black buck, or Indian antelope, without startling them. Then the hood being removed, the Cheetah is turned in the direction of the game. Leaping to the ground, it singles out an individual from the herd, and stealthily endeavours to get as near to it as possible without being seen. When the buck becomes aware of the Cheetah's presence, the chase is on, and the Hunting-Leopard displays full character, literally flying over the ground at terrific speed; and though the antelope is a swift animal, it is usually soon run down, the Cheetah springing on it and sinking its teeth in the throat, remaining in this position, growling and lapping the blood until the hood is again put over its eyes. After releasing its hold, the Cheetah is put back into the cart, and the same process may be gone over again before it is returned to its stable or cage. If an intended victim succeeds in getting too great a start, however, the Cheetah, true to the cat-like character, will not pursue, but will quickly give up the chase. In fact, its build is such that it can run at great speed for only a short time, as it has not the lung-capacity and consequent endurance of an animal like the greyhound.

Family Viverridæ (*Civets and Ichneumons*)

The Civets represent a rather primitive type of the carnivora, animals of a very similar character being found among the fossil remains in various parts of the world. Nearly allied to the cats, they are

much less specialised—that is, they have changed little in form from early times, whereas the cat animals, the bears, the dogs, etc., have undergone considerable modification. In this country, in particular, we find many large and small species of fossil animals closely resembling Civets in many ways.

Some of this family are tree-living, and some prefer the ground; most of them are night animals, feeding chiefly on birds and small mammals, and exhibit a low degree of intelligence. They are natives of Asia and Africa, and are domesticated in the south of Europe. They are usually a silver-grey, more or less banded, the pattern being very beautiful, and the hair long and brilliant in appearance. Civets are comparatively small animals, with longer bodies and shorter legs than most of the cats, and have partially retractile claws. Many of them have sac-like glands toward the extremity of the body which secrete the substance known as civet, formerly much used in medicine, but now chiefly valued as a base for perfumery. There are many species, which while they differ considerably in general character nevertheless resemble each other closely in form and character.

The common Genet (*Genetta vulgaris*), a species of Civet, differs from the larger African forms in the absence of pouches containing civet. The range of this animal is in the Mediterranean region. In some countries the Civets are kept in houses as protection against rats and mice, to which they are deadly enemies. In character they are extremely quiet, but alert, obtaining their prey by stealing up and suddenly seizing it with a swift movement of the

neck and body. The eye is very remarkable, being extremely fierce and brilliant in expression. They are retiring and rather solitary animals, and in captivity are not particularly interesting owing to their habit of sleeping during the day. They exhibit a certain amount of affection toward their keepers and are able to recognize them at a glance. On account of this unfortunate habit of remaining quiet and sleeping by day, they are apt to be put in small and badly-lighted cages, which conceal their true beauty and grace from the casual observer. As a matter of fact, they are most beautifully marked and graceful animals, having singularly pliable and elastic bodies.

A very remarkable creature closely allied to the Civet is the Binturong (*Arctitis binturong*), a native of Borneo and probably found in some of the other large islands. It is covered with a thick, black, and bristly fur, and the prehensile tail is long and heavily-furred. The ears are tufted with hair at the ends, and the whiskers are stiff and white. A fine specimen in the zoölogical collection at Philadelphia is quite tame and allows its keeper to handle it freely. Although naturally nocturnal in habit, yet this one, owing to its fondness for its keeper, would remain awake during the day, when it exhibited many curious characteristics. The inside of the mouth was a brilliant red and looked exactly like a piece of red wax against which, when the animal yawned—as it did on many occasions during the day—the small white teeth showed in brilliant contrast. Altogether, the appearance of the Binturong is very singular and unlike that of any other creature. The specimen



44. Sea Otter (*Enhydra lutris*).

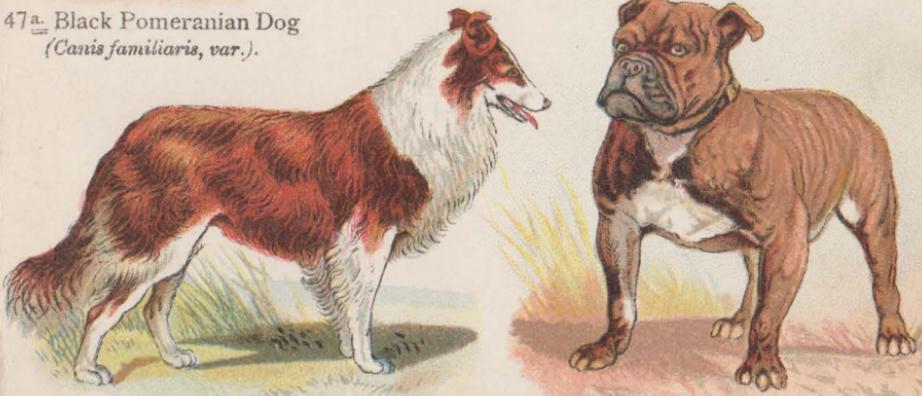


45. Ichneumon (*Herpestes ichneumon*).



46. Civet (*Viverra civetta*).

47a. Black Pomeranian Dog
(*Canis familiaris*, var.).



47b. Collie (*Canis familiaris*, var.).

47c. Bull Dog (*Canis familiaris*, var.).

mentioned was fed upon a varied diet, consisting of vegetables, eggs, and meat. It was large, about five feet in length, including the tail.

Civet (*Viverra civetta*)

The common Civet is a native of the northern half of Africa, and is of a yellowish-grey colour, more or less banded and blotched with black. Along the back runs a short mane, which can be erected at will. The Civet varies considerably in size, being generally about two and a half feet in length, without the tail, which is at least one-third the length of the body. See Plate 9, Fig. 46.

Ichneumon (*Herpestes ichneumon*)

The Ichneumons, or Mongooses, differ from the civets in several particulars. Like them their bodies are long, the legs very short, and the tail long and tapering, but their claws are not retractile and they have no scent-glands. The fur is coarse and long and has a mottled or grizzled appearance, owing to its alternate light and dark colouring. See Plate 9, Fig. 45. Only a portion of the soles of their feet rests on the ground, so they walk, neither flat-footed like the bear, nor on the toes only, like the dog. They usually live in holes in the ground, and are extremely quick in their movements. Perhaps the most interesting species are the Egyptian Ichneumon, which is figured, and the Indian Mongoose (*Herpestes mungo*), which is chiefly remarkable for the deadly enmity which it bears toward the snake family in general, many thrilling tales being told of fights between

cobras and Mongooses. There have been a number of descriptions of the Mongoose's method of overcoming the snake. One that is justly praised is contained in Rudyard Kipling's "Rikki-Tikki-Tavi." When set to fight a cobra in a closed room, the following were the tactics adopted: Upon being released, the cobra took up its position in a corner of the room, coiled, with head erected, ready to strike. The mongoose, being brought to a window, and allowed to jump down into the room, rounded its back so as to make the hair stand straight out, thus apparently increasing his size to double its former appearance. The mongoose then approached on tiptoe, keeping up a peculiar humming noise. The advance was made by a series of zigzags, bringing it constantly nearer, while the snake watched every movement, on the alert to deliver its deadly stroke. The observer says that the snake appeared to strike the mongoose repeatedly, but without effect. Suddenly, with a movement so quick as to be unperceived, the mongoose pinned the cobra by the back of the head, crunching the skull. This particular animal is said to have killed a large number of cobras without ever being bitten. When brought near a snake, the Mongoose becomes very much excited, running back and forth in front of the snake, as the reptile remains on guard, head erect and hood expanded, ready for the expected attack. Keeping up these erratic movements for a considerable time, the Mongoose gradually gets nearer and nearer to the enraged cobra, until, with lightning-like quickness, it pounces upon its antagonist and almost invariably kills with a single bite. The

Indian Mongoose is usually of a brownish-grey colour, the hair somewhat grizzled, and in form it is very snake-like, its movements being extremely lithe and sinuous. The eyes are small, but very brilliant in expression, and the whole appearance of the animal is one of relentless ferocity. In captivity it shows remarkable restlessness, darting back and forth for hours in the narrow limits of its cage.

FAMILY HYÆNIDÆ (HYÆNAS)

This family includes but three species, which are found in the tropical regions of Asia and Africa. The muzzle is moderately long and pointed, and the teeth, though not so truly carnivorous in construction as those of the cats, are enormously powerful and are used to crush the bones of carcasses left by lions, tigers, and other beasts of prey. Hyænas are large, ungainly animals, repulsive in appearance and habits. The front legs are somewhat longer than the hind ones, giving a backward slope to the animal, the body is clothed with coarse, bristly hair, the tail is comparatively short and bushy. The neck is very long and thick and bears a mane; the ears also as long, and the hearing is very acute. In lying down, the attitude of the Hyæna presents some very curious characters, unlike the dogs, to which at first glance it seems closely allied. The usual position of the dog in sitting, or lying down, is with the front paws extended straight out in front, while the hind legs are doubled under the body, the heels resting on the ground. In the Hyænas, however, the front paws are bent backward sharply at the

wrist, in an attitude sometimes taken by the house cat, while the hind legs, instead of being drawn up under the body are allowed to sprawl out behind, so that the animal really lies on its stomach.

A form that is not often seen in captivity is the Brown Hyæna (*H. brunnea*), found in Southern Africa, but aside from colour, this species resembles the two that are figured.

Closely allied to the Hyænas, if not of the same family, is the Aard Wolf (*Proteles lalandii*), also a native of South Africa. It is about the size of a fox, and in general appearance is much like a small Striped Hyæna, but it does not possess the terrible jaws and teeth of its near relative. This animal lives in burrows in the ground, which it makes itself.

Remains of fossil Hyænas have been found in caves in England, France, Germany, and in the Himalayas, and similar species have been found in this country, structurally differing but little from modern forms.

Striped Hyæna (*Hyæna striata*)

Widely distributed throughout the continent of Africa, the Striped Hyæna is also found in many parts of Asia, especially in India, frequenting rocky and hilly districts rather than forests. The colour is a brownish-grey, and over this on the sides are rather wide blackish stripes that are continued along the outer part of the limbs. See Plate 10, Fig. 52. It is a night animal, lurking in caves and other hiding-places during the day, and going about at night in packs in search of bones and remnants of animals that have been left by beasts of prey. Although a

very formidable creature, it is skulking and cowardly, and seldom attacks other living animals unless it can take them at a disadvantage.

Spotted (*Hyæna crocuta*)

The Spotted Hyæna has a more restricted range than the preceding species, being found only in Central and Southern Africa. Somewhat larger, measuring nearly six feet in length including the tail, it is a stronger, fiercer, and more dangerous animal. In colour it is yellowish-brown, covered with irregular black spots or blotches. The singular form adds greatly to its repulsive character, the neck being very long and thick, the head carried low, the mouth usually open and displaying the large and formidable teeth. The eyes are extremely dull in expression, and seem to be glazed by a kind of film over them. See Plate 10, Fig. 53. When excited its antics are remarkable: the short, stiff tail, usually carried down and close to the body, is then stuck up straight in the air, and the animal gallops back and forth in its cage uttering the weird sounds that have given it the name of Laughing Hyæna. At such times it seems to be in a very wild and perturbed state rather than angered. Besides this disagreeable utterance known as a "laugh," it has a regular call which consists of three or four long-drawn growls ending in a kind of whoop, and when emitting them the head is placed close to the ground.

FAMILY CANIDÆ

Dog (*Canis familiaris*)

Dogs are, and since long before the beginning of history, must have been the friends and companions of man, and figures of these animals are found among the earliest stone-cuttings and paintings of the ancient Egyptians. Even at that distant day, many different varieties of dogs were known, and certain ones are easily distinguished upon their sculptures, the Greyhound, in particular, being unmistakable. This animal was used then as now, for coursing, or running down, small game, which it was easily able to do on account of its extraordinary speed. At present there are several varieties of that species, and among them the Russian Greyhound, having long silky hair, and the Scotch Deerhound, a rough-coated type, are especially noteworthy.

A prominent variety of dog, the Foxhound, has for many years been kept in large packs, both in England and the United States, for the purpose of running foxes to earth. Much time and money are spent on their education, and great rivalry exists between different packs to determine which is superior. In this country both English and American hounds are used, the latter being simply a longer-legged and more slender animal than the old English hound.

The Bloodhound is a well-known variety about which much interest centres owing to the custom of using it to track criminals. While it bears an evil reputation, it is in reality not savage and will not often attack the person pursued, but merely tracks

him as it would any other game. The Bloodhound's power of scent is extraordinary, and it can follow a trail that is several days old.

The large and handsome St. Bernard originated in Switzerland in the monasteries of that name. These huge dogs, closely resembling the Newfoundlands, are trained by the monks of that country to rescue travellers lost in the snow while crossing the steep mountain passes in various parts of Switzerland. A small box containing food and drink is fastened to the dog's neck and he is sent out on these expeditions. When a half-frozen traveller is found by this intelligent animal, it approaches, digs away the snow, and allows him to take from its neck the food and drink which have been provided, then, returning at top speed to the monastery, leads men who are on the watch back to the traveller, who is thus rescued and taken care of until the storm abates. In other countries, the St. Bernard is simply a canine aristocrat, his duties consisting merely in allowing himself to be admired. As a rule these dogs are not particularly tractable, and, owing to their large size and somewhat disagreeable disposition, are apt to be rather dangerous.

The Dingo, found in Australia, is a small but handsome wild dog, reddish-brown in colour, carrying its tail tightly curled over its back. When settlers first introduced sheep into that country, the Dingo proved a terrible enemy to them and destroyed so many that a bounty was put upon its head, and consequently of late years they are not nearly so numerous.

The Eskimo dog resembles in general form and

colouring the grey wolf, of whom it is no doubt a descendant. It differs from that animal, however, in that it has a long, curly tail, while that of the wolf is straight and stands stiffly out from the body. This dog is of great use to the Eskimos and white men living in the cold countries of the North, where it is trained to drag sledges, sometimes for hundreds of miles, over the ice and frozen snow. It is rather snappy and disagreeable in disposition, probably as a result of harsh treatment and lack of food, but those brought to the United States have proved perfectly gentle, although a little wild and shy. A wolf-like trait is their habit of howling instead of barking. The amount of cold these animals can endure without freezing to death is truly remarkable, and travellers in the North often tell of digging them out from snow-drifts in the morning after a terribly cold night. As long as their food-supply is ample they seem able to stand the very low temperature, but their lot is altogether a hard one. These dogs have been of much service to prospectors and miners in opening up the Klondike region of our own country.

In some European countries several varieties of domestic dog are used as beasts of burden, particularly in Holland, Belgium, and some parts of Germany. The lot of these poor creatures is miserable in the extreme, as the little wagons they are obliged to draw are very heavy for them and they are often roughly treated and ill-used generally.

Of recent years many interesting articles have appeared describing the training of dogs for military use as carriers of messages, sentries, aiders of the

wounded, and so on. This use of the animals is said to have begun in Algiers by the French, and afterwards adopted in Prussia, Italy, Austria, and throughout the world. For carrying despatches, the dogs have a small pack attached to the collar, and the dog is trained to attack any who attempt to remove it except the proper officers. To shoot these dogs while carrying messages is extremely difficult, as they are taught to take advantage of cover, sneaking through tall grass and finding shelter behind fences or rocks, or fallen trees.

For sentry duty a species of dog having keenness of scent is used, as this makes them particularly valuable for keeping watch after dark. Since they can discover the approach of the enemy at a very great distance, these dogs are trained to call attention by low growls, rather than barking.

With the modern rapid-fire rifles, it is difficult to keep the firing-line supplied with ammunition, and dogs are used as ammunition carriers with great success, some of them carrying as much as three hundred cartridges in a sort of pack-saddle. At the firing-line the dogs run up and down to distribute their supply, going after new cartridges as soon as their load is taken from them.

As assistants to the Red Cross service, dogs are especially useful in finding the wounded and guiding the men of the ambulance corps to their aid. At night these hospital dogs carry little lanterns attached to their backs so they can be easily followed.

The African Wild Dog, or Cape Hunting-Dog (*Lycaon pictus*), is a distinct genus and species, but

in character and habits is much like the true dog or wolf. It is a singular-looking animal, the colour being a curious mixture of white, black, and yellow, irregularly spotted over the body and legs; the tail, which, like a wolf, it holds out stiffly, bearing the same colours. The legs are long and muscular, the body very light in build, head broad, muzzle short, and the ears thick, round and enormously large. This animal shows extraordinary persistence in running down large game, usually hunting in packs. A single specimen, however, has been seen pursuing a sable antelope, one of the larger and more powerful species, running as close as possible, giving it a bite at the belly, and then dropping back for a little distance, repeating these attacks until the animal fell. Large packs will run down big game of various kinds, but they will not, so far as we know, attack man. In captivity the African Wild Dog exhibits an immense amount of reserve strength, trotting back and forth in its cage with untiring energy. One that I saw in Paris, some years ago, displayed great fondness for the puppies of a dingo in an adjoining cage, and it was pitiful to see her anxiety to get possession of the little creatures. A fine male specimen that lived for some years in the Bronx Zoölogical Park showed the same restless activity as the one just mentioned. These dogs are very intelligent, and could no doubt easily be tamed.

Most interesting of the canine family are the wild dogs, or Dholes (*Cyon Dukhuensis*) of Asia. There are several varieties, chief being the Red Dogs of the Deccan, one of the provinces of India. These are

really wild dogs, and not wolves. They hunt in large packs, and are said to be so fierce and relentless in attack as often to drive even tigers away from their prey. This particular variety is well named, the animal be a reddish-fawn colour. In Kipling's "Jungle Book" is a very interesting, though somewhat fanciful, account of a battle between a pack of these wild dogs and some wolves, in which these dogs are vividly described.

Throughout the United States several species of wild dogs and foxes are found, among them the enormously large Maned Wolf (*Canis jubatus*) of South America. Although called a wolf, this animal is evidently a fox with extremely long legs, standing as high as two and a half to three feet at the shoulder and in colour much like the red fox. It is said to be a solitary animal and of rather vicious disposition, but is comparatively little known. The remarkably long legs give it an unusual appearance, almost as if it were walking on stilts. The Azara (*Canis azaræ*) is an interesting species found in South America and extending over a very wide range of country. It is a small animal, about the size of a grey fox, and has many of the characteristics of the jackal. The Raccoon-like Dog (*Canis procyonides*) is so named on account of its superficial resemblance to a raccoon, and at first glance one might easily mistake it for a member of that family. It does not walk on the soles of its feet, however, as does the raccoon, but stands up well on its toes like any other dog. It has the extremely bushy tail of the raccoon, but its back is not so much arched in walking.

Of the numerous breeds of Dog we have figured three as examples.

The Black Pomeranian Dog may be taken as a type of the shaggy dogs with pointed muzzles and pointed ears which are usually called Poodles. See Plate 9, Fig. 47a.

The Collie, or Shepherd Dog, has a shaggy coat and large bushy tail, and is an indispensable assistant to the shepherd who has to look after sheep in the open country, especially in mountainous districts. See Plate 9, Fig. 47b.

The Bulldog is of various sizes and colours, being frequently black and white, and sometimes brown above and white below, as in our figure. The muzzle is short, the jaws drooping, and the whole aspect of the animal fierce and forbidding. See Plate 9, Fig. 47c.

Wolf (*Canis lupus*)

This animal is found in all the northern countries of the world, including Siberia, Russia, and northern Europe in general, as well as in the forests and mountains of our own country. From time immemorial the Wolf has been regarded with fear and distrust by man, and probably in earlier days was one of his greatest enemies. Owing to its habit of travelling in large packs, usually in a half starved condition, man had good reason to dread this powerful and aggressive animal, and many stories are told by travellers and hunters of desperate encounters with these beasts, which—particularly in Russia—have been known to run down sledges and devour the horses and occupants. When not pressed by hunger, however, the



48. Jackal (*Canis aureus, var.*).



49. Arctic Fox
(*Canis lagopus*).



51. Fox
(*Canis vulpes*).

50. Wolf (*Canis lupus*).



52. Striped Hyæna (*Hyaena striata*).

53. Spotted Hyæna (*Hyaena crocuta*).

55. Puma (*Felis oncolor*).57. Jaguar (*Felis onca*).56. Tiger (*Felis tigris*).

Wolf, like other wild animals, is shy of man. In America, on account of the more abundant food-supply, it is not so much dreaded as in European countries, although it is a terrible foe, particularly in winter, to the cattle and horses of the Western plains, and even to this day large bounties are paid in many States for its destruction. Wolves of the Hudson Bay region grow to an enormous size and are covered with a splendid coat of bushy hair.

In character the Wolf is singularly dog-like, and if taken young it may be tamed so that it often becomes an affectionate pet, though the wolf can hardly be said to be as trustworthy as the domestic dog, which has had centuries of training. One specimen that had been brought up by a Russian lady and afterwards presented by her to the Zoölogical Garden in Paris, showed a most affectionate disposition. She learned to know me, and on my approach would thrust her feet as far as possible through the bars of her cage and try to draw me towards her. When patted, she would exhibit all the marks of ecstasy shown by a domestic dog, and it was sad indeed to see this intelligent and docile animal behind the bars of a cage.

In form the Wolf somewhat resembles the collie dog, but is much longer-legged and more powerful in build. The pointed ears remain upright at all times, and the head is very broad between them, owing to the enormous muscles which cover the top and give the terrible biting power for which it is noted, the teeth and jaws also being eminently constructed to destroy. The bite differs from that of the domestic

dog in that the Wolf does not seize and hold its food, but endeavours to dispose of it by a series of rapid snaps. The tail is one of the chief characters wherein it differs from the dog, this member being always carried out perfectly straight from the body, raised or lowered in fear or anger, but never curled over the back. See Plate 10, Fig. 50. Wolves have a number of young in a litter, and the mother is very careful of the puppies, taking great pains with their education and training until they are able to care for themselves. These animals exhibit a great degree of cunning in avoiding traps and poison placed for their destruction.

Wolves hunt either singly or in packs, but in North America do not run in as large numbers as in Europe, the packs usually varying from six to eight. The ordinary gait is a long, swinging stride, quite different from the step or walk of the domestic dog, and in pursuing prey wolves fall into a tireless gallop, and will follow a track for miles.

In North America, found throughout the Western and Southern States, is a smaller form known as the Coyote, or Prairie Wolf (*Canis latrans*), particularly detested by Western travellers for its disagreeable habit of howling at night. A number will approach near to a camp, and, sitting on their haunches, will utter for hours at a time the most discordant wails possible to imagine. While not so powerful nor so courageous as its larger cousin, the wolf, the Coyote is nevertheless a terrible foe to smaller domestic animals, such as sheep and poultry. Its speed is considerable, though a good greyhound is often used

to run it down. This animal may be easily domesticated, but it has an unpleasant trick of snapping without provocation.

Jackal (*Canis aureus*)

The Jackal is a more southern animal than the wolf, and has a considerable range, different species being found in northern Africa, western Asia, India, and adjacent islands. It is a much smaller animal, measuring from two to two and a half feet in length, without the tail, and varies much in colour from yellowish-grey to a mixture of grey and black, the melanistic, or black, form and the albinistic, or white, also occasionally being seen. See Plate 10, Fig. 48. Like the coyote, to whom it is allied, this animal is cowardly, and even when hard driven by hunger will not attack man, but preys upon small animals and carrion. The howl, or cry, that it emits while prowling about towns in Eastern countries, is said to be penetrating and nerve-racking in the extreme.

Fox (*Canis vulpes*)

The Fox is easily distinguished from its allies, the dogs and the wolves, by its eyes, the pupils of which are vertical instead of circular, by its large, pointed ears, long slender muzzle, and extremely bushy tail. It is found in many parts of the Old and the New World, and makes its home in burrows which it digs in the earth—though it is said sometimes to appropriate those of the badger, when more convenient.

North America is particularly rich in varieties of the common Red Fox (*Vulpes fulvus*), the usual

colour of which is reddish-fawn. See Plate 10, Fig. 51. Closely allied, if not of the same species, are the Cross Fox and the Silver Fox, inhabiting the northern part of this country, both much larger than the commoner form, and from the fact that they live in colder climate throughout the year, having much longer and denser fur. The Cross Fox received its name from the fact that there are two distinct marks forming the shape of a cross on its shoulders. The main colour of the fur in this variety is pale yellow, the stomach and under parts being black instead of white, as in the Red Fox. Several large and beautiful varieties are found in Alaska, among them the comparatively rare Silver Fox, which is also simply a phase of colour of the Red Fox. The skin of this animal is very valuable, fine specimens costing several hundred dollars. The upper parts are black or very dark grey, tipped with white, giving the pelt a beautiful silvery or frosted appearance.

The Grey Fox (*Vulpes cinereo-argentatus*) is a well-marked species found in the northern part of the United States, a smaller animal, and differing from the Red Fox in many ways. It is not nearly so swift of foot, and the colour and texture of the fur are quite different. The back and sides are a silver-grey, with a darker streak down the middle of the back and extending along the tail, the under parts are white, and just behind the ears and down the sides of the neck the colour is deep rufous, or reddish, while the hair is coarser and more bristly in character. The ears also are smaller, and the nose is not so sharply-pointed.

The Grey Fox is seldom hunted with dogs, as is the Red Fox, from the fact that it runs at once to its hole and does not give the hounds a long chase. In habits it is similar to the others, feeding on nearly all the small mammals and birds it is able to catch, but is not so destructive to domestic animals, nor does it display so much cunning as its larger relative. A small but very beautiful Fox found in the western parts of the United States is the Kit, or Swift Fox, of a delicate yellowish-grey on the back and pure white underneath. The fur is extremely fine and soft in texture, and the little animal is most graceful and pleasing in appearance.

Arctic Fox (*Canis lagopus*)

Inhabiting the extreme north of Europe, Asia, and North America, is the Arctic Fox, a smaller form than the common red fox, and having long, thick hair that covers even the soles of the feet. In summer it is a bluish-grey colour, when it is sometimes called the Blue Fox, but in winter the fur becomes perfectly white, a case of a change in colour that helps to protect the animal from being plainly seen against the snow—a “protective colouration.”

Arctic Foxes at one time were common in the Pribilof Islands, off the coast of Alaska, and now are protected there by the United States Government and bred for their skins. They feed on the dead seal-pups, which are found in considerable numbers at certain seasons of the year on the islands, and upon the various fish and crabs washed up on the shores. The ears are very much shorter than those of the Red

Fox, and the eyes are darker brown, so that the animal has not the acute and cunning, so-called "foxy," expression of its southern relatives. The claws are very long and sharp, probably because it lives on soft and yielding ground and snow. See Plate 10, Fig. 49.

FAMILY MUSTELIDÆ (WEASELS)

These animals, the true Weasels or the allied forms, are found in all parts of the world except Australia and neighbouring islands, and all the members of the family are noted for their bloodthirsty character and their habit of killing and destroying much more than they can possibly eat. On gaining entrance to a poultry-house at night, a Weasel will kill all the fowls within reach, but suck the blood of only one or two. For this reason it is a dreaded and detested animal, and every possible means are used for its destruction. All are great fighters and very aggressive. They have extremely long and sinuous bodies, short legs, small and narrow heads, and are remarkably snake-like in build. The muscles of the neck and head are very powerful, and a small Weasel, but eight or nine inches in length, is able to give battle to, and to kill, the largest rat. These animals have a curious dog-like habit of tracking their game by its odour, and have been seen running up and down the bank of a stream seeking a scent that has been lost in the water. They will often travel long distances in pursuit of prey.

