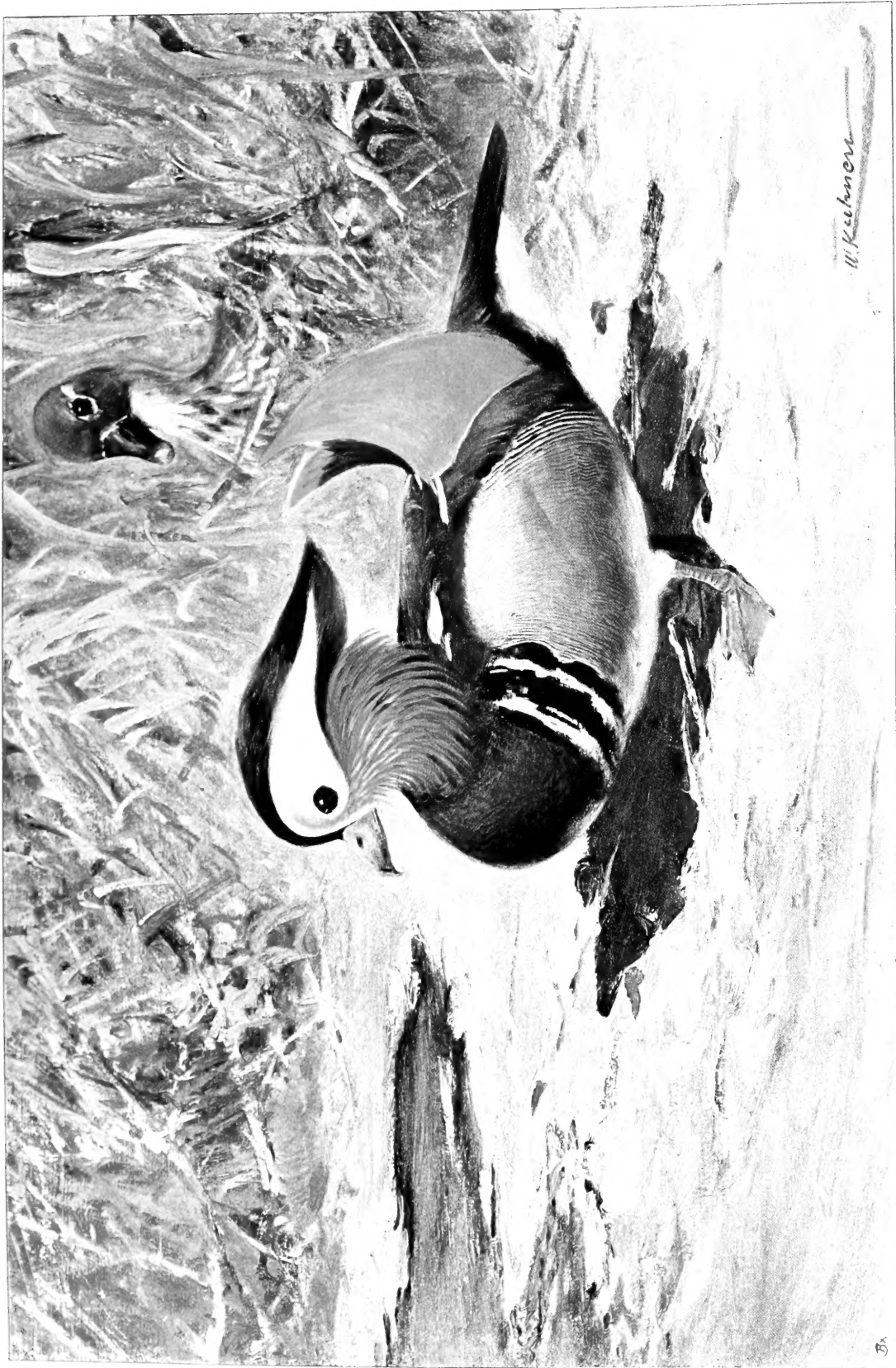


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WILD LIFE
OF THE WORLD

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MANDARIN DUCK.

WILD LIFE OF THE WORLD

A DESCRIPTIVE SURVEY OF THE
GEOGRAPHICAL DISTRIBUTION
OF ANIMALS

BY
R. LYDEKKER, F.R.S.

ILLUSTRATED WITH
OVER SIX HUNDRED ENGRAVINGS FROM ORIGINAL DRAWINGS
AND
ONE HUNDRED AND TWENTY STUDIES IN COLOUR



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ASIA







THE ARCTIC FOX.

CHAPTER I

THE ANIMALS OF ARCTIC ASIA

THE Boreal zone of animal life extends all round the North Pole, its Asiatic portion being consequently much more extensive than the European, which comprises only the coast from the North Cape to the mouth of the Obi River; and it may be shortly defined as the tract lying northward of the limit of trees, where the realm of the Arctic steppe-area, or *tundra*, begins. In the Western Hemisphere the northern boundary of tree-growth lies somewhat to the southward of the Arctic Circle, but in the Eastern Hemisphere runs slightly north of the same in certain parts of Siberia.