The Mink (*Mustela vision*) is a well-known form found in the northern and eastern parts of North



35. Beech Marten (*Mustela foina*).



36. Pine Marten (*Mustela martes*).



37. Weasel (*Putorius vulgaris*).



38. Ermine
(*Putorius erminea*).



40. Polecat (*Putorius foetidus*).



39. Sable (*Martes zibellina*).



41. Otter
(*Lutra vulgaris*).



43. Ferret
(*Putorius furo*).

42. White-backed Skunk (*Conepatus mapurita*).

America, always near streams, since it is very fond of fish and is a good swimmer. A larger animal than the common Weasel, it is usually dark brown in colour—one variety being almost black—and the skin is greatly in demand for use as articles of clothing. In common with the rest of its tribe, the Mink is an enemy to other small animals and to birds, robbing nests and killing wholesale anything it can catch, and often destroying whole flocks of ducks and chickens in a single night, apparently simply for the love of killing. Minks are often caught in traps set in runways which they themselves make to and from the water.

Beech Marten (*Mustela foina*)

The Beech Marten, or Stone Marten, as it is sometimes called, ranges over a large part of Europe and Western Asia. It is light greyish or brownish above, paler underneath, with the throat and part of the breast pure white. See Plate 8, Fig. 35. It is not so exclusively tree-living as the succeeding species, but often takes up its abode near farm-houses, and is very destructive to poultry, although it also eats snakes, frogs, rats, and the like, prowling about at night in search of prey, and showing great cunning in avoiding traps set for it.

Pine Marten (*Mustela martes*)

This species differs in colour from the preceding in that the throat and breast are yellow instead of white. See Plate 8, Fig. 36. It is found in Northern and Central Europe, inhabiting chiefly pine forests, but is occasionally seen about farm-houses. In the

evening, and sometimes during the day, this animal may be seen among the stumps and low bushes of the woods, but it is shy and shuns observation, flattening itself down and concealing itself as much as possible.

The American Pine Marten (*Mustela americana*) is similar in habits to the European form.

Sable (*Mustela zibellina*)

In colour darker and richer, sometimes of a bluish-brown, this animal is by some naturalists regarded as simply a variety of the pine marten. See Plate 8, Fig. 39. It inhabits the eastern part of Siberia and Kamtchatka, dwelling in thick forests, especially near rivers, and making its nest in hollow trees or in burrows in the ground. The long and fine fur is the most valuable of any in the markets of the world, and has constant sale in all countries, particularly in Russia, where members of the Royal household spend immense sums annually for garments made from it. There is never enough to equal the demand. The pine marten of America is commonly called sable.

Polecat (*Putorius fætidus*)

The polecat is a slightly smaller animal than the martens, and is sometimes placed in a different genus. In colour it is very dark brown, with the inner fur pale yellow, and the head marked with black and white. See Plate 8, Fig. 40. Common in nearly all parts of Europe and in some sections of Asia, it has been nearly exterminated in the British Islands. Like most of its tribe, it is a great enemy to poultry and

small game, and is fond of eggs and honey. When injured or irritated, it emits an extremely unpleasant odour.

Ermine (*Putorius erminea*)

The Ermine, or Stoat, is found throughout North America as far south as Mexico, in Europe, and Central and Northern Asia, the species being much the same in all countries. It measures nine or ten inches in length, exclusive of the tail, which is short, heavily furred, and bears a black tip. See Plate 8, Fig. 38. In summer, and more or less in winter in temperate climates, the fur is reddish-brown above and yellowish-white below, but in far northern countries the animal becomes quite white in winter, and the fur very long, the tip of the tail, however, always remaining black.

Ferret (*Putorius furo*)

The true Ferret is closely allied to the polecat and is often crossed with it, but its range is different, covering the northern part of Africa. The colouring is generally of the albino type, a cream white, or pale yellow, with pink eyes. See Plate 8, Fig. 43. This animal has been partially domesticated and is used to catch rats and to drive rabbits from their burrows, but it shows no attachment to people, is unintelligent except in the pursuit of its prey, and is therefore uninteresting as a pet. Like most of the other members of the weasel family it is voracious and bloodthirsty in character.

The Black-footed Ferret (*Putorius nigripes*) is an allied species found in the western part of the United States.

Weasel (*Putorius vulgaris*)

The Weasel is one of the smallest animals in this family, being only about seven or eight inches in length, without the tail, which is between two and three inches longer. The colour of the fur is reddish-brown above and white beneath, and the tail is not tipped with black, as in the ermine, or stoat, nor does the animal turn white in winter. See Plate 8, Fig. 37. It destroys great numbers of rats and mice, and the benefit thus conferred on the farmer is considered to outweigh its attacks on poultry. The slender, snake-like body enables it to push through very small crevices, and it usually kills by driving its sharp teeth through the skull into the brain. The common American Weasel is a larger animal than the European, reddish-brown above and silvery-white below, but in habits is like the Old World species.

Glutton or Wolverene (*Gulo luscus*)

Common in the north of Europe, Asia, and in North America, where it is known as the Wolverene, this creature is one of the strangest forms of the weasel family. The body is bulky, from two to three feet in length, the neck short and covered with long hair, the tail thick and bushy, the feet large and horny and equipped with strong, curved claws. See Plate 7, Fig. 32. It lives chiefly in forest country, where it attacks and kills even such large animals as reindeer and cattle, leaping on them from trees and attacking the throat with the teeth. The Wolverene

bears probably the worst reputation of all animals, trappers and Indians of the Northwest regarding it almost with superstition. It shows extraordinary cunning in following up a line of traps, killing and devouring the small game in them, and often undoing and destroying a whole winter's work. Not content with devouring the animals caught, it pulls up and damages the traps to the greatest possible extent, often burying them in the snow some distance away from where they have been set. For its size, it is one of the most ferocious and terrible of all animals. In running it has the curious galloping gait common to the bears, and in reality it may be said to resemble a cross between a small bear and a large weasel. The fur, a most beautiful brown in colour, long and silky, with a curious whitish tinge around the sides and small white spots on the throat, is very valuable. The Wolverene never becomes accustomed to captivity, always exhibiting the fiercest possible demeanour when caged.

White-Backed Skunk (*Conepatus mapurito*)

The common Skunk of America (*Mephitis Mephitis*) is celebrated not so much for its beauty, which is considerable, as for the extraordinarily disagreeable liquid which it projects at will when alarmed or pursued. The strength of its odour is remarkable, being distinctly noticeable for a great distance from the animal, and remaining in the air for days. Naturally, it is a powerful protection from dogs and other animals. Strangely enough, one of the principal enemies of the Skunk is the great

horned-owl, and specimens of this bird are almost never found without some trace of the odour of the Skunk about them. The fur is very beautiful, brilliant and shining, and is much used, under the name "Alaska sable."

In captivity this animal exhibits considerable intelligence and becomes quite affectionate. Two large specimens that were kept for some years in the Washington Zoölogical Park became perfectly tame, allowing their keeper to go in their cage and handle them freely, and never on any occasion throwing out the offensive liquid. The female produces several young at a time, and the mother and her babies on their pilgrimages for food are a very pretty and interesting sight. The tail is large and bushy, and is carried in a beautiful curve over the back. There are many varieties of Skunk in America, some of them brown and white. The White-Backed Skunk, figured here, is found all over South and Central America, and as far north as Texas. It is put in a separate genus from the common Skunk of the northern parts of the United States, differing somewhat in structure and in marking. See Plate 8, Fig. 42.

Badger (*Meles taxus*)

The Badgers and skunks differ from the true weasels in having long feet with straight toes and slightly-curved, blunt, and exposed claws. The species figured is a native of Europe and Northern Asia, and has a much longer head than the badger of this country. It measures nearly three feet in length, including the tail, the upper surface is red-

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Badger (*Meles taxus*)

The Badgers and skunks differ from the true weasels in having long feet with straight toes and slightly-curved, blunt, and exposed claws. The species figured is a native of Europe and Northern Asia, and has a much longer head than the badger of this country. It measures nearly three feet in length, including the tail, the upper surface is red-

dish or yellowish-grey, the lower parts black, the head black and white. See Plate 7, Fig. 34. The Badger is still common in the British Islands, and is the most bear-like animal found there. It makes burrows in the ground, in which it sleeps during the day, is omnivorous, feeding on any small animals obtainable, as well as on roots and fruits, and is torpid during the winter season. Badger-baiting was formerly a popular amusement in England.

The American Badger (*Taxidea americana*) is a larger and more powerful animal than the European, and varies from it in colour, but is similar in habits. Owing to the very long hair which grows out from either side of the body, it has a curiously broad and flat appearance, often measuring a foot across the back, while only a few inches in height. The colour of the fur is a beautiful silver-grey with a kind of salmon-tinge next the skin, the feet and parts of the face being black. This hair is used commercially in many ways, principally in the making of brushes for the use of artists and painters in general. The Badger is easily tamed and has many playful and interesting ways, but is a terrible fighter when attacked, and will defend itself to good advantage against large and powerful dogs. Although comparatively small in size, it has enormous muscular power and apparently sinks into the ground with the greatest ease, digging rapidly by the use of its strong feet and claws.

Otter (*Lutra vulgaris*)

The Otters differ from the weasels chiefly in their semi-aquatic habits. The feet are short and rounded

(except the hind-feet of the Sea-Otter), the toes webbed, with short blunt claws, the head broad and flattened, the body and tail long. The common Otter lives on the shores of rivers and lakes throughout Europe and a great part of Asia, and in Northern Europe is sometimes found on the sea-shore. It is about two feet in length, without the tail, is reddish-brown in colour, and the East Indian species (*Lutra nair*), especially, is more or less varied with white. See Plate 8, Fig. 41.

The American Otter (*Lutra canadensis*) closely resembles the European in form and habits. The fur of this animal is a beautiful deep rich brown, extremely glossy in texture, and is much in demand. The Otter is among the most interesting of all the smaller animals. When in the water it is in a constant state of activity, gambolling and playing about in a manner that is delightful to see, and its motions are the perfection of grace as it twists and turns about in search of food. Although so gentle in appearance, it is a determined fighter, and its extraordinary suppleness enables it to twist about in any direction in order to bite. The Otter has a very wide range throughout North America, being found from the northern to the southern limits.

In the Southern States is a large variety having, naturally, shorter fur than the northern forms. A specimen that I saw during a stay in Florida, some years ago, exhibited some curious characters. It was perfectly tame, could be handled freely, and was allowed to run at large in the little town in which its owner lived. A close friend and almost constant

companion was a large hound which it persisted in following about on all possible occasions, and to see this dog trotting slowly along the streets and the Otter galloping after him as fast as its short legs could carry him, was a strange and most amusing sight. The moment the hound lay down, the Otter would climb upon his back, curl itself into a tight ball, and go to sleep. It would often go to the river nearby to catch fish, invariably returning to its home afterward; and when given a dead fish to eat would throw itself on its back, hold the fish in its paws, and suck and bite on it and act much as a baby would with a bottle. Altogether, this was a most charming little creature, fat and round, and very active and intelligent in all its movements.

Although such a graceful swimmer, the Otter is rather awkward on land, loping along in an ungainly manner and at times standing erect to survey the landscape. When walking, the back is very much arched in a curious manner—a marked character, but one that is never shown in the stuffed specimens seen in museums.

For some reason not satisfactorily explained, Otters have a habit of making what is known as "otter slides." At certain places along a stream they will select a spot down which they slide into the water, and by constant use this becomes polished like a toboggan-slide, and the animals may be seen running to the top and sliding down into the water.

Sea Otter (*Enhydra lutris*)

Found on the Asiatic as well as the American coasts and islands of the North Pacific, the Sea Otter is considerably larger than the common otter, measuring four or five feet in length, including the tail. It has short, rounded toes on the front feet, and long toes on the hind feet; very strong and blunt teeth, fitting it to feed on shellfish as well as on fish. The Sea Otter is of a dark brownish colour, with grizzled hair, paler beneath, the head and sometimes parts of the body more or less white. See Plate 9, Fig. 44. It is almost aquatic in habits, the young being born at some distance from shore on floating beds of seaweed. At certain times, the Indians organise large expeditions and go out in canoes to the breeding retreats, and there destroy as many as possible. Indeed the animal has been so persecuted on account of its extremely fine and valuable fur, that it is now practically extinct. Comparatively little is known of its habits, since the young are reared at sea.

FAMILY PROCYONIDÆ (RACCOONS)

These animals are almost exclusively American, though one genus, *Ælurus*, scarcely differing sufficiently to be placed in a distinct family, is found in India. They are small animals that walk wholly, or partially, on the soles of their feet, and have long ringed tails.

Raccoon (*Procyon lotor*)

The Raccoon, common throughout a considerable portion of North America, is a small bear-like ani-

mal with a thick body, pointed muzzle, the face marked and the bushy tail ringed with black and white, the fur greyish brown, fine and soft. Plate 7, Fig. 33. It feeds on all sorts of animal and vegetable substances, is nocturnal in habits, sleeping during the day, and in cold climates hibernates in hollow trees. The Raccoon has a curious habit, and one not fully understood, of washing its food in water before eating. Among the Southern negroes, particularly before the Civil War, hunting this animal by torchlight was a favourite amusement, large parties going out on moonlight nights in search of it. The men were accompanied by dogs that trailed the Raccoon to a tree, when it was either shot from its perch or the tree was cut down. A determined fighter when attacked, it will, if possible, retreat to water and try to drown its enemies, seizing and holding them under the water to the best of its ability.

Red Coati (*Nasua rufa*)

The Coati of South America closely resembles the raccoon in general habits, though not in appearance, having an extremely long and delicate, slightly upturned nose, and a long and pointed tail that is carried upright above the back in walking. See Plate 6, Fig. 29. It is a tree-living animal, larger than the raccoon, and defends itself with the same bravery. The long snout is a very useful member, the animal running about and poking it into the crevices and holes of trees in its search for food. There are several species of this creature, but they differ little except in the colour of the fur, which in some is

quite red and in others a dark brown. It has not the strange trick of washing its food in water, like the raccoon.

FAMILY URSIDÆ (BEARS)

These animals are among the most interesting, as well as the largest, of the carnivora. Although placed in the distinctly flesh-eating family, in reality many of the members rarely feed on flesh at all, their diet consisting of roots, fruit, and nuts, and many of the forms seldom eat animals larger than small grubs and insects. Bears are extremely playful in their habits, much given to wrestling and boxing with one another, showing great skill and agility in tumbling about, and warding off each other's blows as two prize-fighters might. Nearly all the species are fond of water, and delight in soaking themselves for hours at a time. All have extremely sensitive noses, which in some species are also very pliable and movable. The lips, as well, are mobile, and the animal does not drink by lapping, like the lions and tigers, but by sucking the water into its mouth. The large and powerful legs are much bent inwards, in many species the front feet almost crossing each other when walking, and all are immensely muscular, getting over ground at great speed when necessary. The northern forms hibernate in winter, going into some den, or hole under a tree, and there remaining in a deep sleep until spring. Before retiring, they grow enormously fat, and this surplus fat sustains them during their long sleep. Southern species, such as the Sloth Bear of India and the Malayan Bear, I believe, do not have this habit.



31. Polar Bear (*Ursus maritimus*).



32. Wolverine (*Gulo luscus*).



33. Raccoon (*Procyon lotor*).



34. Badger (*Meles taxus*).

On the North American continent there are two well-marked species, the Black Bear (*Ursus americanus*) and the Grizzly (*Ursus ferox*). The former is much the smaller, large specimens weighing from four to five hundred pounds, and is a less formidable creature in every way. It has a wide range, and at one time was common throughout the eastern parts of the United States, extending into Florida. The head and feet are comparatively small, the ears very large, and rounded at the tips, and in winter it is covered with a dense soft fur through which protrude shining black hairs of considerable length. It has no definite mane, as has the Grizzly, and the claws are much sharper in comparison and more delicately made. The Black Bear is fond of almost every sort of food, eating, at different times of the year, berries and other fruit, grubs and insects, which it digs up from about the roots of trees, and also fish, which it deftly whips from the water with a stroke of its paw. It climbs trees with great facility, particularly when young, and often robs the bees in order to obtain honey, of which it is very fond. At such times, though it may be severely stung by the angry bees, the bear endures the agony for the sake of the reward. This animal is often hunted and tracked with dogs, and when the female has young ones with her, she defends them with great courage and agility. At other times, the Black Bear can hardly be said to be eager to fight, running away as fast as its legs can carry it when suddenly coming face to face with a hunter. Like most Bears, it has a habit of standing upright when alarmed or interested.

Particularly in the Western part of the United States, there is a form of the Black Bear known as the Cinnamon, in every respect a counterpart except in the matter of colour, which is often of a deep brown or cinnamon. It has been conclusively proved, however, that it is but a variety of the same animal. Of late years several other well-marked varieties have been discovered in the northwestern parts of British Columbia and Alaska, one of them the Glacier Bear, with a kind of grey, or smoke-coloured fur, another almost white. The Black Bear well exemplifies the extraordinary range of colour that may occur in one species, running from almost pure white to jet-black through the various shades of brown and grey; and it is almost impossible ever to find two bears of exactly the same colour. The young of the Black Bear are very pretty and playful little creatures, and are often kept as pets by hunters. They soon become tame and can be taught many interesting tricks.

The Grizzly Bear of our Western States is one of the largest and most formidable species in existence. This huge creature has been estimated to weigh a thousand pounds, or more, and it was formerly much dreaded by Indians and hunters of the plains. Of late years, however, having learned a wholesome fear of bullets, it is with difficulty that a shot at this wary animal is obtained. In the Yellowstone Park, owing to the protection afforded them, they have become rather tame, and one may see them at times feeding on the refuse thrown out by the various hotels of the national preserve. The Grizzly, like the Black,

varies immensely in colour, according to individuals and the region in which it is found. It has a very characteristic head, a rather long and black snout, the tip of which is upturned something after the manner of the pig's nose, and there is a definite mane, or crest, extending along the back of the neck. The claws are long and powerful, and are used in turning over logs and stones to obtain ants and other insects which it seeks for food, and also to defend itself in case of attack. A blow from these terrible claws has been known to tear a man's head almost from his shoulders, and Indians tell thrilling stories of their encounters with these animals. An Indian brave of the old days who could boast a necklace of Grizzly Bear claws was considered a great man in his tribe, and it took a bold man indeed to attack and overcome one of these ferocious creatures.

The legs of this Bear are very long in proportion to its size, the fore limbs being particularly so, the body sloping down both ways from the shoulders. In former times the Grizzly fed chiefly upon the bison that roamed the plains in great herds, but of late years, owing to their extinction, it has become a great foe to domestic cattle and horses. Although apparently clumsy and ungainly, the speed of this animal for a short distance is remarkable, comparing even with that of the horse. A Grizzly has been seen to rush out and pursue a herd of cattle, striking down one of the hindmost steers with a blow of its paw. When wounded, the animal will endeavour to get away, but if cornered, will make a determined fight, rising on its hind legs and rushing forward to grapple

with its antagonist; at such times, with mouth held open and the small ears laid back flat on the head, it has a most terrifying appearance. The eyes are so small as to be hardly visible in the head, and as a matter of fact, no Bear has very keen vision, depending for safety upon its extraordinary sense of smell and its hearing.

A variety known as the Silver-tipped Grizzly owes its name to the colour of the fur, which has a whitish, or grizzled, appearance.

In Alaska and the Island of Kadiak is found a species of Bear known as the Kadiak, somewhat resembling the Grizzly and also the Brown Bear of Europe. Specimens of this huge creature have been known to weigh fifteen hundred pounds and to reach a height of five feet or more at the shoulder. It has an enormous head, measuring as much as eighteen inches in width and eighteen inches in length in the skull alone, and with flesh and hair added it is of course much larger. The nose of the Kadiak is much shorter in proportion to the size of the head than that of the Grizzly, and this gives the face a stumpy appearance. The legs are extremely long, and the fur is of a softer and more woolly quality than that of the latter animal. This Bear has been known to the Alaskan hunters on the island for a number of years, but its numbers are steadily diminishing, owing to constant hunting. In consequence of the limited range of the Kadiak, its food is rather singular, consisting, in summer, of grass, on which it browses much like a cow, and of berries; and in the spring it goes down to the river banks and there catches and

eats the salmon, which at that time are passing up the rivers in enormous numbers to spawn.

The Yakutat Bear, a similar form, is found upon the mainland immediately adjoining the island of Kadiak. Specimens which I have seen measured ten feet in height, when standing erect, and the immense bulk of one that is at present in the Zoölogical Park at Washington is apparent at a glance and dwarfs into insignificance the largest grizzly in the collection.

Polar Bear (*Ursus maritimus*)

This Bear, found in the Arctic regions, is probably the largest of all existing species. In form it differs markedly from any of the preceding, having a very long neck, a small head, and shoulders lower than those of the others, the highest part of the animal being in the centre of the back. The feet are enormously large and powerful, the black claws comparatively short, and in winter the bottoms of the feet are covered with a thick coat of coarse hair that prevents slipping on the ice. See Plate 7, Fig. 31. In character the Polar Bear is less suspicious than the other forms and less difficult to shoot, and its speed when running is not so great. In captivity it evinces remarkable restlessness, swinging its long neck and head from side to side, often for hours at a time, in a most tiresome and exasperating manner. Though rather dull and stupid in disposition, it has been trained to do many tricks, and is often exhibited in shows of trained animals. The fur of the Polar Bear has a soft appearance, due to its delicate cream-white colour, but it is really very

stiff and coarse in texture. The yellow in the fur deepens as the animal grows older, but the skin itself is almost black, the end of the nose and the lips partaking of this deep colouration. The eyes are dark in colour and rather larger than those of most Bears, the head is very long and flat, there being no division between the nose and the back part, the ears are small, well furred to the tips, and set close to the sides of the head. A magnificent swimmer, as might be supposed, since its principal food lives in the water; it is said also to wait at seal-holes until the seal comes up to breathe, and then by a dexterous stroke of the paw, to drag the unsuspecting victim from the water. It is also able to plunge in and catch fish, and has been seen by various Arctic explorers swimming many miles out at sea. Occasionally one is carried south on a floating iceberg. The young are born in the spring, and at that time of the year, the ground being covered with snow, the mothers and babies remain in caves for several weeks before emerging.

Brown Bear (*Ursus arctos*)

Exclusively an Old World form, the Brown Bear extends throughout Europe and a great part of Asia as far as the Himalayas, and has been celebrated for many years in song and story. In general habits it closely resembles the grizzly, and is often with difficulty distinguished when specimens of the two kinds are in the same cage. It is clothed with long shaggy brown hair, the eyes and ears are small, and it is shorter-legged and more chunkily-built than the grizzly. See Plate 6, Fig. 30. Though possessed

of enormous strength and tenacity of life, it is not known to prey upon large game. In Russia this Bear has for many years been regularly hunted by the aid of dogs, and at such times it defends itself vigorously, often killing or wounding several of its assailants before being despatched; and in England, long after Bears became extinct in the wild state, they were reared, or imported from abroad, for the favourite sport of bear-baiting.

A number of other species of Bear are found in Europe, but they do not differ in general character from the Brown Bear.

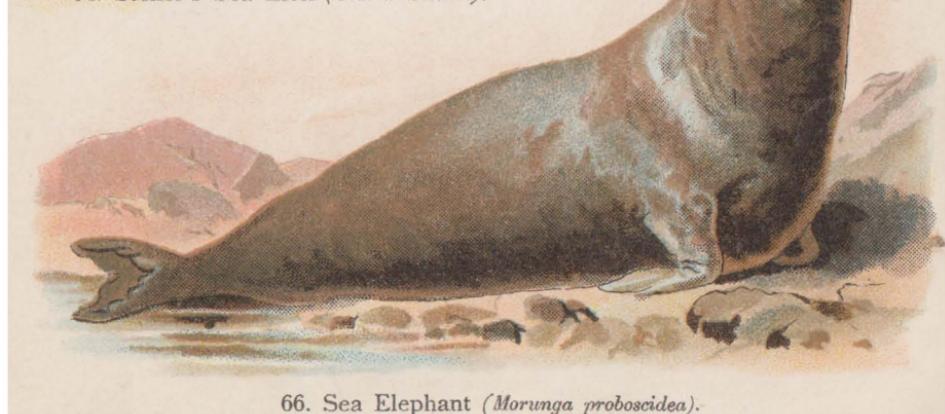
A large and interesting species is the Yezo, found in certain parts of Japan, somewhat resembling the black bear of our own country, but considerably larger and more formidable. The Sloth Bear (*Melursus ursinus*) of India is an extraordinary form differing much from the others. It has short legs, ears enormously large and hairy, nose and lips very pliable and often projected at great length when feeding. The hair is long and coarse, hanging down on both sides of the back, and the front feet are turned inwards, giving a pigeon-toed appearance when walking. It is a small animal, seldom weighing more than two or three hundred pounds, is extremely grotesque, and plays many singular antics.

The Himalayan Bear (*Ursus isabellinus*) is an other well-marked species, somewhat like the black bear, but more heavily-built. The ears also are larger and more rounded than in our own bear, and the animal usually has a white streak across the breast.

The Malayan Sun Bear (*Ursus malayanus*) is an interesting and curious animal, chiefly notable for an almost total lack of hair, the little it has being very fine and sparse. It is, however, a thick and stockily-built animal and very powerful for its size, which is not great, large specimens weighing not more than a hundred and fifty or two hundred pounds. In captivity this Bear is singularly active and restless, tumbling and turning about in all kinds of attitudes. Two that are in the Philadelphia collection are very interesting from their constant gambols with each other, wrestling and fighting like two men, and at times performing all sorts of tricks in order to obtain peanuts, of which they are very fond. The colour of this Bear is black, with a rather greyish appearance about the muzzle and a curious orange-coloured patch across the throat. The head is thick-set and heavy, the ears are small, the feet large and powerfully made, the claws very long and curved. It runs with great agility and climbs trees with facility, and although such a small animal, is no mean antagonist, being very strong and muscular.

FAMILY PHOCIDÆ (SEALS)

These animals are now regarded as forming only a sub-order of the carnivora, under the name *Pinnipedia*. They are almost entirely aquatic, chiefly marine, and feed principally on fish. The body is bulky, rather long, and generally clothed with smooth hair; the legs are very short, the feet large and provided with five toes connected by a web, converting them into paddles; the tail also is short and

63. Walrus (*Trichecus rosarius*).64. Steller's Sea Lion (*Otaria Stelleri*).66. Sea Elephant (*Morunga proboscidea*).

flattened. Seals live in herds, and gather in large numbers in so-called "rookeries," generally on rocks on the shores of islands, to rest or to breed. They swim well, but cannot progress very rapidly on land. These animals are most numerous in the colder seas of the Northern Hemisphere, though some species are found in the colder part of the southern seas.

Walrus (*Trichecus rosmarus*)

The Walrus is the largest of the European members of this group, and is distinguished from all the others by the immense development, in the adult animal, of the upper canine teeth, which form two enormous tusks from one to two feet in length, highly valued as ivory. On each side of the mouth is a tuft of thick bristles. In appearance, the Walrus differs from all the other seals on account of the extraordinary number of wrinkles on the surface of the skin, which cross the body and neck. These are simply folds in the skin, which, owing to the enormous weight of the animal, sink into deep fissures on the body. In colour it is a light golden brown, or grey, and while the young are well covered with hair, the older males become almost hairless. The eye is said to be of a light bottle-green colour, and the pupil so small as to be practically invisible. See Plate 14, Fig. 63.

The Walrus measures from ten to fifteen feet in length, is a sub-arctic animal, and was formerly much more abundant than at present on the north coasts of Europe. Its food is said to consist largely of shellfish and crustacea, but it will also eat fish.

*Common Seal (*Phoca vitulina*)*

The Common, or Harbour Seal, is found in the waters along the Atlantic coast of the United States, as well as along the shores of Europe and Asia. It is not a large animal, seldom exceeding five feet in length, is yellowish-grey above, blotched and spotted with dark brown, and the under surface of the body is white. See Plate 14, Fig. 65. The young, however, are almost pure white, and do not have the spots shown in the parents. The Harbour Seal is a very intelligent animal, and when alarmed, it has a curious habit of standing upright, with its head just above the water, in order to take observations. At such times its appearance is singularly like that of a man, and it is quite probable that the old legends of mermaids and mermen arose from seeing Seals in this position. The eyes are large, very full, and dark in colour, and the animal has an unexplained habit of opening and closing its nostrils. On account of the shortness of its flippers, it has neither the ease nor the grace in swimming that belong to some of the eared seals. On land it travels with considerable difficulty, and is not able to raise itself from the ground by means of its flippers, but progresses by a curious shambling motion of the body, which lies close to the ground; the hind flippers being held straight out behind, are of no use in propelling it forward. The tail is very short, in fact almost invisible. This Seal is easily tamed, and exhibits great affection for and interest in its keeper, following him about to the best of its ability, or coming forward when called.

Sea Elephant or Elephant Seal (*Morunga proboscidea*)

This is one of the largest of the marine mammalia, exceeded in size only by the larger whales, being very bulky and growing to the length of twenty or thirty feet. Its colour is of a lighter and darker grey, and the adult male is furnished with a peculiar proboscis-like snout, somewhat resembling on a small scale that of an elephant. See Plate 14, Fig. 66. This is capable of being inflated and extended. The canine teeth are very large, and are used by the males in their frequent contests. There are probably two species of Sea Elephant, one found off the coast of California and Mexico, the other in more southern waters of the Pacific Ocean.

Steller's Sea Lion (*Otaria Stelleri*)

In the Seals we have been considering, the external ears are small or lacking altogether, but in the genus *Otaria* the ears are very distinct, though short. The Steller, largest of known Sea Lions, is an enormous creature, measuring as much as ten or fifteen feet in length, but its range does not extend as far south as that of the California Sea Lion, though occasional specimens are seen on the seal rocks near San Francisco. Its principal home is on some of the more isolated islands off the coast of Alaska, such as the Pribilof group, which is always occupied by the fur Seals. Male Sea Lions are of huge bulk, particularly in the region of the neck and shoulders, the females being much smaller. Although such a

large animal, it is credited with being extremely timid, notwithstanding that the males fight each other with great ferocity and courage. The voice is a loud roar, or bark, and seems but to emphasise the dull and lonely character of the coasts on which it lives. The skins of this species are greatly in demand by the Eskimos of the northwest coast of America for use in making their boats. Several skins, after being stretched over a framework and dried, are required in the construction of a large canoe. The fore flippers of the Steller Sea Lion are enormously developed, and enable it to sit in the curious upright position that serves to distinguish it from all the other Seals. When resting, or basking in the sun on shore, the head is thrown so far backward that the top rests along the line of the back. See Plate 14, Fig. 64. This attitude, which would seem to be most uncomfortable, is often maintained for a considerable length of time.

California Sea Lion (*Zalophus californianus*)

By far the best known species of Seal in captivity is the California Sea Lion, belonging to the group of eared Seals; and one or more of these are found in almost all zoölogical gardens. They are easily tamed, exhibit much intelligence, and are always of great interest to visitors. They walk with considerable ease on land, and are enabled to do many tricks impossible to other members of the group, such as balancing a large pole on the tip of the nose, tossing it up and catching it again, "playing" upon musical instruments, holding lighted torches in their mouths

and dexterously throwing them into the air and catching them again by the unlighted end.

In swimming, owing to the immense size of its flippers, the Sea Lion drives itself forward in the water at terrific speed, and turns and twists with amazing facility, sometimes swimming on its stomach and sometimes on its back, but always with the perfection of motion. The fur, when dry, is of a light golden-brown, but when wet is extremely dark, almost black, and very brilliant and glistening, offering in swimming the least possible resistance to the element in which it lives. The teeth are long and sharply pointed, and form excellent weapons of offence and defence. As in other members of the group, the male is much larger than the female, and has very much thicker neck and shoulders. From the Cliff House, near San Francisco, a number of this species may be seen disporting themselves around the rocks near that resort.

Common Fur Seal (*Callorhinus atlanticus*)

This Seal is an animal about which until recently comparatively little was known beyond the fact that its skin is used to make articles of dress. The principal home of this Seal at present is the Pribilof Islands, off the coast of Alaska, where its numbers, although considerable, are greatly diminished owing to the systematic killing to which it has been subjected. These islands are now protected by the United States Government, and only a certain number of Seals are legitimately killed every year. The Fur Seal is a large and bulky animal, though not so

large as the Steller sea lion, and the head is quite different in shape, the nose being extraordinarily short and pointed. On top of the head and over the neck and shoulders is a sort of crest or mane of stiff hair. In colour it differs from the sea lions in being a beautiful silvery-grey, and the sealskin of commerce is simply the fur, from which the hair has been plucked, dyed a deep, rich brown. The hair is coarse and stiff in texture, and the natives of the countries where the animal is found do not remove it, but use the pelt in its natural state.

Besides the general persecution and destruction of the herds on the islands that formerly took place, large numbers of so-called pelagic, or deep-sea, sealers, scour the coast of North America and the shores of Siberia in search of seals found swimming in the open ocean. The Fur Seal has a strange habit, after the breeding season is over, of swimming south for many hundreds of miles, for just what reason scientists are unable to determine, and not returning until the following year. It is during this time that the greatest destruction occurs, pelagic sealers killing indiscriminately males, females, and young; and unless this practice is suppressed, the supply of Fur Seals will be practically exhausted in a few years.

In habits this animal shows many interesting characters. Terrific fights take place between the bulls, each trying to keep as many mates as it is able to secure. On first emerging from the water, the males are in splendid condition and rolling in fat, but grow thinner and thinner until at the end of the summer they are reduced to mere skeletons. During all the

time they remain on the islands, they are engaged in constant battles with one another, and as they never re-enter the water for food, their vitality must be extraordinary. Fur Seal pups are pretty little creatures, but for some reason it has been found impossible to rear them in captivity, so that they are almost never seen in collections.

ORDER VI.—RODENTIA (Gnawing Animals)

THE order Rodentia includes a great number of animals, many of which have much external resemblance to the Insectivora, but which may always be distinguished from them by the two incisors in each jaw, above and below, the upper pair being very strong, curved and rootless. Behind these is sometimes present a small additional pair. The canine teeth are always, and the premolars sometimes, absent, but there are generally the three molar teeth on each side, above and below. In any case, the incisors are widely separated from the other teeth, furnished with a cutting edge, and as they are continually worn down by use, grow throughout life. If one of the opposing teeth is lost by any accident, the other, not being worn down as it should be, continues to grow until it may finally cause the death of the animal.

All the Rodents are mainly vegetable feeders, though some are practically omnivorous, and many are highly destructive to crops and stores. Some species are valued for their furs, and others form important articles of diet. Indeed, animals of this order are used by man as food in many parts of the world, hares, rabbits, and squirrels being commonly eaten by Europeans and Americans, rats and mice by the Chinese and sometimes by the Egyptians, and other rodents by various other peoples.



67. Black Squirrel
(*Sciurus niger*).



68. Squirrel
(*Sciurus vulgaris*).



69. Flying Squirrel
(*Sciuropterus volans*).



70. Loir
(*Myoxus glis*).



71. Chipmunk
(*Tamias striatus*).



72. Sisel (*Spermophilus citellus*).

FAMILY SCIURIDÆ (SQUIRRELS)

This is a very large family, comprising many different species, most of which are tree-living; some have their limbs connected by membranes which may be expanded to enable them to take flying leaps through the air; and some are ground-living animals. They feed on birds, young shoots, nuts, acorns, and so on, using their fore-feet much like hands, to hold food to the mouth, and they are common in many parts of the world.

Flying Squirrel (*Sciuropterus volans*)

The Flying Squirrels are at once distinguished by the large expansion of skin, or membrane, connecting the fore and hind legs, by the aid of which they are sustained in the air and enabled to take enormous flying leaps from tree to tree. The colour of the species figured varies from lighter or darker grey or brown to reddish. They measure about eighteen inches in length, including the tail. See Plate 15, Fig. 69. It is a night animal, exclusively tree-living, and is common in Oriental countries.

The beautiful little Flying Squirrel of America (*Sciuropterus volucella*) is about twelve inches in length, including the tail, is covered with extremely fine, soft fur, and has enormously large dark and expressive eyes. These little creatures are often kept as pets, but they are active only at night, sleeping during the day rolled up in a ball. They have no power of true flight, as might be supposed from the name, but simply plunge headlong from a height, at

the same time spreading out their legs and distending the membrane, forming an aëroplane, which serves to hold them up as they come diagonally to the ground. The membrane, however, does not enable the animal to rise from the ground, and is only useful in descent, or in short leaps.

Squirrel (*Sciurus vulgaris*)

This pretty little animal is found throughout the greater part of Europe and Northern and Central Asia. The typical European form is russet-red above and white below, but in Asia the red colour is more often replaced by grey, sometimes shading almost into black. The ears are erect and tufted, the tail is very bushy, and always carried erect when the animal is running on the ground, but when leaping it is extended behind and serves at once as a rudder and as a parachute. See Plate 15, Fig. 68. The Squirrel does not hibernate, but lays up stores of provisions in hiding-places on which it can subsist during the winter. Besides the vegetable substances on which it feeds, it will also plunder birds' nests of eggs and fledglings.

Several species of Squirrel are found in America, among the more common of which are the Red Squirrel (*Sciurus Hudsonius*), the Grey Squirrel (*Sciurus Carolinensis*), and a large form known in the Southern States as the Fox Squirrel (*Sciurus Cinereus*). The first of these is a small animal, about the size of the European species, but without the tufts of hair on the ears that distinguish that genus. It is very pugnacious and is said to be able to drive away the

73. Dormouse (*Muscardinus avellanarius*).75. Marmot
(*Arctomys marmotta*).74. Beaver (*Castor fiber*).76. Black Rat (*Mus rattus*).77. Brown Rat (*Mus decumanus*).

delightful odour, somewhat like that of muskmelon. When wounded, or attacked, the Woodchuck shows great courage, and dogs, unless trained to encounters with them, are often whipped by these fierce little animals. In some parts of the country it is called the Ground-hog, and it is the animal about which has long been told the curious legend that if he sees his shadow when first emerging from his burrow, the second day of February (Candlemas Day), he promptly retires for another six weeks, during which time the cold weather will continue.

Sisel (*Spermophilus citillus*)

This is a European rodent, much resembling the marmot in its habits, but "more" omnivorous, if the expression may be used, feeding on eggs, small birds, mice, and so on, as well as on vegetable substances. It measures nearly a foot in length, including the short tail, and is yellowish-brown on the upper part, indistinctly waved with darker colour, the under-surface of the body being dull yellow. The ears are small and rounded, the cheek-pouches (absent or rudimentary in the true marmot) are well developed, and the tail is very short. See Plate 15, Fig. 72. The burrows of this species are six feet in length, and lead to the sleeping-chamber, where the animals hibernate. Before going into winter retirement, however, they close up the old burrow, and prepare a new one leading almost to the surface of the ground, which is opened when they are ready to quit their winter quarters in the spring.

FAMILY CASTORIDÆ (BEAVERS)

The Beavers are aquatic animals, easily distinguished from allied forms by their naked, scaly, and usually flattened tails and webbed hind-feet.

Beaver (*Castor fiber*)

The Beaver is one of the largest rodents, growing to the length of nearly four feet. Its body is stout, and broadest behind, the legs are short and strong, and the hind feet are completely webbed. The tail is very broad and flat, and for the greater part of its length is scaly and furrowed; the fur, which is very soft and silky, is chestnut-brown above and lighter below. See Plate 16, Fig. 74. Until within the last few centuries, the Beaver was common on the banks of streams and rivers over almost the whole of Europe and Northern Asia, but it has long been extinct in Great Britain, and is now either extinct or very scarce and local in most of the countries where it formerly existed in great numbers. It lives in burrows on the banks of rivers.

The closely-allied American Beaver (*Castor canadensis*) cuts down trees with its strong teeth, making dams in streams with branches, stones, mud, and so forth, and within the ponds so formed, these animals build dome-shaped houses in which they live, and in which they hibernate during the winter. Their food consists chiefly of the bark of trees and the roots of water plants. The Beaver was formerly much hunted, both for the fur, which was used to make beaver hats and other articles of clothing, and to

obtain castoreum, an odoriferous substance used in medicine, which is secreted by two glands near the extremity of the body. The flesh of the Beaver is said to taste like pork.

Musquash, or Muskrat (*Fiber zibethicus*)

The Musquash, or Muskrat, is a native of North America, where it lives in burrows on the banks of rivers, or forms lodges, similar to those of the beaver, but smaller. The tail is long, narrow, and scaly, but, unlike that of the beaver, is flattened vertically, and acts as a rudder. The animal is large, reaching a length of nearly two feet, including the tail; the fur is reddish-brown above, paler below, and has considerable value. See Plate 17, Fig. 34. The Muskrat is hunted also for the sake of its flesh, which is eaten, notwithstanding its strong musky odour.

FAMILY DIPODIDÆ (*Jerboas*)

These animals are distinguished by their short fore-legs and long hind-legs, which enable them to take enormous leaps, like the kangaroo. The tail is very long, and either hairy throughout or tufted at the end.

Jerboa (*Dipus Ägypticus*)

This species is the best known of the Jerboas, and is common in North Africa and Western Asia. It is about eight inches in length, without the tail, which is longer than the body and tufted towards the end. It walks on all-fours, but in feeding sits up, using the fore-paws to lift food to its mouth. When about to take one of its flying leaps, the fore-legs are pressed

so closely to the body that they can hardly be seen. The colour is pale yellowish-grey, whiter towards the extremity of the body, the tuft of the tail black, with the extreme tip white. See Plate 18, Fig. 86. The Jerboa has three toes on the hind feet, on the under side of which are thick elastic pads, and five toes on the fore-feet. It feeds on roots and other vegetable substances, and its large colonies live in burrows in the sandy soil of the deserts.

Cape Jumping Hare (*Pedetes caffer*)

This animal is considerably larger than the preceding, measuring about a foot in length, the tail, which is clothed with hair throughout, being longer than the body, and black towards the tip. It is reddish-brown above and pale grey beneath, and has five toes, armed with strong claws, on the front feet, but only four on the hind feet. See Plate 18, Fig. 87. It is a common burrowing animal in South Africa, and large colonies are found in rocky places, sleeping during the day and coming out to feed at night. It often inflicts during its night-raids considerable injury on the crops of the settlers. The ears are long, like a rabbit's, and its fore-paws are used to convey food to its mouth. When alarmed, the Cape Jumping Hare makes its escape by a succession of immense bounds, flying twenty to thirty feet at every leap.

FAMILY MURIDÆ (RATS AND MICE)

Most of these animals are of small size, some of them the smallest known mammals, generally rather slender, with smooth short hair. The muzzle is



78. Wood Mouse
(*Mus sylvaticus*).



80. Lemming (*Myodes lemmus*).



79. Field Mouse (*Arvicola arvalis*).



81. Mouse (*Mus musculus*).



82. Sitric (*Mus agrarius*).



84. Muskrat
(*Fiber sibethicus*).



83. Water Rat
(*Arvicola amphibius*).



85. Hamster
(*Oryctomys frumentarius*).

pointed, the eyes and ears are rather large, and the tail varies much in different genera, in the Rats and Mice being usually long and scaly. Many of the species of this family are omnivorous, devouring any animal or vegetable food that comes in their way, and those which are carnivorous will prey upon their disabled or weaker fellows. These animals are very prolific, and though they have many enemies, it is not easy to reduce their numbers.

Wood Mouse (*Mus sylvaticus*)

This pretty little creature is reddish-brown above and whitish below, the colours being sharply defined. See Plate 17, Fig. 78. It is very common and prolific in many parts of Europe, and is destructive to grain, vegetables, and so on, though it will also eat worms and insects. It is rarely found in dwelling-houses, but it resorts to barns and outhouses in winter.

Mouse (*Mus musculus*)

This little animal is generally of a peculiar brown colour above, known as "mouse colour," and paler below, but black (melanistic), white (albinistic), or dappled varieties, are frequently met with, at least in captivity. The common Mouse is between three and four inches in length, including the tail, which is about as long as the body. See Plate 17, Fig. 81. It is widely distributed over almost the whole world, and is to be found in nearly every stack, yard, granary, and house, being even commoner than the rat. It is timid, but will venture into a room if everything is quiet, and is easily tamed. Mice utter a low sharp

squeak, but occasionally a specimen is met with which emits a peculiar singing note. There has been considerable discussion respecting the cause of this musical ability, but it is generally thought to be due to some disease of the throat or lungs.

A peculiar variety is the black-and-white spotted Japanese Waltzing Mouse, that whirls round and round, at night, with only occasional intervals of quiet. Authorities differ also as to the cause for this disposition to waltz, but it is commonly regarded to be due to a deformity of the brain that has become established in the breed and is transmitted.

Black Rat (*Mus rattus*)

Rats are placed in the same genus with mice, and are similar in appearance, though the Rat has a much smaller head and ears in proportion to the size of its body, and the feet are also larger and heavier. Until less than two hundred years ago the Black Rat was the only species known in most parts of Europe. It is variable in colour, but typical specimens are bluish-black above and paler beneath, and measure about seven inches in length without the tail, which is rather longer than the body. See Plate 16, Fig. 76. Rats and mice are carried all over the world in vessels, and it is in many cases impossible to determine the original native country from which the Black Rat may have been brought. Of late years it has been almost exterminated by the brown rat, and is quite rare in the countries where it was formerly common.

Brown Rat (*Mus decumanus*)

Greyish-brown in colour, the head shorter and blunter than that of the black rat, this is a larger and bolder animal, sometimes measuring as much as nine inches in length. See Plate 16, Fig. 77. It is a native of Northern China, but is said to have migrated westward and to have swam across the Volga in large numbers towards the close of the seventeenth century. It is now widely spread, and exterminates the black rat wherever it takes up its abode. The Brown Rat is extremely voracious and omnivorous. It grows to great size in the sewers of large cities, and men who work in them generally have a good terrier to drive off the rats, which in such places are really dangerous from their numbers and ferocity.

Sitric (*Mus agrarius*)

The Sitric is abundant in Eastern Europe and Siberia, but becomes rarer and more local in Western Europe, not extending as far as France. The head and body are about three and a half inches in length, and the tail is about one-fourth the length of the body. In appearance, as well as in habits, the animal has much resemblance to the wood mouse, but the tail and the ears are shorter, fur is more reddish-brown, and there is a narrow blackish stripe on the back. See Plate 17, Fig. 82.

Field Mouse (*Arvicola arvalis*)

In America this name is given to the Field Vole; but while Voles closely resemble true mice, they have

stouter bodies, with a large head and short ears, and the tail is usually less than one-third the length of the body. They generally live in grassy places and make burrows in the ground, and are very injurious to crops when they multiply greatly, as is often the case. The species figured is yellowish-grey above and whitish below, and is about the size of a common mouse. See Plate 17, Fig. 79. This and allied forms are abundant in North America, on the Continent of Europe, and in Great Britain. The Voles are almost exclusively vegetable-feeders, eat grass, roots, fruits, bark, or buds, indiscriminately, and lay up stores of corn and nuts in their galleries for winter use. They have many enemies, weasels, owls, and other carnivorous mammals and birds destroying vast numbers of them.

Water Rat (*Arvicolo amphibius*)

This animal commonly known in Europe as the Water Rat, but more correctly as the Water Vole, is a large British Vole, dark grey above and paler beneath, and is always found near slowly running streams or ponds, where it makes its burrows in the banks, and feeds chiefly on water plants, roots, and bark, and lays up a store of provisions in its burrows. See Plate 17, Fig. 83. It is rarely seen far from water, in which it is quite at home, swimming and diving with great agility.

Hamster (*Cricetus frumentarius*)

The Hamster is allied to the voles, but has large cheek-pouches and a very short tail. It is brownish-

yellow above and black below, the front of the body more or less varied with yellowish white, and the feet are white. See Plate 17, Fig. 85. It is not found in Western Europe, but extends through Central and Eastern Europe and a great part of Central and Northern Asia, and grows to nearly a foot in length. Hamsters live in large burrows in the ground five or six feet deep, where they store up such large quantities of corn and other provisions that they are a great pest to the farmers, whom they plunder, stuffing their cheek-pouches with grain, which they deposit in their burrows and then returning immediately for a fresh supply.

Lemming (*Myodes lemmus*)

Also allied to the voles is the Lemming, an inhabitant of Northern Europe. It is five or six inches long, with a very short tail, the fur is very soft, varied with black and tawny above, and is whitish below. Lemmings inhabit dry mountainous regions, where they feed on grass and roots, but at irregular intervals they march forth in enormous numbers, travelling straight on from day to day and week to week till they finally reach the sea, in which most of those which have escaped the previous perils of the journey perish. It is unknown for what reason they undertake these migrations. See Plate 17, Fig. 80.

FAMILY MYOXIDÆ (DORMICE)

In appearance and habits the Dormice somewhat resemble the true squirrels, having large bushy tails, rather large eyes and ears, and short fore-legs. They make nests in hollow trees, where they sleep during

the winter, only waking up at intervals to feed on provisions they have stored within easy reach of their nests.

Dormouse (*Muscardinus avellanarius*)

The common Dormouse is found in most parts of Europe, including the British Islands. It measures two and a half or three inches in length, the bushy tail being rather more than as long again, is reddish-brown above and white below, though the young ones are of a much darker colour. See Plate 16, Fig. 73. Dormice feed chiefly on nuts and seeds, sitting up on their haunches to eat from their fore-paws, and will also eat insects and other available animal food.

Loir (*Myoxus glis*)

Sometimes called the "Fat Dormouse," this animal is common in Southern Europe, and was considered a dainty by the ancient Romans. It is found in dry woods, especially among oak and beech trees, and grows to the length of four or five inches, the tail being about as long as the body. It is grey above, paler on the sides, and white below. See Plate 15, Fig. 70.

FAMILY HYSTRICIDÆ (PORCUPINES)

These are large, heavily-built rodents, inhabiting the south of Europe and Asia, America, and parts of Africa. They are distinguished by long, sharp-pointed spines, or quills, those on the tail being hollow. The Old World species are ground animals, and have no long hairs mixed with the quills, but bristles instead, and the first toe is rudimentary. In



92. Chinchilla
(*Chinchilla lanigera*).

93. Capibara (*Hydrochærus Capybara*).



94. Porcupine (*Hystrix cristata*).



95. Syrian Hyrax (*Hyrax syriacus*).

96. Long-tailed Pangolin
(*Manis macrura*).

one Indian and African genus, however (Atherura), the body is covered with spines and bristles, rather than with quills. The New World Porcupines are more or less tree-living, their spines are mingled with long hairs, and the first toe is entirely absent. They have very powerful incisor teeth, but rely for defence entirely on their quills, which, however, they cannot project from the skin as was once believed.

*Porcupine (*Hystrix cristata*)*

The common Porcupine inhabits South Europe and Northern and Western Africa, but is replaced in Southern and Eastern Africa and India by allied species. It measures upwards of three feet in length, and the head is clothed with stiff bristles which are continued back over the neck to form a crest, or mane. The muzzle is short and thick, and the upper lip is set with long hairs on each side. The general colour is black above, but the long quills, except those of the tail, are banded with white, and the under-surface of the body is clothed with dark brown red-tipped hairs, while the throat is white. See Plate 19, Fig. 94. The Porcupine is a nocturnal animal and lives in burrows. When molested, it erects its spines and backs towards its enemy, the quills, when shaken, producing a loud noise and also being capable of inflicting severe wounds.

They are barbed, and, being easily detached, may become fixed in the flesh of an attacking animal and so carried away. This may have given rise to the notion that they were shot out by the Porcupine.

The North American Porcupines constitute a dif-

ferent genus, with two species, and are of stout build, with short, heavy limbs that end in large claws, the hair long and coarse and almost concealing the small sharp quills. In South America is a smaller form that is almost exclusively tree-living and has a long and partially prehensile tail.

FAMILY CHINCHILLIDÆ (CHINCHILLAS)

Chinchilla (Chinchilla lanigera)

The Chinchilla is a small animal with long silky fur, which lives in large communities at a great elevation in the Andes of South America, like the marmots in the Alps of Europe. It is much prized for the fur, which is of a bluish-grey above and whitish beneath. About ten inches in length without the tufted tail, which is four or five inches long, it has large rounded ears, scantily-haired short front legs, and strong paws suited for digging, with five toes on the fore-paws and four on the hind-paws. See Plate 19, Fig. 92. The food of the Chinchilla consists of bulbs and other roots, grass, and so forth, which it holds in the front paws, sitting on its hind legs when eating. It has some resemblance to the jerboas, with which it was formerly classed.

FAMILY CAVIDÆ (GUINEA PIGS)

This is a small family, including a few South American rodents, with four toes on the front feet and three on the hind feet, and having rudimentary or short tails. The ears are large, and the claws broad and hoof-like.

Guinea Pig (*Cavia cobaya*)

There are several species of *Cavia* found in South America, but none in Africa, and therefore the English name of the domesticated animal is misleading. It measures about seven inches or rather more in length, and is parti-coloured, being white, black, and reddish, in varying proportions, differing from the wild species (*C. aperea*) from which it is supposed to be derived, a somewhat similar animal, but olive-brown in colour. See Plate 18, Fig. 91. The Guinea Pig is extensively reared in Europe, both as a pet and for scientific experiments. It feeds on roots, grass, and so on, and the wild species dig burrows in the ground.

Capibara (*Hydrochærus Capybara*)

The Capibara, found only in South America, is the largest of all rodents. It is a very bulky, clumsy, and stupid animal, covered with coarse light-brown hair, having toes that end in hoofs, rather than claws, and a short and insignificant tail. The ears and eyes are small, the head broad, and the muzzle enormously thick and heavy. See Plate 19, Fig. 93. The Capibara is practically semi-aquatic, spending most of its time on the borders of streams, and its chief enemy is the jaguar, with whom it is a favourite article of food.

Another interesting South American form of rodent is the Agouti (*Dasyprocta agouti*), somewhat smaller than the capibara, and having a more sharply-pointed muzzle. There are many varieties, all distinguished by brilliant colouring, some being

bright chestnut-red on the hindquarters. The form is much more delicate than that of the preceding animal, but like it, the Agouti has somewhat hoof-like claws and a short tail. It also is fond of water, and runs along the banks of streams in large herds.

Still another species, somewhat resembling the agouti, but having shorter legs, is the Paca (*Cœlogenys paca*). The colour of the fur is a deep brown, curiously spotted with white. A more southern form is known as the Patagonian Cavy (*Dolichotis patagonica*), a singular-looking animal, with long ears and long hind legs, like a hare, or rabbit. The fur is greyish, darker on the hindquarters, which are crossed with a white stripe.

FAMILY LEPORIDÆ (HARES AND RABBITS)

In the Leporidæ the upper lip is cleft, the ears are long, the hind legs are considerably longer than the fore-legs, and there is a short tail. They have five toes on the front feet, four on the hind feet, and the soles are furred. The species are found in nearly all parts of the world.

Rabbit (*Lepus cuniculus*)

The Wild Rabbit is a smaller animal than the Hare, not much exceeding a foot in length, without the tail. It is generally of a uniform greyish-brown colour above and whitish beneath, the under part of the tail being conspicuously white, the ears much shorter than the head, and little, if at all, tipped with black. See Plate 18, Fig. 86. Rabbits live in large communities called rabbit-warrens, in burrows in the

86. Jerboa
(*Dipus aegyptiacus*).



87. Cape Jumping Hare
(*Pedetes caffer*).



88. Rabbit (*Lepus cuniculus*).

89. Mountain Hare (*Lepus timidus*).



90. Hare (*Lepus europaeus*).

91. Guinea-pig (*Cavia cobaya*).

ground, and are very prolific, breeding several times in the year. The young are born naked, blind, and helpless.

The Rabbit is believed to have been originally a native of the South of Europe and North Africa, but has long been naturalised in most parts of Central Europe, and has also been introduced in many other parts of the world. When abundant, it becomes a terrible pest, destroying all kinds of vegetable produce, and often whole plantations of young trees by nibbling away the bark. Rabbits and Hares are frequently shot or trapped for food, and ferrets are used to drive them from their burrows. Tame varieties are often larger than the wild, and may be black, white, piebald, or tan in colour, many fancy breeds having lop ears and large dewlaps.

Hare (*Lepus europaeus*)

The common Hare is considerably larger than the Rabbit, measuring about two feet in length, and is reddish-brown above and white beneath. The ears are larger than the head, and tipped with black, and the hind-legs are much longer than the fore-legs. See Plate 18, Fig. 90. The Rabbit is most active in the morning and evening, but the Hare generally sleeps during the day in a depression in long grass called its "form." It is widely distributed in Europe, but is a less abundant animal than the Rabbit, though sometimes sufficiently so to be injurious to crops and young trees. The young are born with their eyes open, and are hairy, not naked as is the young Rabbit.

In North America the common wild Rabbit of

Europe is replaced by a form of the true Hare, the creature which we generally know as the Rabbit being none other than this. It has a great range, being found in nearly all parts of the continent under several specific names, one of the most common, the Cotton-Tail, from the little snow-white tail which it raises and lowers in running. Its habits are those of the typical Hares, although in general appearance it differs somewhat from the European species, is not so large and has shorter ears. In the Western part of this country is a variety known as the Jack-Rabbit, distinguished by its enormously long ears, large, round, and staring eye, and extremely long-legged and delicate build. It has immense speed in running, and is often pursued by greyhounds, giving great sport to the hunters by the way it turns and twists about. Also in the Western part of the United States is found, high up in rocky places, a little animal known as the Pica, a somewhat degenerate form of the Rabbit, with short, rounded ears and practically no tail, the creature to some extent resembling the guinea-pig in appearance.

Mountain Hare (*Lepus timidus*)

The Mountain Hare much resembles the common Hare, but is rather smaller, and the ears and hind-legs are shorter in proportion. It is grey in summer and white in winter, but the tips of the ears are always black. See Plate 18, Fig. 89. It has a wide range over the northern parts of North America, Europe, and Northern and Central Asia to the Himalayas. In the southern portions of its range it is found chiefly in

mountainous regions, and is the Hare of Iceland, Scandinavia, and Ireland, where the common Hare is not found. In the Arctic regions it is replaced by a very similar species, the Polar Hare (*Lepus glacialis*), which is white (except for the black ear-tips) all the year round, and burrows in the ground like the Rabbit.

ORDER VII.—UNGULATA (Hoofed Animals)

THIS is an exceedingly important order, including a great number of mammals, differing considerably in structure, and although a few are small, many are of great size, the largest being the elephants, the bulkiest of existing mammals except the whales and the elephant seal, which are marine animals. Nearly all are vegetable-feeders; the incisor and canine teeth are sometimes present and sometimes absent in one or both jaws, and when present are frequently modified into large tusks. The number of toes varies from one to five, provided with broad, blunt and flattened nails, or hoofs. The Ungulata are divided into four sub-orders, which must be considered separately.

SUB-ORDER I.—HYRACOIDEA

The curious animals belonging to this group are confined to Africa, Arabia, and Syria, and have much superficial resemblance to rodents, with which they were formerly classed. There are only two genera, *Hyrax*, the species of which live in rocky places, and *Dendrohyrax*, which live in hollow trees. The ears and tail are short, and the species measure a foot or more in length, the largest of them, the Cape *Hyrax* (*Hyrax carpensis*), which is common in mountainous districts in South Africa, attaining a length of eighteen inches.

FAMILY HYRACIDÆ

Syrian Hyrax (*Hyrax syriacus*)

The Syrian Hyrax is a brown-coloured animal, paler beneath, and is distinguished from the Cape Hyrax by its smaller size and by the long black hairs projecting from the shorter fur. The Hyraces much resemble rabbits and some of the other rodents in outward appearance, but have peculiar hoof-like claws, and the teeth are singularly like those of the rhinoceroses. See Plate 19, Fig. 95. The Syrian Hyrax is also found in Arabia and Abyssinia, and is considered to be the animal called "coney" in the Bible. The word coney in English means rabbit, but the latter term is in more general use at the present day.

SUB-ORDER II.—PROBOSCIDEA

FAMILY ELEPHANTIDÆ (ELEPHANTS)

Elephants are the largest of the land mammals, and are at once distinguished from all the other members of the order by certain remarkable characters. The upper incisors are enormously developed and project as large tusks from either side of the mouth, the rest of the teeth are greatly reduced in number. The appendage known as the trunk is a very long and flexible projection of the nose and upper lip together, the end being developed into a short finger and thumb. The Elephant uses this trunk in many ways, curling it about leaves and branches of trees in feeding, and picking up objects from the ground; and without it, owing to the extremely short neck and long legs, the animal would be quite helpless. It

is practically hairless, although in a strong light vestiges of hairs may be seen along the sides of the body and on the trunk, and, curiously enough, this hair is of the same reddish colour as that of fossil mammoths, specimens of which have been found almost entire, frozen in the ice in Siberia.

The legs of the Elephant are straight and very post-like in form, in order to support the immense weight of the body, and instead of lying down as most animals do, it kneels like a man, the knees actually touching the ground. This is owing to the fact that the hind foot is very short, and in a sitting posture it is held stiffly out behind, and not bent as in the horses and cattle. The foot is large and round, and the toes are encased almost to their tips in a fleshy pad, very elastic in texture and affording sufficient spring to relieve the great weight upon the ground.

We now know much of the history of fossil forms of these creatures, and of late years small and undeveloped species have been found in North Africa that were not much larger than the present tapir, and had four tusks, two in the upper and two in the lower jaw, all very much smaller in size than those of the Elephant of to-day. On the other hand, the mammoths and mastodons of North America and Europe possessed enormous curved tusks, some as much as twelve or fourteen feet in length and of great thickness and strength. From the specimens of these huge creatures found preserved in ice, we know that they were covered with long reddish wool that protected them from the coldness of Arctic winters, and they were altogether larger and bulkier than any existing

species of Elephant. Sketches of these animals made by the prehistoric inhabitants of Europe, evidently from life, have been found traced on pieces of mammoth tusks.

Indian Elephant (*Elephas indicus*)

So far as is known, there is only one existing species of Indian Elephant. In the wild state it is comparatively rare, but large semi-domesticated herds are kept for various uses. The Indian Elephant is among the most intelligent of animals, and wonderful stories are told, and substantiated, of their great sagacity under various conditions. Although so large, it is not by any means clumsy or stiff in action, but on the contrary is remarkably flexible and is able to perform tricks that are impossible to many smaller animals—standing on its head or walking on its hind legs with equal facility, and doing many other wonderful things. In India these animals are used as beasts of burden in numerous ways, and they carry and pile up with their trunks the heavy teak logs of that country with almost mechanical precision. They are also used by the rajahs and other potentates as means of transportation and in their hunts for tigers and leopards; and in ancient times they were used in war, and we often see representations of them in the various paintings and bas-reliefs that have come down to us.

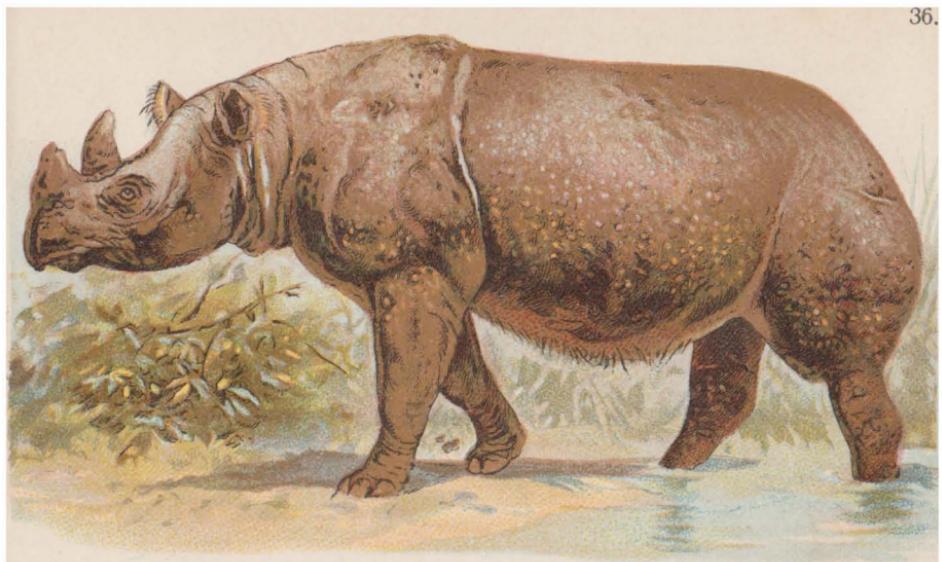
In Assam and Borneo great reverence is paid by the natives to various individuals which are lighter in colour and known as "White Elephants"; the term being misleading, however, as they are not white,

but merely a light pinkish colour, particularly on the head and trunk.

In form the Indian Elephant differs considerably from the African. In the former species the top of the head is the highest point of the body, whereas in the latter the head is always carried lower than the shoulders; that of the Indian is larger and more rounded than his African cousin's, and the trunk is longer and more heavily-built. The skin also is much finer and more delicate in texture.

African Elephant (*Elephas africanus*)

The African Elephant is somewhat larger in size than the Indian, large specimens measuring as much as eleven feet in height, and having tusks from six to eight feet in length. The ears are of enormous size, devoid of hair, and very thin, and flap back and forth like the sails of a ship. They are about three times as large as in the Indian species, and when at rest the upper portions are folded back and meet in the middle over the neck; but when alarmed or excited, these great ears are extended at right angles to the head, and at such times give the animal a most extraordinary and startling appearance. The skin on the body is coarse, and on the trunk is divided by many heavy wrinkles, distinguishing it at once from its Indian relative. The creature has a curious dried and shrivelled appearance, always looking thin and in poor condition. The feet are smaller and the legs longer, and the back too is different in form, there being a deep hollow in the line between the shoulders and hips. See Plate 36, Fig. 153.



152. Sumatran Rhinoceros (*Rhinoceros sumatranus*).



153. African Elephant (*Elephas africanus*).

At the present day this species is confined almost entirely to the higher regions of the central parts of Africa, and many are found in the mountains of that country where they have probably been driven by the pursuit of hunters. In travelling and feeding the herds show great sagacity, always being under the leadership of some quick-witted and intelligent individual whose business it is to see that no harm comes to them. While feeding their trunks are continually raised and lowered in order to snuff the wind for any approaching danger.

The African Elephant has but three visible hoofs on the back feet, while the Indian has four, both species having five on the front feet.

Of late years a smaller form has been discovered in Africa, much less in stature than the common African Elephant, with smaller and much more rounded ears, and skin finer in texture, like that of the Indian species.

SUB-ORDER III.—PERISSODACTYLA

This sub-order includes three families—the Equidæ, or Horses; the Rhinocerotidæ, or Rhinoceroses; and the Tapidæ, or Tapirs. The Tapirs have four toes on the front feet and three on the hind feet, whereas the Rhinoceroses have three toes on each foot, and the Horses have only one developed toe. Very few species of this sub-order exist at the present day, but in former times the number of genera and species was considerable, and the structure of the feet, especially in animals allied to the Horses, was much more variable than in existing species.

FAMILY TAPIRIDÆ (TAPIRS)

Tapirs belong to a very ancient form of animal; indeed, they have hardly changed their appearance for many thousands of years, judging from the close resemblance they bear to the fossil skeletons of some of the old-time creatures. They have a short proboscis, much smaller than that of the elephants, and therefore of much less use, but still long enough to enable its owner to grasp and pull down the leaves and branches of trees, which it eats. The hair is very sparse over the body, and a curious fleshy crest runs along the neck and on top of the head in most species. The eyes are small and stupid in expression, and well indicate the character of the animal, which is noted for a singular lack of intelligence. Tapirs are shy and inoffensive creatures, and generally remain hidden during the day, coming out at night to feed.

Tapir (*Tapirus americanus*)

This animal is the commonest and best known of the species, and is widely distributed in South America. It is usually of a brownish or pinkish colour when adult, but the young are covered thickly with short dark brown hair, over which run curious white markings or stripes in varied forms, less distinct as the animal grows older and finally merging into the monotone colour. See Plate 35, Fig. 150. Tapirs are semi-aquatic and powerful swimmers, subsisting on aquatic plants and various roots and weeds which they are able to pull up with their prehensile lip, or snout. The voice is singularly small, considering the

size of the animal, consisting of a high squeal much like that of a very young pig; the often mentioned resemblance to the hog, however, is slight in the form of the creature. It has a curious shrunken appearance in the hindquarters, and the short, fleshy tail is carried pressed close against the body. The feet are large, the toes well separated, and ending in rather sharply-pointed hoofs.

The South American Tapir is a favourite food of the jaguar, and the flesh is considered palatable by hunters who have eaten it. When alarmed, it makes a dash for the water, and if allowed to reach that element is apt to escape, as its powers of swimming and diving are extraordinary.

Malay Tapir (*Tapirus indicus*)

In character and habits the Malayan Tapir is much like the South American, but is quite different in colour, being curiously banded with pure white and jet black in sharp contrast. It is also considerably larger than the foregoing species. See Plate 35, Fig. 151. The young are black, with longitudinal stripes and rows of spots of a yellowish colour on the back and sides, and the under surface is white.

FAMILY RHINOCEROTIDÆ (RHINOCEROSES)

There are five living species of Rhinoceroses, three of them Asiatic and two African. They are large, bulky animals, have three toes on each foot, a very thick, naked, or sparsely-haired hide, and on the middle line of the face, one or two large horns, which are declared to be composed of hairs massed together, at-

tached only to the skin, and therefore having no bony core. The tail is short and tufted.

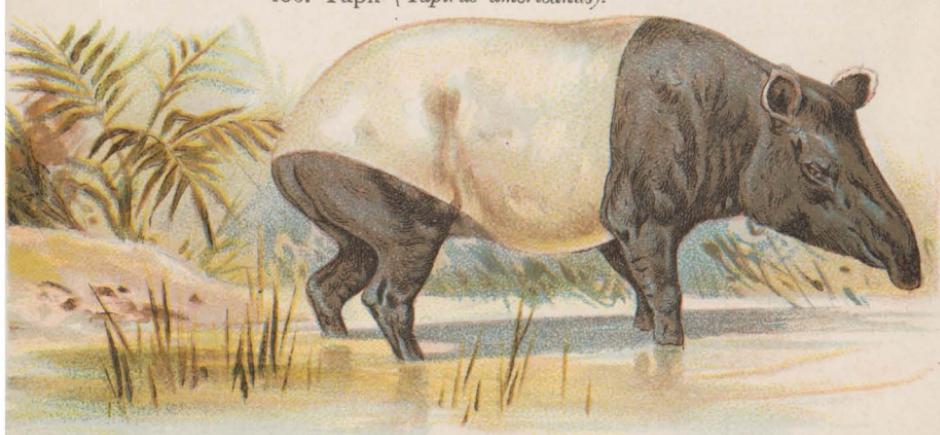
The so-called Black Rhinoceros (*R. Bicornis*) of Africa is a large and powerfully built animal, specimens having been seen over five feet in height at the shoulder. In spite of its great size this animal is very active and can run with considerable speed. There are two horns on the nose, one placed toward the tip, the other almost directly over the eyes, the forward one usually larger than the rear one. This horn, as has been said, does not cover a bony core, like those of the antelope and cattle, but is simply attached to the skull by a roughening of the surface of the bone on top of the nose, and by the surrounding flesh and skin. In fact, the horn has been at times torn from the nose completely, but its growth continues during the life of the animal. In captivity, owing to the lack of wear to which it should be subjected, it becomes mal-formed and odd in shape, growing out in different directions much as an unused nail would do; but in the wild state, owing to the constant friction, it becomes smooth and pointed and continues in a fairly upright line from the nose. This species also possesses a rather long prehensile lip, which is of great aid to the animal in feeding upon various bushes. The skin of the Black Rhinoceros is heavy and coarse, but is not laid in such heavy folds, or plates, as that of the Indian species. The ears are large and tube-like, and set close to the top of the head; the eyes are small, and the animal does not see well, depending upon its keen scent and hearing to warn it of danger. Although greatly reduced in



149. Quagga (*Equus quagga*).



150. Tapir (*Tapirus americanus*).



151. Malayan Tapir (*Tapirus indicus*).

numbers, the Black Rhinoceros is still fairly common in Africa.

Sumatran Rhinoceros (*Rhinoceros sumatrensis*)

This species is brown or black, and is more thickly covered with bristles than any other living species of Rhinoceros. It is not confined to Sumatra, but is also found in Borneo and throughout the Malay Peninsula. It measures seven or eight feet in length, and is a much more timid and retiring creature than the other members of the family. It is remarkable as being the only Asiatic species that possesses two horns; both of which, however, are small and rather insignificant. See Plate 36, Fig. 152.

Burchell's Rhinoceros (*Rhinoceros simus*)

This animal, often called the White Rhinoceros, is now on the verge of extinction. It is still larger than the Black Rhinoceros, and although the two forms bear such widely different names, they are said closely to resemble each other in general colour, which is neither black nor white, but a light pinkish-grey, much the colour of rock. It does not possess the prehensile lip of the Black Rhinoceros, the mouth being broad and square, but resembles it in form. The forward horn also is longer and straighter. Until a few years ago it was abundant in various districts of Africa, but is now practically exterminated, the few remaining specimens being very strictly preserved. It is known, however, that a similar, if not the same, species inhabits some parts of Central Africa. The African hunters, Cumming and Selous,

relate that, when alarmed, the female lets the calf run before her, guiding its paces by resting her horn on its rump.

Indian Rhinoceros (*Rhinoceros unicornus*)

The Indian Rhinoceros is a gigantic creature with one horn. This enormous animal is six feet or more in height at the shoulder, and measures ten or twelve feet in length, and the massive, but short, horn projects from the tip of the nose. Most singular are the immense folds, or plates, of hide disposed over the body, and the position of the ears, which are placed close together and set on the extreme top of the skull. The head is very much bent up in profile, the nose being turned downward and the under lip spread out on either side. The feet are small and compact for the size of the animal, which, owing to its great bulk, has not the speed of any of the other species. It is found in swampy country in India, and is often hunted, as is the tiger, with elephants. The voice is out of proportion to its huge size, consisting merely of a diminutive squeak or squeal.

In general character it is very primitive, resembling fossil forms that existed many thousands of years ago. Indeed, the Rhinoceros represents a type that has otherwise long since disappeared from the face of the earth. At one time, judging from these remains, it was very common in all portions of North America, Europe, and many parts of Asia; and in the north of Europe and in Siberia a woolly form, clothed like the mammoth with reddish hair, has been found, possessing two horns and in general form not unlike

the African. Still another, that must have carried one enormous horn directly over the eyes, has been discovered in the same region.

FAMILY EQUIDÆ (HORSES)

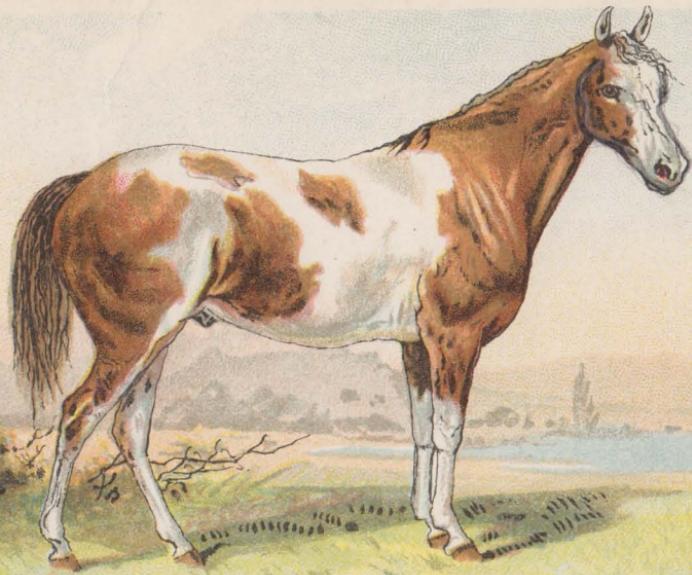
This family includes the Horses, Asses, and Zebras, which are distinguished from other mammals by having only one toe (the third) developed on each foot. The hair on the body is short and smooth, but the mane and tail are long and bushy. Several species of Horses and Asses are still found wild in Africa and in Western and Central Asia, while the striped species called Zebras are confined to Africa south of the Sahara. Wild Horses are now extinct on the steppes of South Russia, where they were found up to perhaps a century ago, and Horses have run wild in many countries to which they were not native, and are now found in many parts of Australia and America.

Naturalists were long puzzled to know whether any true wild Horses were still in existence, but of late years a really well-marked wild species, called the Prejevalsky Horse, has been found in the high tablelands of Turkestan. In colour this little animal is a light bay, or fawn, with dark legs and tail and a dark stripe running down its back. The mane is also dark in colour and stands upright, and the end of the muzzle is greyish or whitish. It is about the size of a pony, the flanks are thin and delicate in form, and the breast also is narrower than in most domestic Horses. Just below the elbow on the front legs are four or five small stripes. This striped character of

the legs, and, in fact, the general colour, is found in many of the Horses of our Western States, especially the so-called dun ponies of the plains. The Prejevalsky Horse does not differ essentially in characters from all other members of the family, and shows considerable intelligence, but is not easily tamed. Two which have lived for some years in the Bronx Zoölogical Park are still in good condition, but have never bred. Their parents were captured some years ago in Turkestan by an animal dealer, who sent out a special expedition for this purpose. As it was found impossible to take the adult animals, only the young were captured, by chasing the herds until the foals became exhausted. These were nursed by domestic mares taken out by the party. A number of them lived and thrived, and there are now several in various European collections.

Mustang (*Equus caballus varius*)

The domesticated breeds of Horses differ very much in size and colour, and even in shape, some being slenderly formed, like the Race Horse, others very bulky and powerful, like the Dray Horse, and individuals may be either chestnut, bay, brown, black or white. The so-called wild Horses that roam in great herds over the plains of Mexico and the adjoining Southern States of America, are nothing more nor less than domestic Horses that have run wild. They are popularly called Mustangs, are generally pied or dappled, often, as in our figure, being coloured like a red and white cow. See Plate 34, Fig. 145. The Horse has a callosity on the inner side of



145. Mustang (*Equus caballus*, var.).



147. Egyptian Wild Ass
(*Equus asinus*).

148. Zebra
(*Equus Zebra*).

146. Koulan (*Equus hemionus*).

all legs, but in the Asses and Zebras those on the hind legs are wanting. The mane and tail are also much more thickly haired in the Horse. Horses were very numerous in America in former times, but appear for some unexplained reason to have become extinct before the arrival of the Spaniards, by whom they were reintroduced into the New World.

Koulan (*Equus hemionus*)

The Asiatic Wild Ass is found in large herds throughout Western and Central Asia as far as the northern and north-western frontiers of India. It measures six or seven feet in length, and about four in height, and varies considerably in colour, hairiness, and so on, in different localities, but is generally grey, reddish-grey, or chestnut, with the under parts white, and a dark stripe on the back. The mane is short and erect, and the tail is tufted towards the end, instead of being uniformly covered with hair, as in the horse. See Plate 34, Fig. 146. Earlier naturalists considered that there were three allied Asiatic species, but the best recent authorities regard them as only varieties of one. It is an extremely swift animal, and very difficult to capture.

Egyptian Wild Ass (*Equus asinus*)

This is a greyish animal with long ears and a short black mane and long tail, inhabiting Egypt and Abyssinia, and although it is sometimes treated as distinct, under the name *Equus tæniopus*, there is little doubt that it is the original stock from which the domestic Ass has been derived. There is a dark

stripe along the back, and sometimes more or less developed cross-stripes, especially in the young animal. See Plate 34, Fig. 147. In Southern Europe and North Africa the Ass is often large and graceful in form. It is sometimes used as a beast of burden, and is also much ridden by children in holiday resorts. In mountainous countries mules (a cross between the Horse and the Ass) are much used, as they are extremely sure-footed.

Quagga (*Equus quagga*)

This animal was formerly very abundant on the plains of South Africa, roaming in large herds, as is the habit of all the Equidæ, and was frequently brought to Europe in the first half of the nineteenth century. But owing to the reckless destruction of the larger mammals in South Africa since that time, the Quagga is believed to have been absolutely exterminated, and there are now only a few specimens preserved in museums. Judging from skins and photographs, it looked not unlike the Burchell Zebra, but was a somewhat larger animal, and the whole body was a darker shade. See Plate 35, Fig. 149.

Zebra (*Equus zebra*)

The true Zebra is often called the Mountain Zebra, because it inhabits the mountainous sections of Cape Colony, where, however, it is now becoming very scarce. It is an interesting and characteristic species of horse, distinguished by curious stripings and markings. All are more ass-like than the true horse, having long pointed ears, small hoofs, and long switch-

like tails. The species represented is about the size of a large donkey, and in character is wild and untamable, being extremely vicious in confinement. The stripes are broader than those of the other forms, and it has many characters unlike them. The stripes are brownish, widest across the hips, and continue even to the very hoofs of the animal. See Plate 34, Fig. 148. It is almost impossible to capture this Zebra, owing to its great speed over rough ground.

Burchell's Zebra (*Equus burchelli*) is found further north, in more open country than the Mountain Zebra, and is somewhat more horse-like in appearance. It has very few stripes below the knee and elbow on the legs, which are pure white in colour. Another variety known as Chapman's Zebra is striped almost to the feet, the ears are shorter, the hoofs larger and rounder, while the stripes are not so broad nor so conspicuous. Still another and larger variety, found in Abyssinia, is known as Grevy's Zebra (*E. grevyi*). This has extremely large and rounded ears, and the body is covered with a countless number of fine stripes arranged in a beautiful pattern. This is probably the handsomest and most striking of the group, and also the most easily tamed.

SUB-ORDER IV.—ARTIODACTYLA

This sub-order includes by far the larger number of existing Ungulata, such as cattle, sheep, goats, antelopes, giraffes, deer, camels, pigs, etc. Many of these are ruminating, or cud-chewing, animals; all agree in having an even number of toes (either two or four) on all the feet, and with the exception of the

pigs, which may be called omnivorous, they are exclusively vegetable-feeders. In most of the species the incisors, and frequently also the canines, are wanting in the upper jaw; a large number bear horns, and some few have tusks or humps. Nearly all the most important animals used for food or for yielding milk belong to the Artiodactyla.

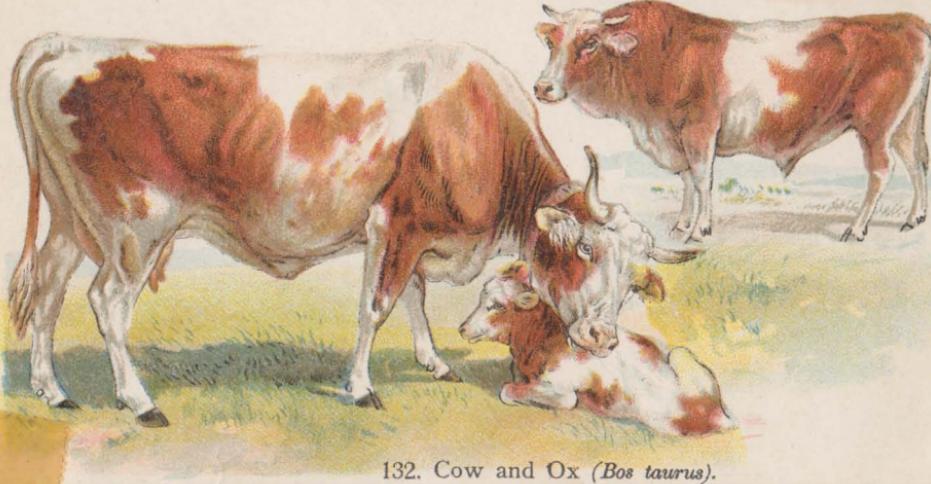
GROUP PECORA (RUMINATING ANIMALS)

Family Bovidæ (*Oxen, etc.*)

There are many varieties of domestic cattle, and several wild species, but so far as we know the domestic forms are not descended from the wild species—at any rate, from those of the present day. We do, however, find fossil types of cattle which seem to resemble the domestic more closely than any living wild form. The animals most nearly allied to the domestic Ox have been divided into several sections, which are treated here as subgenera of *Bos*.

Ox (*Bos taurus*)

In structure the Ox is highly specialised and represents a very recent type of animal. In Europe remains of many different species have been found, and there is no doubt that this creature was known to primitive man and was of great service to him in various ways. The flesh was probably eaten by the ancient Egyptians, and the animals were worshipped as sacred things. The Bible mentions sacrifices of cattle in religious rites and also tells of the use of their flesh for food.

130. Markhor (*Capra Falconeri*).129. Argali (*Ovis argali*).131. Rocky Mountain Sheep (*Ovis montana*).132. Cow and Ox (*Bos taurus*).

In England and Scotland at the present time several breeds of wild cattle are preserved in parks, the most important being the herd in Chillingham Park, Northumberland. They are usually white, with black muzzle, and black, or, more frequently now, red, ears. The coat is shaggy, and there are traces of a mane in the bulls. See Plate 30, Fig. 132. It is not believed that the Chillingham cattle are the true ancestors of any of the domestic breeds, but that they are simply an early offshoot from the same general stock.

In many parts of the world Oxen are used as beasts of burden for ploughing and drawing carts. The method of driving them is still extremely primitive, and the yoke is exactly the same as that used by the ancient Egyptians three thousand years ago—a poor form of harness and one that does not enable the animal to use its great strength to advantage.

In recent times much attention has been paid to the development of various breeds of cattle for use as food, the Western plains of North America, the pampas of South America, as well as other parts of the world, serving as grazing grounds for immense herds in a semi-wild condition. The great variety of breeds is simply the result of the selection of certain types. While some are noted for the amount of flesh, or beef, they are able to produce, others are celebrated for their milk-giving qualities. Among the latter are the Holstein cattle, a very large black and white variety found principally in Holland and the Netherlands, the great quantity of milk yielded, however, being

of rather poor quality. In contrast with these are the celebrated Jersey, Guernsey, and Alderney cattle, well known for the richness and high quality of the milk they produce. In form and colour these animals are very beautiful, being of a light fawn colour, with dark marks on the face and legs, and the eyes are very large and soft in expression. The horns are short and sharply recurved. The bull differs somewhat in colour from the cows, being a beautiful mouse colour, darkening to black on various parts of the body.

Resembling these in form and colour, but larger in size, are the cattle found in Switzerland; wandering with tinkling bells through the mountain passes, they are among the picturesque features of that country. Other breeds that are noted for their flesh-developing characters are the Herefords, an English form now extensively used in the United States, and the Angus, or polled cattle, remarkable for their lack of horns. There are many other varieties of domestic cattle, too numerous to mention here; suffice it to say that of all the animals known to men, the Ox is probably the most valuable commercially, its flesh and hides forming a large part of the commerce of many countries.

The cattle of our Western plains, and the men known as cowboys who take care of them, have figured in many thrilling and picturesque incidents in the development of our country. These men, in common with the Gauchos of South America and the vaqueros of Mexico, owing to long and constant practice become remarkably expert and in lassoing the

cattle execute the most difficult and daring feats of horsemanship possible to imagine.

Most breeds of cattle have one pair of permanent horns, which are hollow and grow upon a bony core or support, in this character resembling the horns of sheep and goats and antelopes, but differing from those of the deer, which are true antlers and grow directly upon the skull itself. Horn is simply a number of hairs joined together, and is the same substance as the nails of our own fingers. In size and shape the horns carried by various breeds of cattle differ greatly, some being of enormous length and thickness, while others are almost wanting.

Zebu (*Bos indicus*)

A variety of wild cattle known as the Zebu is found throughout Eastern Asia, in Africa, and Madagascar, where it is also domesticated. It is a very beautiful animal, with exceedingly fine and soft hair, and the bulls, particularly, have a large hump over the shoulders and a heavy dewlap under the throat. They vary considerably in size, some being no larger than a Newfoundland dog, whereas others are among the largest of cattle. The male is black about the head and shoulders, and grey on other portions of the body, while the female as a rule is the same even grey all over. See Plate 31, Fig. 134. The hips are not as wide as those of most domestic cattle, and the little animal is extremely active, and can run and leap to a considerable height. Zebus are used both for riding and as draught animals, and covered as they are at times in India with beautiful silver ornaments,

form a most interesting part of the street scenes of that country. They are worshipped as sacred animals by the Brahmins and are allowed to wander through the streets and bazaars, helping themselves to whatever they please, quite secure from molestation.

*Yak (*Bos [Poephagus] grunniens*)*

The Yak is found both in a wild and domesticated state in Thibet and the neighbouring mountains and plateaux, from the snow-line up to the height of 20,000 feet. They are rather extraordinary animals in appearance, some being jet black, others pure white and still others mottled. Along the sides and over the chest are enormously long masses of hair which hang like a great fringe, dragging the ground in places, and the tail also is very bushy, like that of a horse. The animal is greatly prized by the inhabitants of the country in which it is found. Yaks do not low, or moo, as other cattle do, but their voice is a kind of grunt. The horns stand out at right angles to the head on either side for some distance and then turn upwards at the tip. There is a small hump on the shoulders, and the animal is grotesque in appearance, but is not particularly savage in disposition. See Plate 31, Fig. 133.

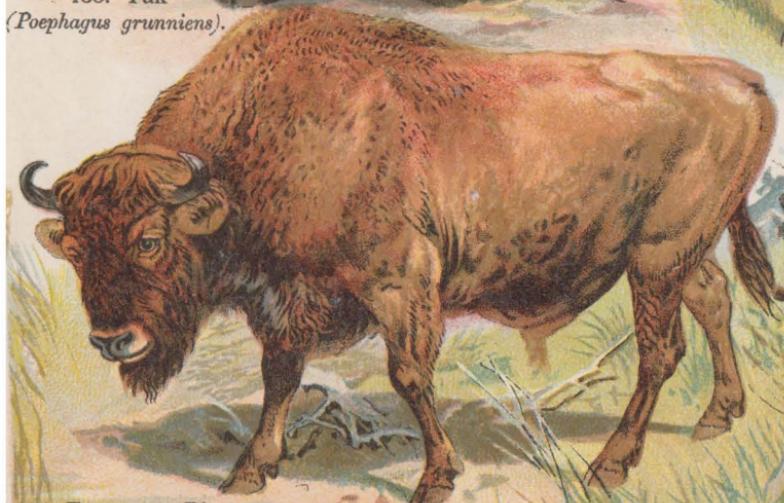
*European Bison (*Bison [Bison] europaeus*)*

This animal, which resembles more than any of the other cattle our own Bison of the Western plains, is of larger size, standing as much as six feet at the shoulder and having much longer legs than the American species. The head is comparatively small, and the huge hump over the shoulders begins almost at

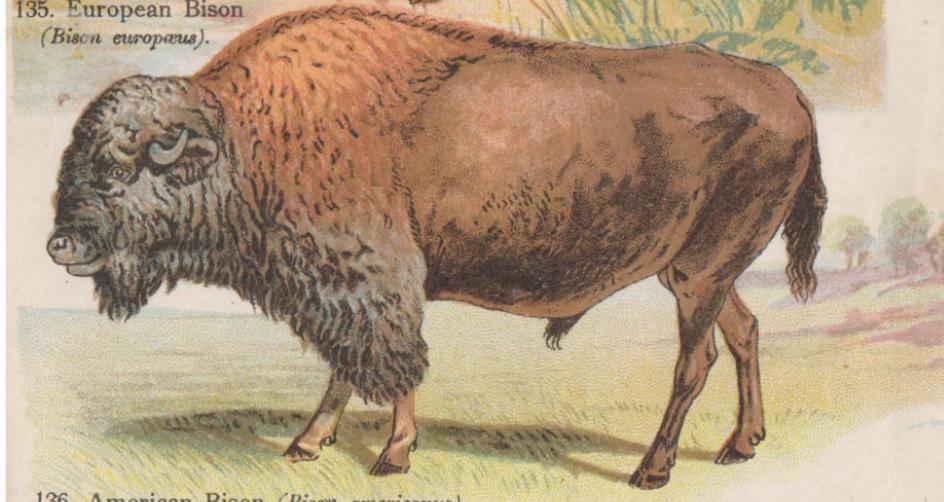


133. Yak
(*Poephagus grunniens*).

134. Zebu
(*Bos indicus*).



135. European Bison
(*Bison europaeus*).



136. American Bison (*Bison americanus*).

the middle of the back, the animal sloping down from that point towards the head and the tail. See Plate 31, Fig. 135. It is a fierce and dangerous animal, and was at one time common throughout Europe, but exists to-day only in a semi-captive state in some of the Czar's preserves in Lithuania. Its habits are not well known, but it may safely be said that they approximate closely those of the American Bison, although it probably never existed in such large herds.

American Bison (*Bos [Bison] americanus*)

The American Bison, generally, but incorrectly, known as the Buffalo, resembles the European species, but has shorter legs and a larger and more shaggy head, and differs from it in other respects. The highest point of the American animal is well forward of the shoulders, and the neck is very long in proportion to the size—so long, in fact, that the front legs are almost at the middle of a line drawn from the forehead to the tail. The enormous head is heavily furred, the horns are short, black, and recurved, and from the shoulders forward the hair is very thick and woolly, but the hindquarters are almost naked—a curious character. The tail is short and stumpy; the legs, though powerful, are quite delicate in build, and the speed in running is said to be considerable, but is of course no match for that of a good horse. The so-called hump bears no resemblance to the hump of the zebu, but is simply an elongation of the spines of the backbone and is more in the nature of a ridge or crest along the back, projecting well over the shoulders. See Plate 31, Fig. 136.

Until comparatively recent times these animals wandered over the Western plains of our country in vast herds, and it has been estimated that no less than fifty millions were living at one time; but owing to incessant persecution their numbers steadily decreased, so that at the present day, with the exception of a few wild specimens kept in the Government preserves and still fewer in zoölogical gardens, they may be said to be exterminated. The Government is now trying to re-establish them, if only on a small scale, in their former haunts, and has lately sent out to one of the southwestern reservations as many individuals as could be obtained.

It was to this animal that the American Indians owed their chief food-supply during the long cold winters. Regular hunts were organised, and mounted Indians would surround as many of the Bison as possible and shoot them down with bows and arrows. After skinning them and carefully laying away the hides, the meat was cut into strips and hung in the sun to dry, and parts of it were pounded and beaten with fat and grain into what was known as pemmican, an article of food much prized by the Indians for use on long journeys on account of its concentrated form. The hides were afterwards scraped and tanned by the squaws and made into robes; or else the hair was removed and the dried skin used for making the tents in which they lived. The bones were split and made into implements resembling knives, and in the old days the larger leg-bones were also used as clubs by the Indian braves.

The Bison were preyed upon not only by man, but

also by vast herds of grey wolves, known to hunters as buffalo-wolves, which followed in the tracks of grazing animals and devoured any of the helpless and young they could secure. When attacked, the females and young herded closely together in the centre of a ring of bulls, which faced outwards, defying the intruders. A single Bison bull alone was a match for a number of wolves—which, indeed, unless greatly pressed by hunger would not dare attack one.

Still later came white hunters, armed with rifles, and completed the destruction of the Bison. They were mercilessly shot down, the hides sold for but a dollar apiece, and often the tongues only were used for food. At the present time a fine buffalo-robe is worth from two to three hundred dollars.

In the natural state, it is said that these animals made a yearly migration, proceeding southward slowly as winter came on and retracing their steps with the return of summer. In these movements they kept as nearly as possible in long files, and their trails may be seen even to-day on the Western plains.

Buffalo (*Bos [Bubalus] vulgaris*)

Quite a different creature from the foregoing is the true Buffalo of India, a large and powerful breed of cattle found wild as well as domesticated in various parts of that country. The horns are long and flat and lie well along the back, projecting but little over the sides. They are thick at the base and tapering to a moderately sharp point. The hair is thin and sparsely scattered over the body, and in walking the animal carries its head high with the nose stuck

up at a rather uncomfortable angle. See Plate 32, Fig. 140. The Buffalo is valuable as a beast of burden, and although a native of India, it has long been domesticated in Southern Europe and Northern Africa. It is very fond of the water and of lying down in ponds and swamps in which most of its body is immersed. Clumsy and unprepossessing in appearance, the Buffalo is a powerful animal, and is said to be able to contend with an elephant or a tiger on fairly equal terms.

African Buffalo (*Bos [Bubalus] caffer*)

Somewhat resembling the preceding species in the form of the body, but not in the head, the African Buffalo is a fierce and active animal, with enormously powerful and heavy horns. These differ greatly in character from those of the common Buffalo, projecting almost at right angles from the head. Immensely thick where their roots meet in a defensive plate over the front of the skull, they droop quickly at the side of the head, turning sharply upwards in points like two great hooks. See Plate 32, Fig. 137. With these terrible weapons the African Buffalo is able to conquer almost any animal, not excepting the lion or the leopard, a side lunge of the head bringing down a horse at one blow. It is shy and wary, and when hunted will lie in wait for its pursuer and spring upon him unawares, if possible. Sir Samuel Baker and other African travellers who have given accounts of this animal, speak well of its prowess in defending itself, and in the early days of settlement in South Africa many men were killed



137. African Buffalo (*Bos caffer*).



138. Musk Ox
(*Ovibos moschatus*).



140. Buffalo (*Bubalus vulgaris*).



139. Anoa (*Bos depressicornis*).

and wounded by these great creatures, which often leaped out upon them from hiding places in the tall reeds. Old and solitary bulls, in particular, are much to be dreaded. This animal is now in a fair way to extinction, owing to its destruction by man, and also to the ravages of a terrible disease known as rinderpest, which some years ago swept over Africa and was particularly fatal to the Buffaloes, killing them off by the thousand.

Anoa (*bos [Anoa] depressicornis*)

This little animal, the smallest of all the cattle, is confined to the mountains of the island of Celebes. It somewhat resembles the true buffalo, with whom it is closely allied, but the horns are much shorter and are quite straight throughout their entire length, projecting slightly backwards from the base. Although of such small size, it is said to be extremely fierce and very active in its movements. It is sparsely covered with hair, like the Indian buffalo, and the colour is very dark brown, with the ears, legs, and under surface more or less white, and the ears hairy only at the base. See Plate 32, Fig. 139.

Musk Ox (*Ovibos moschatus*)

The most northern of cattle, being found in Greenland and the northern parts of North America, the Musk Ox is also perhaps the most singular in appearance. The extremely long and dense fur, almost black in colour, is parted down the middle of the back and falls down on either side quite to the ground. The hoofs are short, and the hair surround-

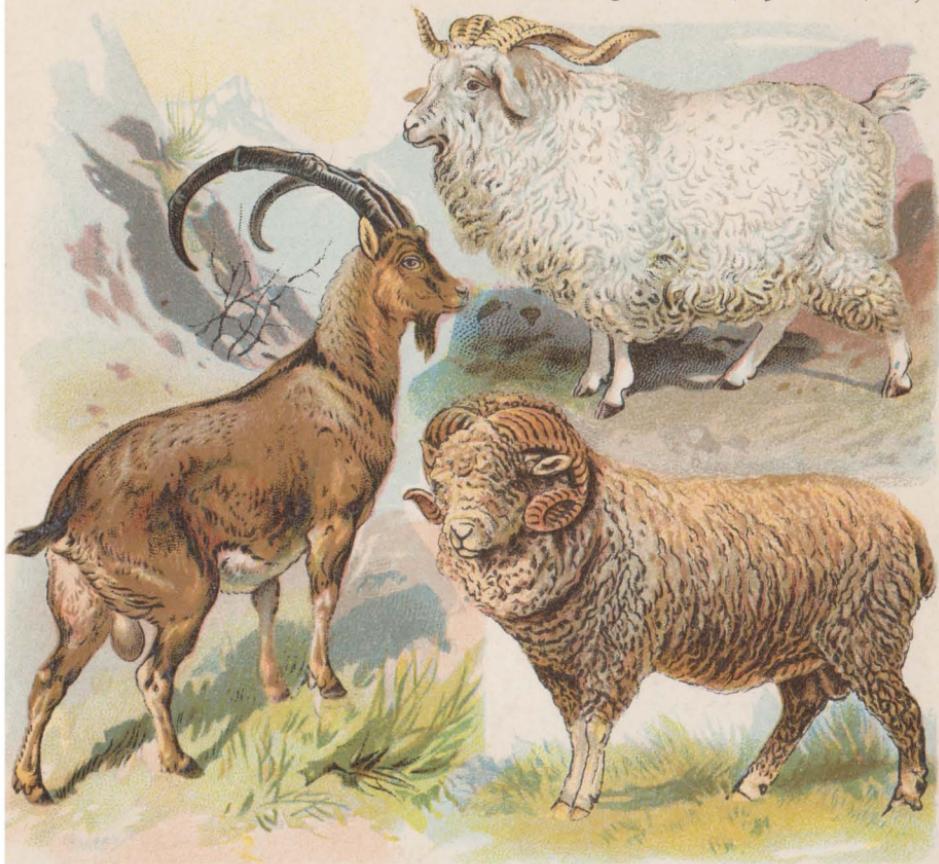
ing them is of a light silver-grey colour. The horns are extraordinary in form, very thick at the base, much like those of the African buffalo, dropping from that point closely against the sides of the head, and then curving sharply upwards. The small ears are almost hidden by great masses of hair, the eyes are large, and the animal is said by those who have made its acquaintance in the far northern countries, not to be lacking in intelligence. See Plate 32, Fig. 138.

The name is derived from the fact that at certain times of the year, or under conditions not yet perfectly understood, the whole animal smells strongly of musk, but at other times the flesh is palatable, and among the Eskimos of Greenland it forms one of the principal articles of food. In our own northern lands it is as yet practically unmolested except by occasional fur-hunters and by the wolves that inhabit the same region. The skins make fine robes, the long woolly hair being almost impervious to the lowest temperature.

FAMILY OVIDÆ (SHEEP)

Sheep (*Ovis aries*)

There are numerous breeds of domestic Sheep, varying in shape and size, and in many of them the horns are but little developed in either sex. The horns grow closer together than in oxen, are normally large in the male, curved downwards and often again upwards, and in the females are smaller. The body is thickly clothed with more or less woolly hair, and the males lack the scent-glands that emit

125. Angora Goat (*Capra hircus, var.*).126. Persian Wild Goat (*Capra aegagrus*).128. Merino Sheep (*Ovis aries, var.*).127. Sheep (*Ovis aries*).

such a disagreeable odour in their near allies, the goats. See Plate 29, Fig. 127. Wild Sheep are mountain animals, and several species are found in the mountains of Europe, Asia, and America. The wild race (or races) from which the domesticated Sheep is derived is unknown, and is probably extinct. Some of the numerous domestic breeds are most valued for their flesh, like the small Welsh and Southdown Sheep, and others, like the Merino, or Spanish Sheep, for the fineness of their wool, and in some parts of the world milk obtained from the ewes is made into cheese. See Plate 29, Fig. 128.

In Africa the wild Sheep are replaced by an animal which seems to be almost between the Sheep and the goats in character, known as the Barbary Wild Sheep (*Ovis tragelaphus*), a large animal almost equalling in size our own Rocky Mountain Sheep, and having a curious fringe of long hair hanging from the throat, and two cuffs, or tufts, of hair around the wrists on the fore-legs. In colour it is a light, even brown, and the eyes are pale golden-yellow. The horns are goat-like in form, standing upwards and outwards from the head, not curling in a circle and not so deeply ridged as in the true Sheep. It is quite a common animal in captivity, being very hardy and breeding well.

Mouflon (*Ovis musimon*)

The Mouflon of Corsica and Sardinia is a wild Sheep with large curving horns, and standing nearly three feet in height at the shoulder. It is of a reddish colour above, with the face ashy, the under parts and

legs white, and a dark brown stripe running along the back.

Argali (*Ovis argali*)

This is a large and handsome sheep found in the mountains of Mongolia and Eastern Siberia. It is dark greyish-brown above and whitish below, in winter becoming reddish, and the fleece is fine, intermixed with stiff bristles. The great horns are curved downward and outward, and are said sometimes to weigh as much as forty pounds and to measure five feet across the tips. See Plate 30, Fig. 129. Several allied species are found in Thibet and Central Asia which attain even greater size, the horns being heavier and more twisted in form.

Rocky Mountain Sheep (*Ovis montana*)

The magnificent animal known as the Bighorn, or Rocky Mountain Sheep, was at one time common in the western parts of this country, but is now becoming exterminated. It measures as much as three feet in height at the shoulder, has enormously long, heavy, and recurved horns, and in colour is light brownish-grey shading to a lighter tint on the under parts. The tail is extremely short, almost invisible. See Plate 30, Fig. 131. This animal, as usual with wild sheep, lives in mountainous and inaccessible parts of the country, and is extremely sure-footed, leaping from crag to crag with extraordinary facility. In character it closely resembles the two preceding forms, and is about midway between them in general proportions.

Of late years two distinct varieties of this great sheep have been found in the more southwestern

parts of the United States and Canada, blue, or smoke-coloured, smaller in stature than the true Mountain Sheep, and having horns more delicate in form.

FAMILY CAPRIDÆ (GOATS)

Goat (*Capra hircus*)

Goats are distinguished from sheep by the curving or spiral horns rising upwards, instead of curving over the sides of the head. The males possess a scent-gland which emits an offensive odour, and the hair is generally coarser and less woolly than in sheep. The common Goat has long been domesticated for its flesh, its fleece, and its milk, and is generally white or brown, with long, erect horns curving backwards, longer or shorter hair or wool, and a large beard under the chin. They are sure-footed mountain animals like the sheep, and although they will feed on grass or hay, they are extremely fond of bark, and are destructive to all kinds of trees.

Since the introduction of Goats into the island of St. Helena, the original forests, which drooped even into the sea when it was discovered by Europeans, have entirely disappeared, and many of the most interesting and characteristic of the native plants have vanished.

Instead of figuring the common Goat, we have preferred to depict two of the domesticated races which yield the finest wool—the Cashmir Goat, from the wool of which the famous Cashmir shawls are made, and the Angora Goat of Asia Minor, which yields extremely long and fine wool of great commercial

importance. See Plate 28, Fig. 124, and Plate 29, Fig. 125.

Ibex (*Capra ibex*)

The Ibex is the wild goat of the Alps, but is now very scarce, though strictly protected, and is found only in the lofty and almost inaccessible mountains between Piedmont and Savoy, where it is met with in small bands of from five to fifteen individuals. The coat is thick, reddish-grey in summer, but more yellowish in winter, and the males have a slight beard in winter only. They measure four feet, or more, in length, and the males have very large, deeply ridged horns, set close at the base, and rising in a graceful curve over the back, the tips bending downwards. See Plate 28, Fig. 123. Those of the female are much smaller and more goat-like in character. The animal is very shy and wary, and is as active and difficult to stalk as the chamois, which it much resembles in habits.

Persian Wild Goat (*Capra aegagrus*)

By some naturalists this animal is called the Bezoar Goat, from a substance called bezoar sometimes found in the stomach and formerly much used in medicine, especially as an antidote to poisons. It inhabits the mountains of the Caucasus, Asia Minor, and Persia, and eastward to the Indus. The Persian Wild Goat much resembles the ibex, but the largest males exceed five feet in length, and the horns are considerably larger, with deep cross ridges. It is reddish or brownish-grey above, and paler beneath, with the face, beard, chest, front of legs, stripe on

123. Ibex (*Capra ibex*).124. Cashmir Goat
(*Capra hircus*, var.).122. Eland (*Taurotragus oryx*).

the back, and the tail, black or dark brown. See Plate 29, Fig. 126. By some writers it is thought to be the original species from which domesticated goats are descended.

Markhor (*Capra Falconeri*)

This wild goat is found in the mountains of North-western India and neighbouring regions. It varies considerably in size, and also in the shape of the great twisted horns, which are often three feet and upwards in length. The coarse, bristly hair is reddish-brown or grey above and paler beneath, and the beard, which is very large in old males, is black, but varies according to age, sex, and season of the year. See Plate 30, Fig. 130.

Rocky Mountain Goat (*Oreamnos montanus*)

This animal seems to represent an intermediate link between the sheep and the antelopes, and is the only species of the genus *Haplocerus*. It is found in the western parts of the United States and Canada, high up on the sides of mountains, and in general appearance is goat-like. The hair is long and pure white in colour and hangs in a beard at the throat. The hoofs and horns are black, the horns being smooth, insignificant in size, but little more than eight inches in length in large specimens, and perhaps an inch in diameter at the base, and rise abruptly from the forehead and curve sharply backwards for a short distance at the tips. See Plate 27, Fig. 120. Old males of this species have a large hump on the shoulders, and are said to be fierce and aggressive in dis-

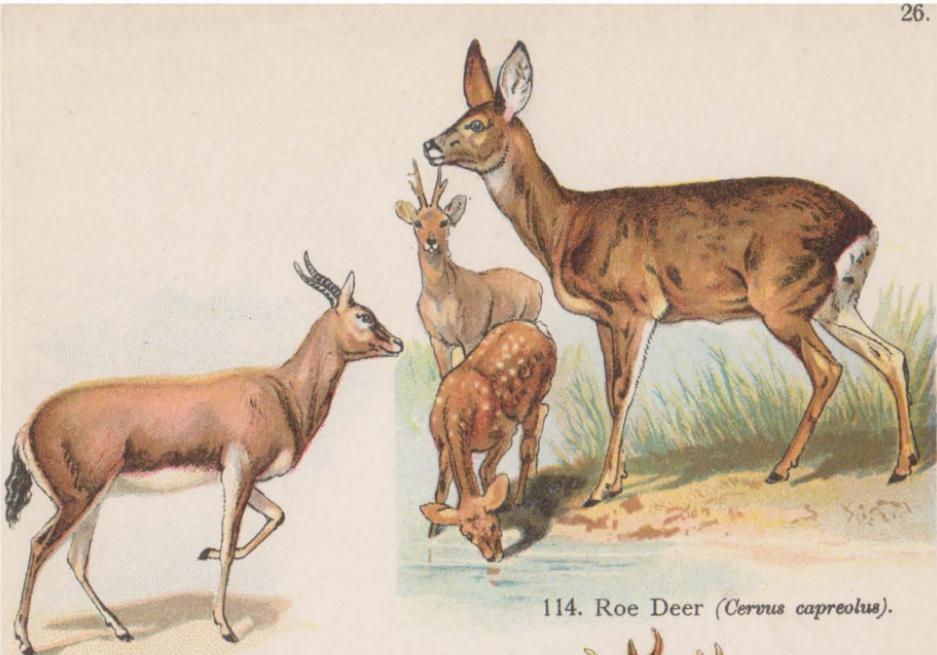
position. Owing to their white coat, these animals are quite conspicuous in summer, but in the winter, on snow-covered cliffs, they are, of course, invisible.

In certain parts of the high mountains of Thibet and in the Himalayas are other forms resembling the Rocky Mountain Goat in character, though not in colour.

FAMILY ANTILOPIDÆ (ANTELOPES)

Antelopes are a branch of the order of Ungulates which vary greatly in size, some, like the Pigmy Antelope, being less than a foot in height, while others, such as the Eland, measure as much as six feet at the shoulder. The number of horns also varies, in some species four being present on the head of the males. These are always hollow and supported on a bony core, as in the cattle, are never branched, and are not shed like those of the deer. Most of the Antelopes are found in Africa, and there is but one species in America, the Prongbuck or Pronghorn, whereas Asia is represented by two or three species. Many of them are unprovided with dewclaws—the short, small hoofs seen at the back of the foot in cattle and deer. While some are plains animals, living on dry, hard ground, certain others prefer swampy country, and in these latter the real hoofs are much elongated and the dewclaws are greatly developed, in order to support the animal on the soft ground.

There is great variety in the form of the horns, some being cimeter-like, as in the Roan Antelope, in others like a corkscrew, as in the Indian Antelope,



116. Gazelle
(*Gazella dorcas*).



115. Reindeer (*Rangifer tarandus*).

while those of the Gemsbok and Oryx run in a perfectly straight line back of the head or fall in graceful curves on both sides of the shoulders.

In the early days of the colonisation of Africa, great herds composed of many different species wandered over the face of the continent, but since the opening up of the country to civilisation, and on account of various diseases that have been fatal to them, their numbers have greatly decreased. As a rule, they are animals of great swiftness, and when wounded are dangerous; in charging, they lower the head between the front legs so that the horns project straight forward, and dash at the enemy with remarkable agility. Occasionally leopards have been found impaled on the horns of the Gemsbok, both animals having been killed.

Most forms of Antelope, particularly those living on the plains, are a light-grey or brown in colour, and in the reed-living species this is varied by stripes or spots upon the body. In captivity, they seem tougher and less sensible to pain than the deer family, and as a rule do well; but they are usually savage in character and are handled with much difficulty.

The most celebrated species in India is the Black Buck, or Indian Antelope (*Antilope cervicapra*). The males are a beautiful rich black above and pure white beneath, but the females are a uniform light fawn colour. The horns, which are present in the males only, are corkscrew-like in form, and extend for two feet or more straight backwards. This is the animal that is often hunted by means of trained cheetahs. In common with several other species, the

Indian Antelope, when pursued, has a habit of bounding into the air, in order, it is thought, to gain a better idea of the character of the country it is to traverse. This animal is the only representative of its genus.

Gazelle (*Gazella dorcas*)

The Gazelle is one of the smaller antelopes, not exceeding two feet in height at the shoulder. It is fawn-coloured above, blackish on the lower part of the sides, the under surface of the body and a great part of the legs and rump are white, the face is marked with black and white, and the tail is black. The horns are of moderate length, but are larger and more strongly ridged in the male than in the female, and the eyes are large, full and beautiful in expression. The legs are long and extremely delicate in build. See Plate 26, Fig. 116. These animals are found in North Africa, usually in herds, their colour harmonising well with that of the deserts in which they live. When feeding, they post sentinels which give warning by a stamp of the foot at the approach of an enemy, when the whole herd at once takes to flight.

Four-horned Antelope (*Tetraceros quadricornis*)

This is a small Indian Antelope measuring about three feet in length, and remarkable for possessing four short horns, in the male only. The horns are not ridged, and the front pair is much shorter than the hinder pair, and is sometimes wanting. The upper surface of the body is reddish-brown, and the under surface is whitish, and there is a dark stripe down the

front of each leg. See Plate 27, Fig. 121. The Four-Horned Antelope is found in hilly, bushy parts of India.

Pronghorn Antelope (*Antilocapra americana*)

The single representative of the Antelope family in America is the Pronghorn or Prongbuck, found in mountainous parts of the West—and is not a true antelope, although it is more nearly allied to that family than to any other. The horns have a small prong, or branch, projecting forward from the main beam, from which the animal takes its name, and, singularly enough, this horn is shed every year like that of a deer, although it is supported on a bony core, as in the true antelopes.

The Pronghorn is a beautiful creature, about four and a half feet in length and two and a half feet high at the shoulder, the colour of the coat brownish above and white below; the hindquarters white, and there are two irregular patches of white on the throat. The eyes are large, deep brown in colour, and placed well at the sides of the head.

Saiga Antelope (*Saiga tatarica*)

This is the only desert Antelope which is found in Europe, and it is met with as far west as Poland, extending eastward across the steppes of Russia far into Central Asia. The face is much like that of a sheep, but the snout is very long, overhanging the lower jaw, and the nostrils are curiously inflated. It is ashy-grey above, whitish below and on the inner side of the legs, and a dark brown stripe runs along

the middle of the back. Below the eyes and from the ears grow long tufts of hair.

Roan Antelope (*Hippotragus equinus*)

This is a large and handsome species inhabiting East Africa, and standing four or five feet high at the shoulder. It is brownish-grey above, white beneath, the face is varied with black and white, the ears are very long and pointed and have a tuft of hair at their tips, and there is a short black mane along the back. The tail is long and tufted with black. The horns are long, curving, and ridged, and the animal is dangerous when brought to bay. See Plate 27, Fig. 118.

Nearly allied to the Roan is the Sable Antelope (*Hippotragus niger*), also a very handsome animal, dark brown or black above, with a pure white stomach, the male bearing splendid cimeter-shaped horns as much as three feet in length, rising abruptly over the eyes and curving gracefully backwards. Like the Roan also, it is a fierce and determined fighter when wounded. These animals are still common in Southern Africa, and may be seen in quite large herds.

Eland (*Oreas canna*)

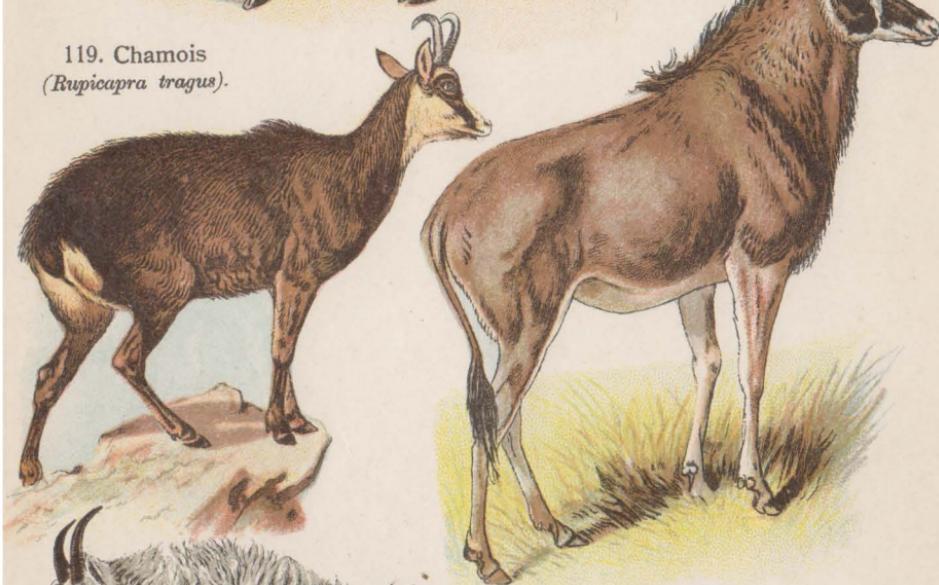
Prominent among South African Antelopes is the great Eland, largest of the species, full-grown males standing six feet high at the shoulder and measuring as much as nine feet in length. In colour it is a beautiful fawn or purplish-grey above, white beneath, and has very thin and delicate white stripes running across the body. The horns of the male are



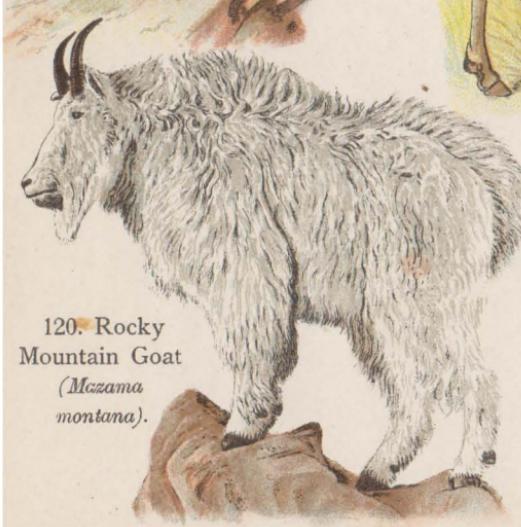
117. White-tailed Gnu
(*Connochaetes gnu*).

118. Roan Antelope

(*Hippotragus equinus*).



119. Chamois
(*Rupicapra tragus*).



120. Rocky
Mountain Goat
(*Oreamnos americanus*).



121. Four-horned Antelope
(*Tetracerus quadricornis*).

about two feet in length, those of the female somewhat longer, and run in a general straight line, the base only being spirally twisted, in a corkscrew form. The adult male has a curious patch or tuft of hair between the eyes, of a light golden-yellow colour, and an enormous dewlap bordered with black hangs on the under side of the neck; the tail also is tufted with black. The body is quite ox-like in form, but the head is very small and delicate in proportion to the size of the animal. See Plate 28, Fig. 122. The flesh is very palatable, and the creature is often pursued by the natives of South Africa for food.

Next in size to the Eland is the Kudu (*Strepsiceros kudu*), probably the most beautiful of all the antelopes. It is similar in colour, but has rather brilliant white stripes across the body, and a white line extends in front of the eyes and down on either side of the nose. The ears are enormously large, and the male has magnificent spiral horns as much as three feet in length.

Chamois (*Rupicapra tragus*)

In form and habits the Chamois resembles a goat rather than the more typical antelopes. It inhabits the high mountains of Central and Southern Europe and Southwestern Asia, leaping from crag to crag and up and down the mountain-sides with the greatest agility. It is a dull reddish-brown in summer, darker in winter, with a black stripe on the back. The throat is dull yellow, the head and rump are varied with white, and the tail is reddish-brown. The Chamois is a small animal, about three feet in length and two

feet or more high, and has small black horns that are hooked backwards and sharply pointed. See Plate 27, Fig. 119. The herds post sentinels who warn them of approach of an enemy by whistling and stamping, and chamois-hunting is very dangerous sport owing to the rough character of the country the animal frequents.

White-tailed Gnu (*Connochætes gnu*)

Probably the most singular in appearance of all the antelopes is the Gnu, several species of which are common in South America. For years this creature was a puzzle to naturalists, who were unable to fix its exact place in the zoölogical world. The Dutch colonists called it the "horned horse," which name they no doubt derived from the long and bushy tail somewhat resembling that of a horse. The head, however, is unlike that of any other animal, and the horns, which are present in both sexes, form a broad and heavy base that reaches across the forehead, tip suddenly forward over the eyes, and then sharply recurve upwards.

The White-tailed Gnu is dark brown in colour, with the exception of the long tail, which is pure white; there is a short mane, a tuft of hair under the chin and a brush of black hair under the neck. See Plate 27, Fig. 117. The females are somewhat lighter in colour.

The Brindled Gnu, or Blue Gnu (*Connochætes taurina*), so named on account of the greyish-blue colour, is slightly larger than the preceding species

and distinguished from it by the dark brown stripes and dark brown or black tail.

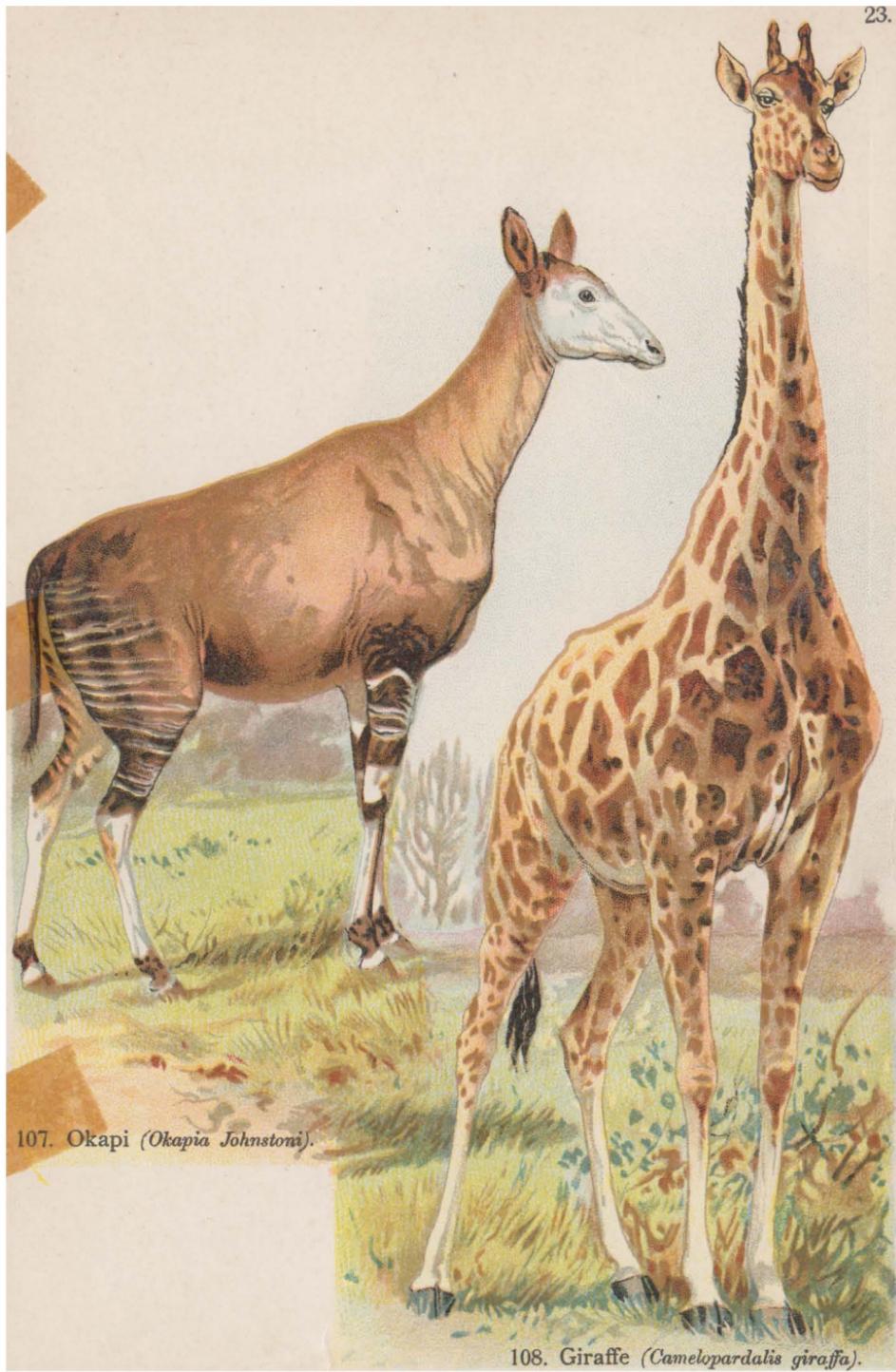
When running in herds these creatures perform curious antics, gathering around any object that may have attracted their attention, leaping and jumping about, whisking their long tails, and grunting in an extraordinary manner. In captivity they are irritable, and sometimes charge at spectators, dashing their horns against the bars of their paddocks.

There are several ugly species of antelope in South Africa called the Hartebest (*Bubalis cama*), distinguished by their extremely long, solemn-looking faces and their curiously shaped horns. They are yellowish-brown in colour, the face and legs marked with black, and the tail black and bushy. Like the Gnus, they are noted for their extraordinary antics.

FAMILY CAMELOPARDALIDÆ (GIRAFFES)

While the whales and elephants are the bulkiest, the Giraffes are the tallest of all known animals, the largest specimens being at least twenty feet high. They have two short permanent horns on the head, covered with skin and tufted with hair, in front of which is a short third protuberance, and occasionally there are two more at the side of the head, so that the animals may be said to have either three or five horns. There are two hoofs only on each foot, there being no trace of dewclaws. The neck, though very long, contains only seven vertebræ, as in the great majority of mammals; the legs are very long, and the back slopes rapidly toward the tail, which is long and bushy at the end. On the back is a short mane. The

great height of the animal enables it to browse on leaves of trees, which form its principal food, and when drinking, it is forced to spread its fore-legs wide apart in order to reach the water with its lips. It is, however, able to do without water for long periods. The eye of the Giraffe is large, full, dark brown in colour, and with heavy lashes, and is singularly gentle in expression. These animals inhabit chiefly the open plains of Central, Eastern, and Southern Africa, and are capable of great speed, although they ordinarily move with a shambling trot. All the Giraffes are of a lighter or darker fawn-colour, with large, reddish-brown blotches in varying proportions, the front and under surface of the body and the lower part of the legs being more or less white. There are different races of Giraffes found in Africa, which vary considerably in colour, the development of the horns, and so on, but naturalists are not agreed as to whether they should be regarded as species or varieties. The name *Camelopardalis* dates from classical times, the form and colour of the animals suggesting a resemblance to both the camel and the leopard. They were unknown to Europeans during the Middle Ages, and were only brought under their notice again in the course of the eighteenth century. At the present time, however, Giraffes are fairly common in zoölogical gardens. They are absolutely silent animals, never having been known to utter a sound of any nature.



107. Okapi (*Okapia Johnstoni*).

108. Giraffe (*Camelopardalis giraffa*).

Giraffe (*Camelopardalis giraffa*)

The species figured is the South African Giraffe, which is one of the best-known forms, though those obtained by the Romans probably came from the Sudan. See Plate 23, Fig. 108. The Giraffe is not now known in Africa north of the Sahara, nor did it probably occur in that part of the continent as late as classical times.

Okapi (*Okapia Johnstoni*)

The Okapi is a rare and still little known animal, which inhabits the depths of the Congo Forest, and is very shy and difficult to stalk. It was not until 1901 that specimens of the hide, and afterwards the skin of an immature specimen and two skulls, were obtained by Sir Harry Johnston, and sent over to England. Since then other specimens have been obtained, but it is still a great rarity in museums, and there are no living examples in captivity. It is allied to the giraffe, but the size is smaller (an adult would probably attain a height of six or seven feet), and the neck and legs are much stouter and thicker, and the back less sloping, giving the animal more resemblance to a large antelope than to a giraffe. The body is dark reddish-brown, the middle of the sides of the head, the legs, and rump being white. The hindquarters are banded with black, like a zebra, and there is a broad, black band above each hoof, down to which runs a perpendicular black band on the front legs. The adult male possesses two short, curved horns just above the eyes. These are covered with skin till full-

grown, when the bare tips project. See Plate 23, Fig. 107.

This animal is believed to be most nearly allied to some extinct fossil forms found in Greece and India.

FAMILY CERVIDÆ (DEER)

The Deer resemble the antelopes, but are at once distinguished from other ruminants by their horns, or, more properly, antlers, which are solid throughout, generally more or less branched, and cast every year. While growing, they are protected by a covering of skin clothed with short hair, and in this condition they are said to be "in the velvet." When the horns are fully developed, the velvet dries up and peels off, leaving them bare and hard, like bone. They thus become formidable fighting weapons, and are used as such by the males, in their combats for the leadership of the herd.

So far as is known, there are no deer in Africa or Australia, their place in Africa being taken by the antelopes. In Central Asia there are several large and handsome forms resembling the Red Deer in shape and in the character of horns, and others that are more like the American Elk, or Wapiti. In North America several species are found, and in South America there are a few well-marked but comparatively small and insignificant forms of deer. For grace and beauty of form the deer family are unsurpassed, their magnificent horns, delicate limbs, and stately carriage giving them a style not possessed by any other mammal. The males are frequently killed in their savage encounters with each other during the

fall and winter months, but after the horns are shed the stag becomes shy and retiring and does not regain its fighting qualities until the horns are thoroughly out of the velvet. Nearly all are animals of very great speed, owing to their powerfully developed hindquarters. The flesh, called venison, is most palatable, and is highly valued for food by the natives of the countries inhabited by deer.

In common with certain other ruminants, the Deer family possess exterior glands on various parts of the body, in many species on the face below the corner of the eye, and in others on different parts of the legs and body. The use of these glands is not definitely known, but they are supposed to aid the animal in tracking other members of its family, and when the Deer is alarmed or excited they are expanded to the fullest extent.

Barking Deer (*Cervulus muntjac*)

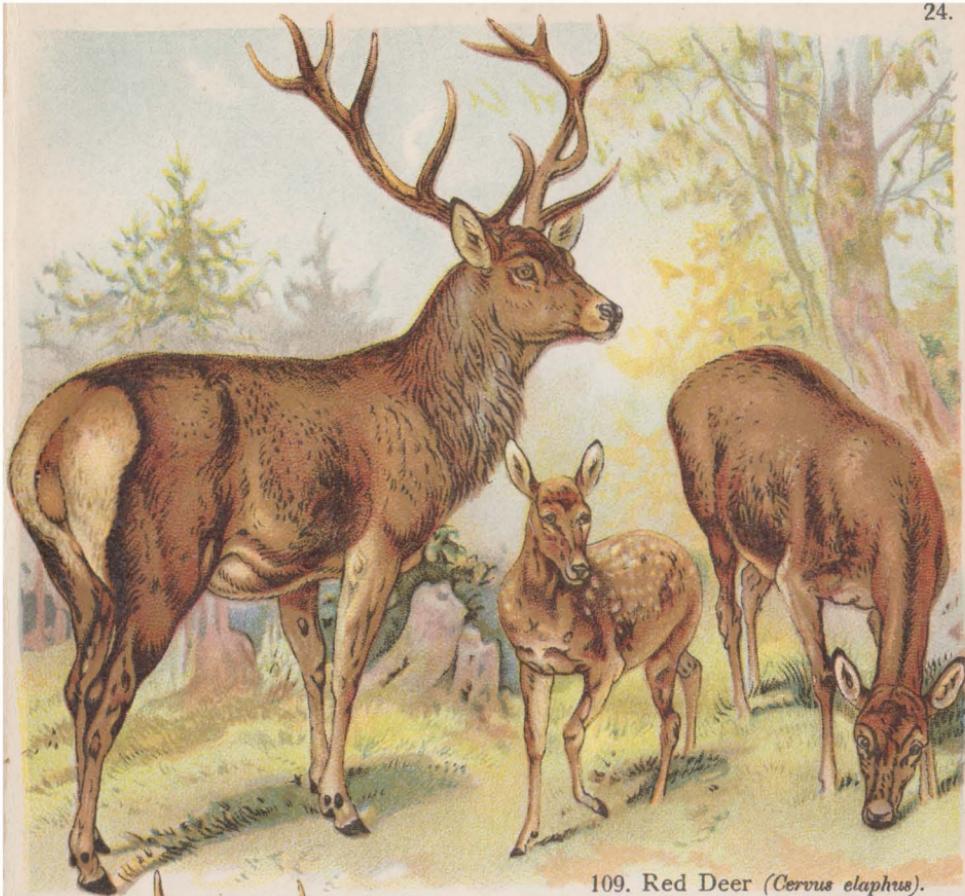
The Muntjacs, or Barking Deer, are small animals, about three feet long, common in India, Burma, Ceylon, the Malay Peninsula, and large adjacent islands. It is dark reddish-brown above, white below. The legs are short, the back arched, and the male has short, straight antlers running obliquely backwards and slightly divided at the extremity, and short brow antlers, curving inwards. It also has large upper canine teeth, which are used in fighting, but those of the female are short; her horns also are rudimentary. See Plate 24, Fig. 112. The voice of this deer is a peculiar sharp bark, like that of a dog.

The Red Deer (*Cervus elaphus*)

The Red Deer is perhaps the most widely known of any species, having figured in the history of Europe for many centuries. It is a large animal, nearly equalling in size the American elk, or wapiti, and has large and many-branched antlers, in adult males cup-shaped at the extremity and projecting in three points, or prongs. See Plate 24, Fig. 109. At present the Red Deer is found in a semi-domesticated state in many of the parks and preserves both in the United Kingdom and on the continent of Europe. A large, wild form is found in the eastern part of Europe and in Central Asia, and the finest specimens are said to come from Siberia.

The Red Stag is, and has been, often depicted in art, particularly by German and English painters. Landseer, for example, made a specialty of painting this splendid Deer, and at present in Germany there are several painters who confine themselves almost exclusively to pictures of this animal. In bearing it is extremely haughty and graceful, and serves as a typical example of the deer family.

In Scotland the Red Stag is hunted in several different ways, but principally by the method known as deer-stalking, in which the hunter endeavours to creep up on the deer, concealing himself as much as possible until near enough to get a good shot. Large dogs known as deerhounds, a shaggy-haired variety of greyhound, are also used in connection with this sport. In Germany also great numbers of Red Deer are preserved in royal parks, and every year at certain



109. Red Deer (*Cervus elaphus*).



113. Elk
(*Alces malchis*).



112. Barking Deer (*Cervulus Muntjac*).

seasons great hunts are organised and attended by many of the nobility, when the deer are driven by certain positions in the forests and shot from ambush as they pass. In France and in parts of England they are hunted with hounds who pursue the deer, the hunters following on horseback.

When driven to bay, the Red Stag is a formidable antagonist, and uses his sharply-pointed horns to good advantage. The females are devoid of horns, and the young are thickly spotted with white. In winter the colouring is somewhat more greyish than in summer, and the neck is clothed with long stiff hair, which gives a very thick appearance to that part of the body.

American Elk, or Wapiti (*Cervus canadensis*)

In this country the place of the Red Deer is taken by the Wapiti, or American Elk, of greater size and differing in certain characters, but having antlers that much resemble those of the European species. At one time found in many parts of North America, it is now confined chiefly to the far Western States, where it may still be met with in quite large herds, usually frequenting the neighbourhood of streams. The general ground colour is reddish-brown on the upper portions of the body and darker beneath, with a whitish patch on the under part of the head and on the rump. See Plate 24, Fig. 113.

The cry, or challenge, of the male Wapiti is a singular nasal whistle which may be heard for a considerable distance. In the fall this piercing cry rings like a bugle-note through the clear air of the regions

inhabited by the Wapiti, and is answered by any male that chances to be within ear-shot. There is no finer sight in the animal world than the appearance of this splendid stag advancing slowly with head upraised to meet his adversary.

Virginia Deer (*Dama virginianus*)

Found chiefly in the eastern parts of the United States, extending from Canada into Florida, and varying in colour at different places and seasons, is the Virginia Deer. The horns of this species are unlike those of any other. Sharply recurved at a short distance above the head, they bend well forward, almost meeting at their tips, and have several small projecting points, but are in no way palmated, or flattened.

It is a comparatively small animal, about the size of the fallow deer, although the bucks are heavier, and the legs and feet are more delicate. The colour is very beautiful, the winter coat dark brown or grey, and white on the under parts. The tail, which is very long, for a deer, is white on the under surface, and when startled or alarmed the animal has a curious habit of waving this member back and forth like a flag. The ears are long and delicately made, the eye is large, dark, and beautifully soft in expression; and altogether the Virginia Deer is most graceful and charming in appearance. The young, as is usual with the deer family, are thickly covered with white spots, which vanish as they grow older.

In the western part of the United States, particularly in hilly regions, is a form known as the Mule

Deer (*Dama macrotis*), so-called on account of its extremely long ears. In general colour it closely resembles the preceding species, but is somewhat larger and more heavily-built, and the horns are longer and have more definite branches.

Fallow Deer (*Cervus dama*)

This is a well known European species, smaller than the Red Deer and differently coloured—a rich reddish-brown, spotted with white, the under surface white, and the spots remaining throughout life. In winter it is greyer, and both white and black or dark brown specimens are found in the parks of England. The males only are antlered, the antlers being palmated, or shovel-shaped, and very large in proportion to the size. The Fallow Deer is native to Southern Europe, but has long been naturalised in England and other parts of Northern and Central Europe.

A curious feature, particularly in the buck, or stag, is a lump, or protuberance, on the throat directly under the head, which gives a very characteristic appearance to the animal. The eye is somewhat sheep-like; indeed the female decidedly resembles a sheep, having a more woolly coat than the male. See Plate 25, Fig. 110. The fawns are pretty little creatures, covered with many white spots.

Roe Deer (*Cervus capreolus*)

A small form, standing not much more than two feet high at the shoulder, the Roe Deer is widely distributed throughout Europe and Western Asia. The

male only has short, erect, three-pointed antlers, and no upper canine teeth, and the tail is very small, almost rudimentary. The hair is a reddish-brown in summer, greyish-brown in winter, and more or less white on the under surface, hindquarters, and legs, and is much thicker in winter than in summer. See Plate 26, Fig. 114. The Roe Deer is generally found in woods in small herds, often consisting of only a single family.

Moose (*Alces machlis*)

The Moose is the largest of the deer tribe, standing seven feet in height at the shoulder. The male of this magnificent animal is armed with a tremendous pair of shovel-shaped horns, edged with enormous points and projections, and measuring as much as six feet across in large specimens. It is ungainly in appearance, having extremely long legs, and a very short tail; the head, too, is singular in form, the heavy nose and upper lip drooping well down over the mouth. Its sense of smell is remarkably acute, and the animal is on that account hunted with difficulty, although at certain seasons, particularly in the fall, the male may be drawn from concealment by imitating his call. American and Indian hunters do this by blowing through a piece of birch bark twisted in the shape of a cone. The colour of the Moose is dark reddish-brown, becoming lighter on the under parts and grey on the legs. The feet are enormously large, strong, and heavily made, with well-developed dewclaws. See Plate 25, Fig. 111. When the animal is angry, the thick black mane over the shoulders



110. Fallow Deer (*Cervus vulgaris*).



111. Moose (*Alces machlis*).

is raised, and the ears laid back close against the head like those of an angry horse. The Moose is very fond of the neighbourhood of water, and feeds largely on water-lily roots, wading in ponds up to its neck, then reaching down and tearing them up from the bottom with its teeth.

Owing to its long legs, the speed in travelling is very great, and the chase of Moose is not often attempted unless the snow is deep on the ground, when they break through the crust and soon become exhausted. They are then pursued by hunters on snow-shoes.

The males fight desperately in the fall, and at this time will not hesitate to attack any one who trespasses on their domains. Occasionally two combatants have been seen with horns locked together so that they could not be drawn apart.

The largest and finest specimens are found in Alaska, where the males always develop enormous and handsomely-shaped horns. In general disposition they are shy, lying concealed during the day in some thicket, and feeding at night; and in winter they make what is known as "yards," a number of them herding together and tramping down the snow in the vicinity. To these places they are sometimes tracked by hunters, who usually kill indiscriminately all the animals found.

An animal as large as the Moose and closely resembling it in form has been found in a fossil state in some parts of New Jersey and elsewhere, but the horns differ considerably in shape.

In Europe the Moose is called the Elk, and speci-

mens there are somewhat lighter in colour than the American species.

Reindeer (*Rangifer tarandus*)

There are several species of Reindeer, all found in sub-arctic regions—some in the extreme northern parts of America, others in Lapland, Greenland, and Newfoundland. All are similar in form, however, differing chiefly in the size and shape of their horns and in the colour of their fur. The North American species, usually called the Caribou, is the largest and handsomest. These animals are used as beasts of burden by the Greenlanders and Laplanders, and are able to draw sledges for long distances over the snow and ice. Their fur is also largely used for making articles of clothing.

The hoofs of the Reindeer are very widely spread, in order to support the animal on the snow, and the nose is almost entirely covered with hair, only a small spot at the tip remaining bare. The ears are small and are also thickly covered with hair, and the whole body in fact is enveloped in dense, soft fur, dark grey in summer, paler in winter. The horns differ greatly from those of any other deer, the main shaft being round and smooth in character, and very much branched and spread apart at the tips. A singular-shaped tine projects from the base of the horns well forward over the nose, and is thought by some authorities to be of use in scraping away the snow in search of food. See Plate 26, Fig. 115.

Musk Deer (*Moschus moschiferus*)

The Musk Deer differ from the other Cervidæ in having no horns in either sex. Both have canine teeth, however, and in the male these are very largely developed, curved inwards, and are used like horns as weapons of offence and defence. The male is provided with a pouch which yields the perfume called musk. The species figured is a small animal, not exceeding two feet in height and three in length, and is found in the Himalayas and other high mountains and plateaux in Central Asia. The toes, or hoofs, are long, and may be widely spread apart; dewclaws also are present. The colour varies from brown to reddish or yellowish, above, with the under surface of the body whitish. See Plate 22, Fig. 105.

GROUP TRAGULINA**FAMILY TRAGULIDÆ**

The animals belonging to this family are hornless, and have four well-developed toes. There are upper canines in both sexes, which are very large in the male; the lower ones resemble incisors. There are only a few species, of small size, found in India and in the Malay Peninsula and larger islands. They are commonly known as Chevrotains.

Chevrotain (*Tragulus pygmæus*)

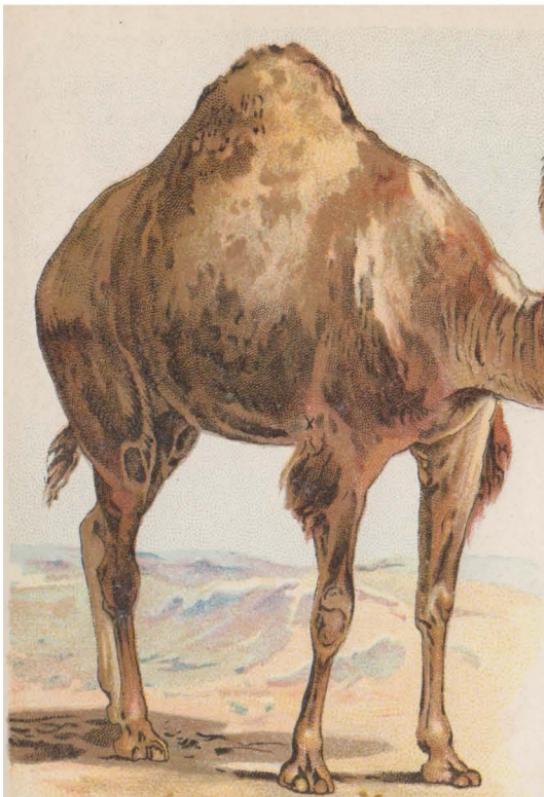
The creature known as the Chevrotain, often incorrectly called Pygmy Musk Deer is the smallest of this family, measuring not more than eighteen

inches or two feet in length. Neither male nor female has horns. The head is small and pointed, the eyes large, and the feet tiny; the back is much arched like that of an agouti. It is a silent little animal, standing for hours apparently in the same position with its slender legs bunched closely together. The hair is rather fine and close, reddish on the head, with the sides paler and the under surface white. See Plate 22, Fig. 106. It lives in the thickest parts of the forests of Java and the islands of the Malay Peninsula.

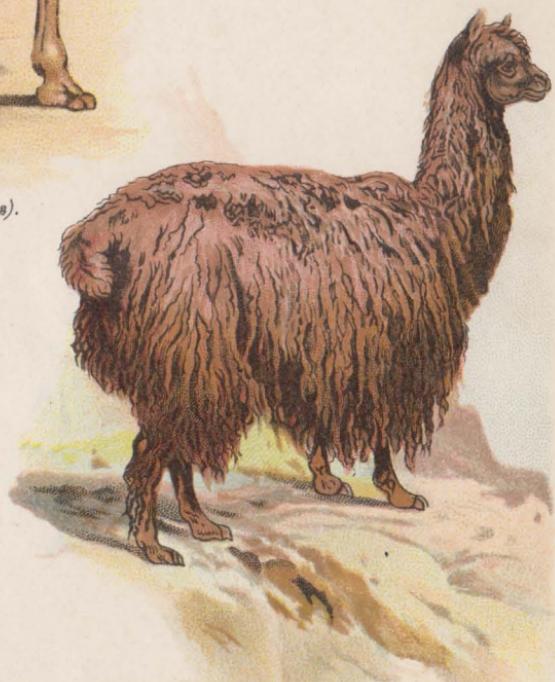
GROUP TYLOPODA (Camels and Llamas)

The Camels and Llamas form a well-marked family in this group, distinguished by many interesting characters, chief among them being the padded hoofs in all species, and, in the Camels, either one or two humps high up on the back. In form the Camel is the most grotesque of all animals, the long neck carried in a sharp curve, the head held high, in a horizontal position, the long knotty legs, and the large humps, giving it a unique appearance. The hump is not supported on a bony structure, as might be supposed, but is simply a large projection of flesh that is thought to store up nourishment for use on long journeys. At any rate, the Camel is judged by the condition of the hump, this being flabby and soft when the animal is in poor condition.

There are two existing species, one the Dromedary, or single-humped Camel of Africa, and the other the Bactrian Camel of the northern part of Asia; the Llamas are all South American.



102. Camel (*Camelus dromedarius*).



103. Alpaca (*Llama pacos*).

Arabian Camel (*Camelus dromedarius*)

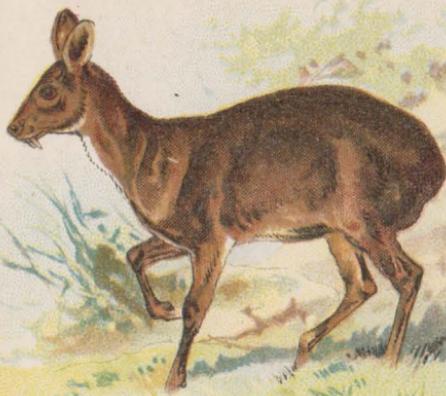
The One-Humped Camel, or Dromedary (the latter name being used for the swift-running breed used for riding), is a large animal about six feet high and nine feet long from the nose to the end of the tail, only known as domesticated in Arabia and North Africa. In hot and waterless regions this animal is absolutely indispensable to man, horses being unable to live in certain sections of Africa. Owing to the peculiar construction of the stomach, it is able to go without water for several days. The speed of the Dromedary is very considerable, though not so great as that of a good horse, and it is able to keep up a slow trot for hours at a time. It is the most unwilling of servants, however, groaning and making protests every time it is loaded. The Camel has a singular manner of lying down, kneeling upon both the front and the hind legs, and as a protection to the delicate joints, the knees are covered with large horny pads of thickened skin. The nostrils are long narrow slits which can be closed at will in order to keep out the sand, and the eyes are heavily fringed with long and thick lashes. The foot is eminently adapted to traverse the soft and yielding sand of the desert, is divided into two toes, armed with heavy hoofs, the under side consisting of but one soft pad, which stretches out when the animal bears its weight upon it, but, being elastic, returns to its original size when the foot is raised. See Plate 21, Fig. 102.

Bactrian Camel (*Camelus bactrianus*)

The Bactrian, or Two-humped Camel, is a native of Northern and Central Asia, where it is used as a beast of burden more than for riding. It is a larger and more heavily built animal than the Arabian Camel, and in winter is covered with very long woolly hair, which in summer is shed completely. From this hair the natives of India and Persia make very beautiful articles of dress, principally shawls. The Bactrian Camel is quite striking in appearance, some varieties being a light golden-brown, others a deep rich brown, almost black, while still others are practically white. The hair on the lower part of the neck and on the front legs is much longer than on the rest of the body, and hangs down in great fringes. See Plate 22, Fig. 104.

From time immemorial the Camel has been used as a beast of burden in the East, and many references to it are made in the Bible and other records of antiquity. At one time they were common in North America, as we know from finding fossil remains of many different species. One known as the Giraffe Camel had a neck almost as long as that of the animal from which it is named, but otherwise was camel-like in shape.

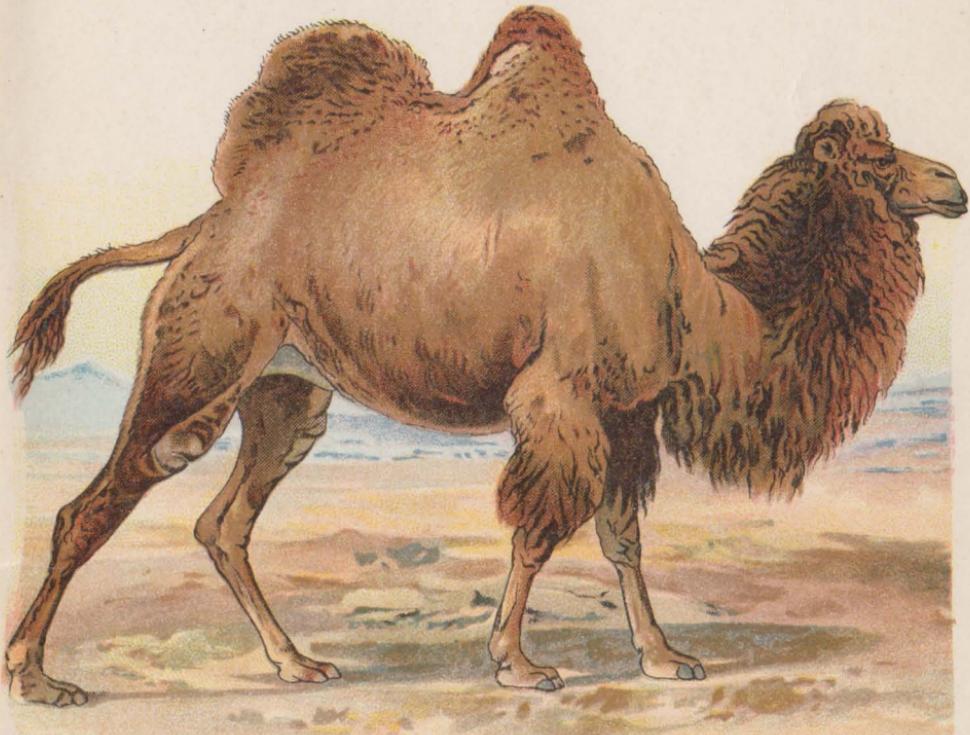
Wild Camels of this species are met with in the loneliest parts of the deserts of Central Asia; but whether they are truly wild, or are descendants of animals that have escaped from domestication, has not yet been decisively settled.



105. Musk Deer (*Moschus moschiferus*).



106. Pygmy Chevrotain
(*Tragulus pygmaeus*).



104. Bactrian Camel (*Camelus bactrianus*).

Alpaca (*Llama pacos*)

There are several species of Llama, all South American, and inhabiting the higher and more mountainous regions of that country as far south as Patagonia. They are distinguished from the camels by their smaller size, the absence of humps, much smaller feet, and toes armed with claw-like hoofs, which are divided throughout their entire length. Most of the species are covered with a long heavy wool, which is greatly used by the natives of the country in manufacturing articles of clothing. See Plate 21, Fig. 103. The true Llama is used as a beast of burden, and is known only as a domesticated animal; the Alpaca is kept semi-domesticated for the sake of its wool; the other species are wild.

In Patagonia is found a small and less heavily-furred form known as the Guanaco (*Lama guanacus*). The fur is soft, short and woolly, a beautiful light brown above and white below. These animals run in large herds and are often preyed upon by pumas and jaguars; the flesh is also eaten by the natives. They are captured by the use of the bolas, the Indians riding the horses in pursuit and throwing the bolas, which is simply two heavy balls of iron or lead connected by a long rope. On approaching the animal, this is swung around above the head and then thrown from the hand, the heavy balls winding around the legs and throwing it to the ground.

Llamas have a singular habit, when irritated, of spitting at any one who disturbs them, and warning

signs to this effect are usually seen in zoölogical collections.

GROUP SUINA

This group includes two existing families—the Suidæ, or Swine, and the Hippopotamidæ or Hippopotami. They are non-ruminant animals, with four toes on each foot (or, rarely, three on the hind feet).

FAMILY SUIDÆ (SWINE)

The Swine have a long projecting snout, flattened at the end, and covered with a tough skin, used in burrowing in the ground in search of roots, which they use for food. The nostrils are at the extreme end, and the scent is very keen in all species. Pigs are fond of living in burrows, or wallows, which they make themselves in soft or muddy soil. The upper canines are more or less turned up, becoming formidable tusks.

Wild Boar (*Sus scrofa*)

The largest and most powerful of all the Swine is the Wild Boar, found in certain parts of Europe, throughout a great part of Northern Africa and Western and Central Asia. In appearance it is most striking. The body is covered with long bristles, which on the neck and shoulders grow into a stiff upright mane that is raised when the animal is excited or angry; the head is very large in proportion to the body, the jaws long and capable of inflicting terrible bites; the ears are large and heavily fringed with hair at the edges, and do not droop as in most of the do-

mestic hogs. Unlike the domestic animal, too, the Wild Boar is thin and slab-sided. See Plate 33, Fig. 143.

The Indian Wild Boar (*Sus cristatus*) grows to a larger size than the European species, and boar-hunting with the spear, or "Pig-sticking," is a favourite sport among the Anglo-Indians. When pursued, the Boar runs at full speed until brought to bay by the hunters, when it will stand facing them, suddenly leap forward and inflict a terrible gash with its sharply recurved tusks, which cut like razors. These tusks work against each other, so that they are always kept keen. Pig-sticking, though popular, is a dangerous pastime, and there are many accidents on record. The Wild Boar feeds chiefly upon roots and fruit, but it is also fond of animal diet, devouring worms, insects, etc., with avidity. In hunting for food the powerful nose is pushed through the ground much in the manner of a plough, and the extremely delicate scent is of great assistance. The young are yellowish, with white stripes running lengthwise of the body.

The domestic breeds of hogs are supposed to have been first imported from China, and local varieties are found in all civilised countries of the world. In most of them the ears lop over or hang down in front of the face, the body is much more sparsely covered with bristles, the legs are shorter, and the animal is wider and without the bristly mane that is present in the wild species. The fattening of domestic hogs and pigs takes place only because of their captivity and artificial feeding, species that run wild being com-

paratively thin. The use of the flesh of hogs for food has long been forbidden by many religious sects.

The young of the domestic species are not striped, but are usually the same colour as the parent, which may be white, red, black, or black and white. Pigs have a large number of young in a litter, and multiply very quickly.

Babirussa (*Babirussa alfurus*)

The extraordinary animal known as the Babirussa has many peculiar characteristics, the most marked of which is the upper canine teeth, which grow through the skin of the face half way between the eyes and the end of the nose, coming upward through the fleshy part of the muzzle and turning backward in a graceful curve over the eyes. The lower tusks follow the same line to a great extent on either side of the upper jaw, but do not grow so long, nor are they so sharply recurved. The hide is almost devoid of bristles, and is rather greyish in colour, and heavily creased over the entire body. See Plate 33, Fig. 141. This strange creature inhabits the swampy forests of the islands of Celebes and Borneo in the Malay Archipelago.

In Africa there are several species of wild hogs, among them the Wart Hog (*Phacochoerus Ethiopicus*) and the Red River Hog. The former is distinguished by the enormously long and heavily-made tusks which project from the upper jaw on either side in great curves, almost meeting over the top of the muzzle, and by the curious wart-like appendages on either side of the face just under the eyes. It is a delicately-built animal, the head is enormously large in



143. Wild Boar (*Sus scrofa*).



141. Babirussa (*Babirussa atra*).

142. Collared Peccary
(*Dicoteles tajacu*).



144. Hippopotamus (*Hippopotamus amphibius*).

proportion to the size, the feet very small, the tail long and tufted at the end. The skin is somewhat like that of the Babirussa, being much wrinkled, and is almost devoid of bristles except on the back, where they are very long and hang in a mane. It is not fond of the water, like most pigs, but lives in burrows made by the aardvark, running with considerable speed when pursued and taking refuge in the nearest hole.

The Red River Hog (*Potamochoerus Porcus*) is so named on account of the brilliant orange-red colour of the hair, which is not bristly as in most of the hogs, but fine and soft in texture. The ears are extremely long, delicate, and heavily pencilled at the tips with long tufts of hair. The tail is long and straight, reaching the ground, and bushy at the end. The Red River Hog has none of the repulsive features of the Wart Hog, and in captivity shows much intelligence.

FAMILY DICOTYLIDÆ (PECCARIES)

This family of Hogs is found in the New World, in the forest of Central and South America. They are distinguished from other species by having three toes, instead of four, on the hind feet, and tusks that are more like the canine teeth of other animals, the upper tusks projecting just below the line of the lip. Small as they are, however, these form terrible weapons. Peccaries run in large herds and are very fierce and aggressive in character. They have a curious scent-gland on the back just above the tail, and when excited this is opened and emits a strong musky

odour. It is said that these animals will not hesitate to attack a jaguar who has killed one of their number, forcing it to take refuge in a tree to escape being cut to pieces. The snout is not as long as in the wild boar, but in proportion to the size, the head is larger and the feet are more delicate; the tail is practically wanting.

Collared Peccary (*Dicotyles tajacu*)

The Collared Peccary is widely distributed throughout Central and South America, and is also found in the southern part of the United States as far north as Arkansas. It is about three feet in length, generally dark brown in colour, with a whitish band on the neck. See Plate 33, Fig. 142.

The White-Lipped Peccary (*Dicotyles labiatus*) is a larger species, which does not extend so far north, but is met with in larger herds and is considered fiercer and more dangerous. This species is greyish-black except on the under jaw, which is white.

FAMILY HIPPOPOTOMIDÆ

Hippopotamus (*Hippopotamus amphibius*)

The Hippopotamus, or River Horse, is a huge unwieldy animal which frequents the rivers and lakes of Central and Southern Africa, where it spends most of its time floating on the water or wading and feeding on grass and reeds growing either at the bottom or on the edges of streams. It is enormously heavy and long in proportion to its height, large specimens measuring as much as fourteen feet in length and five in height. The head is huge and power-

fully made, and the gape exceeds that of any other known creature, the jaws forming a continuous line with one another. The tusks are enormously developed in both jaws, and the males fight viciously on occasions, inflicting severe wounds with these great canine teeth. The eye is rather large, but very dull and stupid in expression, and is placed, as might be expected in an amphibious animal, close to the top of the head; the ears are small and pointed and flexible, and are just above the eyes. See Plate 33, Fig. 144. When floating, the whole body is submerged with the exception of the nostrils, eyes, and ears. Besides man, the Hippopotamus is not known to have any enemies—a possible exception being the large crocodiles that infest the rivers in which it lives. The female is very fond of her young, and may often be seen floating with a little one on her back. In looks the baby is an exact counterpart of its mother.

A curious character of the Hippopotamus is the presence of numerous large pores in the skin from which exudes a thick oily liquid resembling blood, which is useful in protecting the skin against the action of the water. Upon emerging, these pores immediately begin to throw out the oily fluid, which trickles from the body in tiny streams.

On account of its enormous appetite, this animal is very destructive to the crops of the natives of Africa, and for this reason it has been exterminated in many places where it was formerly abundant. It is captured in pitfalls and killed, and is also speared in the rivers—the latter a dangerous operation and one that requires great skill and patience.

The Hippopotamus lives well in captivity, and in the zoölogical collection in New York as many as six young have been born in the past twenty years.

The only other species is the Liberian Hippopotamus (*Chæropsis liberiensis*), which inhabits West and Central Africa. It is a smaller and much rarer animal, and differs from the foregoing species in several particulars.

In early times the range of the Hippopotamus was much greater than at present, fossil specimens having been found as far north as France.

ORDER VIII.—SIRENIA (Manatees)

THIS is a small order of fish-like mammals, differing considerably from both whales and seals, although supposed by some authorities to be allied to them. There are but two existing species, the Manatees and the Dugongs, the Sea Cow, a much larger animal than either of these having been exterminated on Bering's Island towards the end of the eighteenth century. The body is long and rounded, and the tail is either divided like that of a whale or is broad and rounded at the end. The forward limbs only are present and developed into the form of paddles, or flippers. The hide is thick, the nostrils are placed at the extremity of the muzzle, and there are bristles and long hair about the mouth. These animals frequent sea-shores, estuaries, and large rivers, and feed on water-plants or seaweed.

Manatee (*Manatus australis*)

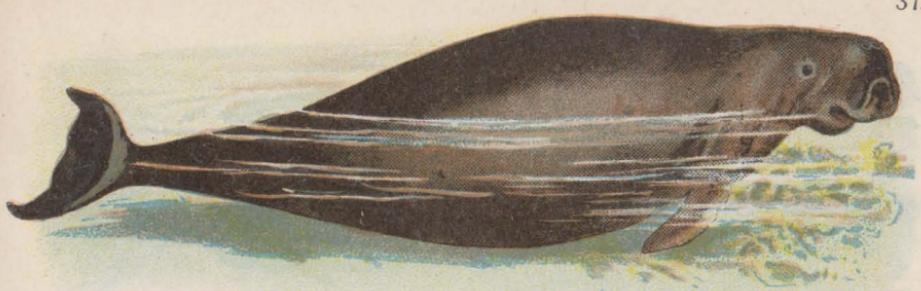
This species is found in the shallow seas and large rivers of the Gulf of Mexico and the East of South America, and is not unlike the seal, except for the heavy rounded tail, though it is never known to go upon shore. It browses at the bottom or along the edges of the rivers and streams in which it lives, and seldom goes out to sea, preferring brackish waters to the ocean. The colour is dark brown or grey, the skin is heavily wrinkled over the entire surface of

the body, and is sparsely covered with stiff bristly hairs. The head is singular in form, particularly the muzzle and jaws. The upper lip is long and hangs down on either side of the lower jaw, which works between the flaps. These are almost prehensile in character, projecting forward, and with them the animal seizes the food, drawing it into the mouth. The nostrils are small and placed at the extreme tip of the muzzle, the eyes are almost invisible, and the ears are wanting externally. See Plate 37, Fig. 155. The fore-limbs are used in balancing while swimming slowly about, but when alarmed or in a hurry progression is made by an upward and downward beat of the heavy tail.

Another very similar species, *Manatus senegalensis*, is found in the waters off the coast of Africa.

Dugong (*Halicore dugong*)

A similar animal to the manatee, but more marine in its habits, the Dugong is found on the shores of the Indian Ocean. Very similar species are met with in the Red Sea, and as far eastward as Australia, where they feed exclusively on seaweed. The tail is a somewhat crescent-shaped flapper, not so broad nor so heavily made as that of the manatee. See Plate 37, Fig. 154.



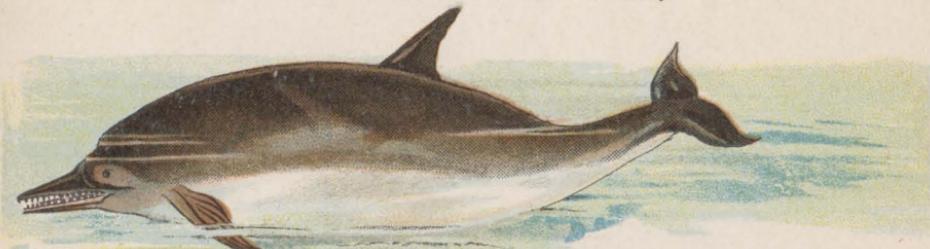
154. Dugong (*Halicore dugong*).



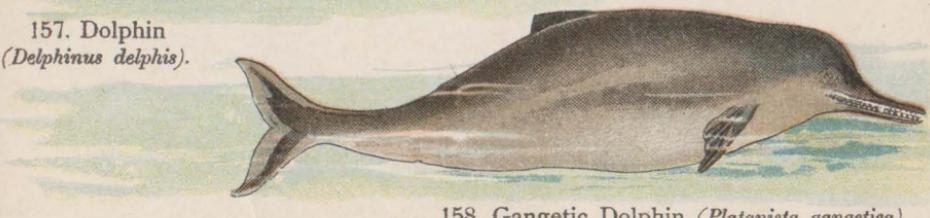
155. Manatee (*Manatus australis*).



156. Narwhal (*Monodon monoceros*).



157. Dolphin
(*Delphinus delphis*).



158. Gangetic Dolphin (*Platanista gangetica*).

ORDER IX.—CETACEA (Whales and Dolphins)

THE Cetacea are the largest and most powerful of all mammals. All are strictly aquatic and fish-like in their habits, never coming to shore on any occasion except when stranded, or driven in by storms; and all are more or less fish-like in appearance and might be easily mistaken for the lower order of life, but for several singular characters, perhaps the most noticeable among which is the up-and-down motion of the deeply-forked tail.

They are mainly surface feeders, although able to dive to great depths. The Sperm Whale, in particular, is thought to obtain its food at the bottom of the ocean. The nostrils, or "blow-holes," are generally at the top of the head. The Whale is obliged to come to the surface of the water at frequent intervals in order to breathe, or "spout," and it was at one time thought that great quantities of water were taken into the mouth and forced out through the nose, causing this spouting. The fact is, however, that as the Whale nears the surface of the ocean it breathes heavily outward through the blow-hole, thereby forcing the water that is immediately above the nostril high into the air. This spouting, or blowing, is usually the first sign of the presence of the animal, and the cry of old whalers, "There she blows!" always announces the discovery of one. Many species are toothless, and when teeth are present they are all

similar in structure, sometimes being found only in the lower jaw. The eye is very small and as a rule set close to the corner of the mouth, and the ear is quite invisible. The fore-limbs are encased in a thick heavy skin and developed in the shape of paddles, or fins, and there are no hind legs, the immensely heavy and muscular tail taking their place. Beneath the skin is a thick layer of fat called blubber, and in some species there is a dorsal, or back, fin.

The Cetacea are divided into two sub-orders—the *Mystacoceti*, containing the single family *Balaenidæ*,—in which there are no teeth, the mouth being furnished with plates of whalebone, which are used to strain from the water the small animals on which the Whales feed; and *Odontoceti*, including the remaining Cetacea, in which teeth are always found in both jaws, but no whalebone.

FAMILY BALÆNIDÆ

Greenland Whale (*Balaena mysticetus*)

The Greenland Whale, or “Right Whale,” inhabits the Arctic Ocean. It has an enormous head and mouth, containing from three hundred to four hundred layers of whalebone on each side, for which and for the oil obtained from its blubber, it was formerly so eagerly hunted that its numbers have become greatly reduced. See Plate 38, Fig. 161. Some years ago great numbers of ships were fitted out and sailed from New Bedford, Massachusetts, to various parts of the world, some going to the North to hunt the Right Whale, others to the Southern Seas in search

of the Sperm Whales. Owing partly to the substitution of steel-springs for many purposes for which whalebone was formerly employed, and to the extensive use of mineral oil, whale-fishing is now carried on only to a comparatively small extent. At present specimens are rarely met with exceeding fifty feet in length, but in former days when the animal was less pursued, it attained a much greater length. It is naturally a mild, inoffensive animal, and rarely turns on its pursuers.

Although the Right Whale is so gigantic in size, its food consists of minute forms of sea-life, taken into the mouth with the water in which it swims and then strained by the pressure of the immense tongue against the thick layers of whalebone, which act like a sieve.

Common Rorqual (*Balaenoptera musculus*)

The largest species of Whale, growing to a length of eighty feet or more, is the Rorqual. It is more slender than the Greenland Whale, the whalebone is much shorter, and there is a small back-fin toward the end of the body. See Plate 39, Fig. 162. The whalebone and blubber are less valuable than those of the Greenland Whale, and the animals are bolder and more dangerous to attack, so that the old method of harpooning them by hand from rowboats is no longer used, and, instead, bombs are now shot into the animal from steam whale-boats, exploding and killing it very quickly. The huge creature is then fastened to the side of the vessel and towed ashore, where the blubber is cut from it in great strips.

FAMILY CATODONTIDÆ (SPERM WHALES)

Cachalot (*Catodon macrocephalus*)

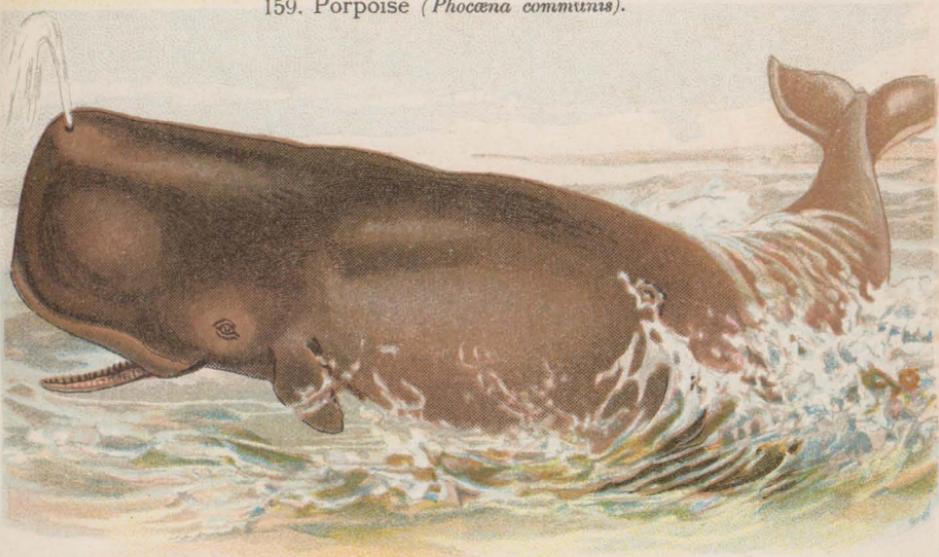
The Sperm Whale, or Cachalot, as it is sometimes called, is a more southern form than the right whale, and differs from it considerably in shape. The huge head is cut off sharply at the muzzle, making it almost square, and the lower jaw is very long and thin and armed with long rows of conical, or pointed, teeth. This lower jaw is said to hang down in the water while the animal is swimming, though the reason for carrying it in that position is not definitely known. See Plate 38, Fig. 160.

In the head of the Cachalot is found the substance known as spermaceti, a thick, dark, oily liquid when first exposed to the air, but becoming lighter and almost wax-like in consistency after being subjected to a cooler temperature. Another curious substance sometimes found in the sperm whale is ambergris. Scientists were long puzzled as to its origin, but ambergris is now known to be a secretion from the stomach of this animal. The odour is strong and rather repulsive, but the substance is greatly in demand as a base for perfumes, and brings a high price in the market.

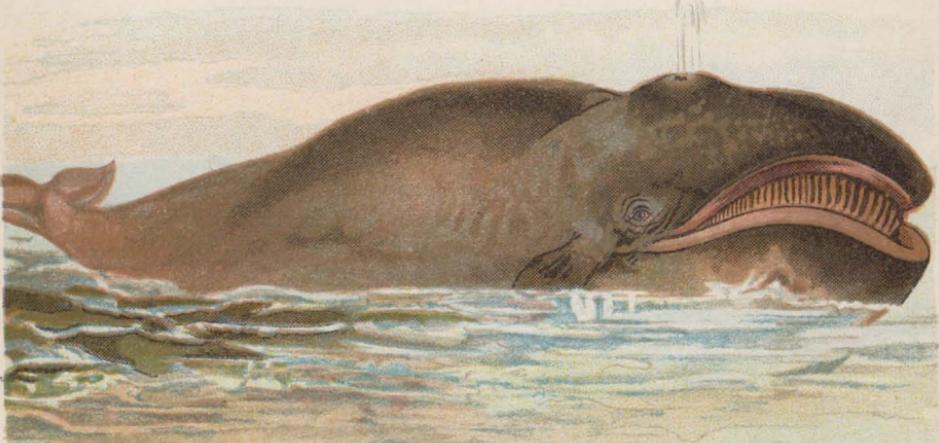
Unlike the whalebone whales, the Cachalot feeds on large fish and other marine animals, more especially on the huge cuttle-fishes, equalling, or perhaps far surpassing, the whales themselves in size, which probably crawl about among the rocks in the depths of the ocean, and never rise to the surface except by accident.



159. Porpoise (*Phocena communis*).



160. Cachalot (*Catodon macrocephalus*).



161. Greenland Whale (*Balaena mysticetus*).

An interesting species of whale found in the Gulf of St. Lawrence is the Baluga or White Whale, not often exceeding fifteen feet in length, and pure white or light cream in colour.

FAMILY DELPHINIDÆ (DOLPHINS)

This is the most numerous family of the Cetacea, but contains species of moderate or comparatively small size. There are generally teeth in both upper and under jaws.

Narwhal (*Monodon monoceros*)

An inhabitant of the northern, and especially the Arctic, seas, where it is met with in small shoals, or "schools," the Narwhal attains a length, in the males, of fourteen or fifteen feet. It is light greenish-grey in colour, irregularly blotched with white, and a distinguishing feature of the males is the possession of two spiral tusks, of which the left only is usually developed, and projects to a distance of from six to eight feet from the end of the nose. See Plate 37, Fig. 156. The use of this formidable weapon is hard to conjecture, for the Narwhal, like most of the Cetacea, is a rather inoffensive animal.

Porpoise (*Phocæna communis*)

Probably the best known of all the whale family is the Porpoise, common to our shores and also found in various other parts of the world, sometimes ascending rivers to a considerable distance. It is a small animal, measuring perhaps as much as six to eight feet in length, blackish above and white below.

The head is short and rounded and near the middle of the back is a large fin. See Plate 38, Fig. 159. Porpoises swim in schools, and have a habit of turning slowly over and over in the water, one following another in single file, and their antics are often very amusing.

Dolphin (*Delphinus delphis*)

This animal is similar to the one above mentioned in size and colour, but differs from it in having a long pointed muzzle and numerous sharp-pointed teeth in both upper and lower jaws. It is found in nearly all the seas of the world, and many species are known, but it does not come so near shore as the porpoise. As a rule those seen in crossing the Atlantic are a dull greenish or yellowish on the back, striped with white below. They are terrible foes to shoals of small fish, devouring them in great numbers. The Dolphin is a swifter creature than the porpoise, and makes long and graceful leaps over the waves with the greatest agility. See Plate 37, Fig. 157.

The term "Dolphin" is often improperly applied by sailors to a large and brilliantly metallic fish, (*Coryphæna hippuris*), which is found in the warmer parts of the Atlantic, in the Mediterranean, and the Indian Ocean, and feeds chiefly on flying-fish.

FAMILY PLATANISTIDÆ

Gangetic Dolphin (*Platanista gangetica*)

This species inhabits the Ganges and other large rivers of India, and is usually about seven or eight feet long, but occasionally reaches a greater length.

It differs from the dolphin in having a short neck, and in the ribs not being connected together, but free, as in land animals. The colour is blackish, the back fin is rudimentary, and the tiny eye is useless, the animal being blind. There is a long beak, containing about thirty teeth on each side in each jaw, which are sharp in the young but wear down in old specimens. See Plate 37, Fig. 158. The Gangetic Dolphin feeds on fish and crustacea.

Grampus (*Orca gladiator*)

A species of cetacean found in many parts of the world is the Killer, or Grampus, reputed to be the most savage and bloodthirsty of the order to which it belongs. Rushing through the water in schools of six or eight individuals, they devour everything that comes in their way, and several seals have been found in the stomach of a single specimen. The Killer is at once distinguished by the gigantic backfin, which stands upright to a height of several feet and has a small hook at the tip. They are large animals, attaining a length of twenty feet or more; the upper parts are black, the under part is white, and a white streak runs over the eye. Although the head is small in proportion to the size of the body, it is armed with strong and powerful teeth. Stories are told by seamen of fights between Killers and the large Greenland whales, several of them combining and attacking the larger animal; and there is no doubt that they are extremely aggressive, destructive, and voracious creatures.

ORDER X.—EDENTATA (Toothless Animals)

ALL the animals belonging to this order are inhabitants of warm countries, and are either toothless or furnished with teeth of uniform shape and size, but destitute of either roots or enamel, and never occupying the front of the mouth. They have usually, however, large claws for climbing, scraping, and digging.

FAMILY BRADYPODIDÆ (SLOTHS)

Sloths are animals with long shaggy hair, rudimentary tail, and two or three strong claws hooked, by which they hang below the under surface of the branches of trees. They have five teeth on each side of the upper jaw, four in the lower, long front legs and short hind legs. The few known species are confined to tropical America.

Two-Toed Sloth (*Cholæpus didactylus*)

This singular animal, found in the forests of Brazil and other parts of South America, has, as the name indicates, but two toes on the front feet. It is about two feet in length, and is covered with long coarse hair closely resembling hay. The legs are long and delicate and progression is made by crawling along the under side of branches of trees, supported by the sharply-curving claws, the movements being extremely slow and deliberate. Upon the ground the

animal walks awkwardly with the greatest difficulty. The face is remarkably human in appearance, the eyes large, round, and very gentle in expression, the nose small, while the long hair is parted above the forehead and falls on either side of the face. See Plate 20, Fig. 98. The Sloth feeds on leaves and fruit which it finds in great abundance in the immense forests of South America, and is a most gentle and inoffensive animal.

At one time in the history of the world huge Ground-Sloths inhabited the Southern parts of South America and also parts of North America. One of these great animals, called *Megatherium*, measured as much as fifteen feet in length, but unlike the modern forms, did not climb among the branches of trees, but waddled along the ground, and when feeding rose upon its short but powerful hind legs in order to reach the leaves of trees upon which it fed.

FAMILY MYRMECOPHAGIDÆ (ANT-EATERS)

These animals have long thick hair and a bushy tail, and no teeth. The snout is long and tapering, the tongue long and slender, and covered with adhesive saliva, to which adhere the ants and other insects on which the animals feed.

Great Ant-Eater (*Myrmecophaga tridastyla*)

The Great Ant-Eater, found in South America, is a rather large animal, measuring upwards of four feet in length without the tail. The head is very long and pointed, the mouth small, opening at the extreme end of the muzzle, the tongue prehensile,

very long and slender, and covered with a sticky substance. The food consists of ants which are dug from hills by the use of the powerful claws. These are long and very strong, especially on the front feet, and are not placed on the ground in walking, the creature stepping on its knuckles instead of the soles of its feet. The hind-feet are somewhat bear-like in form, and are placed flat upon the ground. In colour the Great Ant-Eater is a dark grizzled-grey, or black, with a band of white projecting over the front of the neck and diagonally across the shoulders. The hair is extremely coarse in texture, and the long bushy tail is carried almost in line with the body. See Plate 20, Fig. 101.

FAMILY DASYPODIDÆ (ARMADILLOS)

These are comparatively small animals, inhabitants of tropical or subtropical America, and characterised by the thick and bony armour covering the upper parts of the body. This armour is not in a solid piece, but is arranged in a series of bony plates, overlapping at the edges, and between the plates coarse stiff hairs project in all directions. The under parts of the creature are soft and sparsely covered with hair. Armadillos are burrowing animals, and are furnished with enormously strong and heavily made claws which are of great service in making the huge excavations in which they live. Their bones also are very thick and powerful, as might be supposed of an animal whose life is spent in digging subterranean passages. In most species the snout is rather long and the whole animal is somewhat pig-like in char-



99. Pichichiago
(*Chlamyphorus truncatus*).



97. Tatouay (*Lysiurus unicinctus*).



98. Two-toed Sloth
(*Choloepus didactylus*).



100. Aard Vark (*Orycteropus capensis*).



101. Great Anteater (*Myrmecophaga tridactyla*).

acter, trotting about and snuffing in much the same manner as a pig. They are nocturnal in habit, sleeping during the day and feeding chiefly on insects at night.

Pichiciago (*Chlamydophorus truncatus*)

The Pichiciago, smallest of the species, is a very curious little animal about five inches long, which is found in the Argentine Republic and Chili. The shield, or bony armour, covers the whole back, but is attached only along the middle, and has the appearance of being cut off sharply at the hinder part, giving the animal a cylindrical form at the end. The eyes and ears are small and concealed under the hair. The colour is greyish-pink, and the face and lower parts of the body, the legs (except the under surface, which is plated), and the sides, are clothed with long silky hair. There are five strong claws, which are chiefly used for digging, and the tail is very short. See Plate 20, Fig. 99. In habits it resembles other armadillos, living in holes during the day, but owing to its shyness it is seldom seen.

Tatouay (*Lysiurus unicinctus*)

The Tatouay is a larger species than the preceding measuring about eighteen inches in length, and is found in Brazil and other countries of South America. The shield which covers the upper part of the body is yellowish, the head, short legs, and rather long tail, being brown. The ears are long and pointed and placed well at the top of the head, the muzzle is extremely long and pig-like, and, as in all the

members of this family, the feet are furnished with powerful claws. See Plate 20, Fig 97. Nearly all these animals have the ability, when alarmed, of rolling themselves into balls, the softer parts being thus protected from injury; and when walking, they stand well up on the tips of their claws.

FAMILY MANIDÆ (PANGOLINS)

These animals somewhat resemble the preceding family in habits, and are armoured, but instead of being covered with plates, they are provided with large overlapping scales, between which grow scanty hairs. There are no teeth, and the tongue is long and capable of being projected in order to secure the ants and other insects on which the animal feeds. The tail is very long, but the legs are short, with five toes on each foot.

Long-Tailed Pangolin (*Manist macrura*)

A native of West Africa, this animal measures from five to six feet in length, including the tail. The body is covered with overlapping scales on the upper part, the lower part being bare. The head is small and insignificant, the eyes and ears almost wanting. There are no teeth, and the tongue is long and extensile. As in the armadillos, the claws are strong and well developed, and the animal has the habit of rolling itself into a ball, when it is protected by the sharp edges of the scales, completely covering the softer parts of the body and rendering attack difficult. See Plate 19, Fig. 96.

FAMILY ORYCTEROPIDÆ

Aardvark (*Orycteropus capensis*)

The Cape Ant-eater, or Aardvark, is common in South Africa. It is about five feet in length, including the tail, and is almost devoid of hair, having only a few bristles here and there over the brown hide. The ears are enormously large and rabbit-like, set closely together at the top of the head, while the snout is long and narrow, much like that of the armadillos. The eyes are small and pig-like, the feet end in heavily made claws, and the tail is long, stout and tapering. Aardvarks feed chiefly on ants, breaking into the great hills with their strong claws, and securing the ants by means of their long tongues. The hind legs are long and the animal sits up on its haunches much in the manner of a rodent. See Plate 20, Fig. 100.

ORDER XI.—MARSUPIALIA (Pouched Animals)

THIS is a very distinct order of mammals, but containing species which vary widely in general appearance, all, however, possessing certain characters in common. Chief among these is a pouch of skin in front of the body of the female to which the young are transferred immediately after birth, and where they remain, secure from danger, until able to shift for themselves. The Marsupials are nearly all Australian, except the Opossums, which are native to America.

FAMILY DIDELPHIDÆ (OPOSSUMS)

The Opossums are small mammals living in trees and feeding chiefly on birds, eggs, small animals, and insects, though they will also eat vegetable food. They have thick fur, a moderately pointed muzzle, erect ears, numerous teeth of all the usual kinds, five toes with long claws, except the first toe of the front foot, which is unarmed and prehensile; the long naked tail is also prehensile.

Opossum (*Didelphys marsupialis*)

The Opossum is a native of the United States, where it is confined to the southern portions. It is somewhat rat-like in appearance, although much larger and more heavily built. The body is thickly

covered with soft whitish fur through which project longer and thicker hairs, or bristles, and the tail is naked and prehensile. See Plate 39, Fig. 163. A nocturnal animal, it sleeps during the day, hanging head downwards from the branch of a tree, with the tail coiled round the limb. The animal has a singular habit of feigning death, when attacked, or "playing 'possum," and when in this state will allow itself to be mercilessly ill-treated. The Opossum is much hunted in the South, especially by the negroes, who prize it highly as an article of food.

The young are very tiny when born, only about half an inch in length, and are suckled in the mother's pouch for about thirty days; and after they are sufficiently grown to leave it, they occasionally return to it for some time afterward, especially when threatened by danger. As they grow larger they cling to the mother's back, their tails coiled about hers, and sometimes a family of twelve or thirteen young ones are seen thus attached to the mother, who creeps slowly about with them among the branches of trees.

Merian's Opossum (*Didelphys murina*)

This is a small South American species, measuring only about six inches without the tail, which is rather longer than the body. It is grey above and yellowish white beneath, including the legs and feet; the head is mostly yellowish white, with a dark ring round the eyes and a black patch behind them. See Plate 39, Fig. 164. In habits it does not greatly differ from the preceding species.

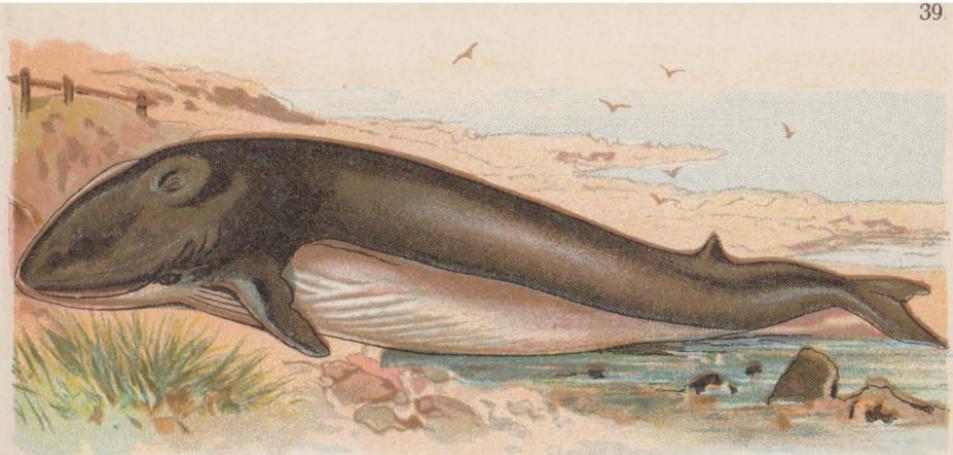
FAMILY DASYURIDÆ

These are carnivorous or insectivorous animals, with numerous teeth. The limbs are of nearly equal length, and there are five toes on each foot, with claws, but the front toe of the hind foot is rudimentary.

Tasmanian Wolf (*Thylacinus cynocephalus*)

This animal differs greatly from other marsupials in general appearance. As the name implies, it is really quite wolf-like. The tail, however, is almost devoid of hair, and unlike that of the wolf, is held stiffly out at an angle of forty-five degrees downward, the creature not having the ability to twist it about in any direction. The hair is short and close, the ears are large and rounded, the eyes very dark and set wide apart. The colour is light brownish-grey, lighter on the under parts, and over the back and extending down the tail are a number of heavy stripes or bands of dark brown. The legs are rather short and powerfully made, and the speed is considerable. See Plate 39, Fig. 165. The Tasmanian Wolf is found only in Tasmania, where it is confined to the highest parts of the island. It is a voracious animal, and at one time committed great havoc among sheep and poultry, but its numbers are now greatly diminished.

A few years ago a female carrying several young in her pouch was brought to the Washington Zoölogical Park. All are still living, the young having developed into strong and healthy adult animals.



162. Common Rorqual (*Balaenoptera musculus*).



163. Opossum
(*Didelphis marsupialis*).

164. Merian's
Opossum

(*Didelphis murina*).



165. Tasmanian Wolf
(*Thylacinus cynocephalus*).

FAMILY MACROPODIDÆ (KANGAROOS)

The largest and most important group of marsupials are the Kangaroos, confined to Australia and the adjacent islands, remarkable for the curious structure of the limbs and tail. The hind legs are enormously long and powerful, and there are but three toes on the hind feet, long, and armed with claws. The fore-legs are short and weak, the tail very thick and powerful, and the animal sits upon its haunches much like a rodent, with the front legs dangling. The mode of progression is by a series of enormous leaps and bounds, the tail rising and falling and acting as a balance; but when feeding, the Kangaroo walks clumsily on all-fours. With the strong hind legs it is able to deliver very severe kicks, when attacked. The head is very rodent-like, the long ears very closely resembling those of a rabbit. The young are carried in a pouch. These animals are entirely herbivorous, and as they devour grass required for the sheep, the Australian colonists do their best to exterminate them.

Great Grey Kangaroo (*Macropus giganteus*)

This is the largest known species of Kangaroo; it was the first seen by Europeans, and was formerly very abundant in Australia, but is now much reduced in numbers. A large specimen measures upwards of seven feet in length, including the tail, and when resting on its hind legs stands nearly as high as a man. The fur is brown, the tail is tipped with white, and the ears are pale brown outside and white within. See Plate 40, Fig. 166.

Closely approximating the Grey Kangaroo in size, and much more beautiful in colour, is the Red Kangaroo. The males of this species are covered with a very soft woolly fur of a delicate reddish hue, lighter on the under parts, and the female is a beautiful purplish-grey.

FAMILY PHALANGITIDÆ (PHALANGERS)

These are animals of moderate size, which are confined to Australia, New Guinea, and the adjacent islands. They are thickly clothed with hair, and the tail is large and more or less prehensile. In some species the skin is expanded between the legs to form a parachute, as in the flying-squirrel and other similar animals. They are mostly nocturnal and tree-living, and feed on insects and small birds, as well as on vegetable food. There are several species, which, however, do not differ greatly from each other in general characters. In Australia they are sometimes called "opossums."

Common Phalanger (*Trichosurus vulpecula*)

This species is common in Australia, where it sleeps in hollow trees during the day, feeding at night. There is something fox-like in its general appearance, which gives its second Latin or species name. It is brownish-grey above, ochre-yellow below, and measures about eighteen inches in length, without the tail, which is a foot long. See Plate 40, Fig. 167.

FAMILY PHASCOLOMYIDÆ (WOMBATS)

The Wombats are the most rodent-like in form of all the marsupials, the head being like that of a beaver, although the legs and feet are singularly bear-like. The tail is short, almost wanting. They have five toes on each foot, but the first toe on the hind feet is very small and without a claw, the other four being connected by a web.

Wombat (*Phascolomys mitchelli*)

This animal is common in Australia. It is nocturnal, living in very long burrows during the day, and coming out at night to feed on grass and other vegetable substances. The fur is short, thick, and woolly, brownish-grey above, and whitish on the under surface of the body. See Plate 40, Fig. 168. It grows to a length of about three feet. Misled by the name, the explorer De Rougemont figured a flight of "Wom-Bats" in the narrative of his Australian adventures.

ORDER XII.—MONOTREMATA

THE last, but not the least interesting order of mammals, is the Monotremata, distinguished from all the others by the fact that they lay eggs instead of producing living young, and also by their somewhat bird-like beaks, or bills. The eggs have a soft yielding skin like those of a reptile, and are hatched in a kind of pouch like that of the marsupials. The order is confined to Australia and New Guinea, and only a very few species are known.

FAMILY ORNITHORHYNCHIDÆ

In this family the body is clothed with hair, the beak is broad and duck-like, and the feet are webbed, and provided with five toes. In habits they are amphibious. The tongue is not prehensile, and the want of teeth is supplied by a horny plate on each side of the mouth.

Duckbill (*Ornithorhyncus anatinus*)

The Duck-billed Platypus, or Water Mole, as it is variously called, is about eighteen inches in length, including the tail. As the name indicates, the bill bears a close resemblance to that of the common duck, and it is probably used in much the same way to procure its food, consisting of insects, small worms, and so on. The animal is covered with a soft and shin-



166. Great Grey Kangaroo (*Macropus giganteus*).

167.
Common
Phalanger
(*Trichosurus*
vulpecula).



168. Wombat (*Phascolomys mitchelli*).



170. Spiny Anteater
(*Echidna aculeata*).

169. Duck-bill (*Ornithorhynchus anatinus*).

ing fur, which is reddish-brown above and lighter beneath. The feet are webbed, like those of an otter, and the tail is broad, bristly above, and naked beneath. The Duckbill lives in long burrows which it digs in the banks of streams, and is semi-aquatic in habits. All the toes have claws, and the hind leg of the male is provided with a short thick spur, which the animal probably uses as a weapon of offence. See Plate 40, Fig. 169.

FAMILY ECHIDNIDÆ

In these animals the body is clothed with fur mixed with strong spines and the beak is rather narrow; there are no horny plates in the mouth, but there are spines on the inside and on more or less of the tongue, which is long and prehensile, as usual in ant-eaters. There are five toes on each foot, not webbed, but armed with claws, and the tail is short.

Spiny Ant-Eater (*Echidna aculeata*)

This species differs greatly from the duckbill in general appearance. It is not unlike the hedgehog, being covered with spines, and rolls itself up in a ball in the same way when alarmed. The beak is long and delicate, the tongue tapering and extensile, like that of all the ant-eaters, and has spines at the base. See Plate 40, Fig 170. It is an Australian species, living in open sandy country, and burrowing in the ground with great agility. The food consists of insects, especially ants, which it digs out with its claws and licks up with its tongue. Like the duckbill, it lays eggs instead of producing living young.

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