The landscape and vegetation of the tundra bear the impress of the Polar climate, with its long dark cold winter, and its short cool summer of perpetual daylight. Among the characteristics of the Arctic winter are the violent winds which heap up the thin mantle of snow in certain parts of the tundra, and sweep it clean away in others. Equally noticeable is the absence of moisture in the air, under the clear wintry sky. The long winter drags on into the months of our own spring, and in March or April often develops its most intense cold; but in May the temperature of the air suddenly rises, July being the hottest month,

while the brief summer ends in August. Although during the greater part of July and August the sun never sets, its warmth is for the most part used up in melting the enormous masses of ice and snow, so that very little remains for warming the air.

The summer temperature varies much in different parts of the Boreal area, but is almost everywhere low, even during July. Fogs are frequent, and in some parts occur continually, being often so dense that objects cannot be recognised even a yard distant. So cold and penetrating, indeed, is this fog, that it wets everything like rain, and sometimes can hardly be distinguished from a drizzle. It is clear that such a brief and foggy summer cannot allow the warmth of the sun to penetrate the frozen ground very deeply; and at the most the warming influence extends only to a depth of from 12 to 18 inches, below which the ground remains frozen solid. In spite of this permanently frozen soil, the Arctic countries, where free from ice in summer, are characterised by a vegetation, which although poor in species, clothes a large extent of the tundra with a green mantle, in which moss plays a conspicuous part. Only indeed in the southern parts of the tundra, on the banks of rivers, and in fiords, are willow-bushes and small meadows, or thickets of evergreen small-leaved shrubs, rising here and there among mosses, met with. Where the most severe climate holds sway, the vegetation covers only small isolated spots separated by the bare stony soil, where the melted snow gathers in flat cakes on the ground. In such spots, where the soil becomes a swamp containing thin layers of peat, are the flats of the tundra carpeted with a few flowering plants. Those most sheltered against the icy winds form, indeed, warm areas where the almost vertical rays of the sun melt so much of the ice and snow that plants receive such a supply of water as to cause them to grow with the vigour of those in the flower-beds of a southern garden. These flowery oases interrupt, however, only at rare intervals the dead monotony of the tundra, as the time for development at the disposal of Arctic plants is limited to a short period of some eight or nine weeks' duration.

In spite, however, of the moistness of the Arctic summer, the character of the vegetation in these tracts bears a considerable resemblance to that of the deserts of more southern latitudes, for owing to the frozen subsoil the roots of the plants suffer from dryness at a slight depth, and therefore their leaves, like those of many desert plants, are adapted for retaining water. In general the leaves of Arctic plants are either of a juicy, or a leathery and hard type, and their scaly or spiny form presents but little surface to the air, and thus checks wasteful evaporation.

Monotony is the prevailing note of the tundra; everywhere wind and silence, the summer one long monotonous day, lighted by the pale moon-like sun in a veil of fog. Far or near there is no green like that of the grassy plains of Europe, although here and there flowery patches of the tundra heather (*Cassiope tetragona*), the crow-berry (*Empetrum nigrum*), or the mountain avens (*Dryas octopetala*), relieve the dull monotone. Here and there also the white coral-like reindeer moss (*Cladonia rangiferina*) spreads itself over the ground, while in its midst a half-hidden dwarf willow, or a poor little blossom of the golden saxifrage (*Cheilosiphium alternifolium*), affords a brighter bit of colour. In places again

may be seen the pigmy crow-foot (*Ranunculus pygmaeus*) or perhaps a few stunted plants, the tiny whitlow-grass or a clump of saxifrage standing out conspicuously. The dry leaves and stems of the previous year or two, which generally remain on the growing plants, and which they serve to protect, do but add to the characteristic impression of dearth.

Occasionally, indeed, a yellow Iceland poppy raises its head above the rest of the herbage, generally close to spots overflown by water in early summer; and where the grass is greener, the plant-patches may widen out and the moss disappear. At wide intervals a vivid green spot breaks the monotonous brown and grey, showing where the grass grows more richly on some abandoned Samoyed camp, or on the holes of the Arctic fox, but even these do little to redeem the cheerless character of the region.

Apart from the polar bear, which is an inhabitant rather of the frozen sea, the Arctic fox (*Canis lagopus*) is the largest mammal of the Asiatic Boreal tract, and is indigenous not only to the Eastern but also to the Western Hemisphere, the southern limit of its distribution being where tree-growth begins. This peculiar fox is distinguished from others of its tribe by the short and rounded ears, the short muzzle, and the whiskers on its cheeks. The soles of its feet are more thickly haired in winter than in summer, to facilitate its walking on slippery ice and frozen snow, and in these regions its dark, short-haired summer coat is exchanged for a longer white winter dress. In summer, with the exception of the yellowish white of the under-parts, the fur is principally brown or dark rust-colour, but occasionally bluish grey above and nearly white beneath. These parti-coloured foxes turn absolutely pure white in winter. Such a change is, however, by no means constant in the species; the valuable "blue-fox" of the furrier being skins of individuals of this animal in the winter coat. As a matter of fact, the Arctic fox is what is called a dimorphic animal; some individuals turning pure white in winter, while others at this season assume a pale slaty-blue coat. Both dark and light individuals may be found in the same district, and apparently in the same litter. In Iceland none of the Arctic foxes turn white in winter.

In many places the Arctic fox seems to migrate south in winter, particularly in the northern section of its American habitat. Although these foxes are known to store up provisions for that season in certain districts, as in Spitzbergen, it is possible that their wanderings may be undertaken in search of food. On the island last named there grow neither berries on which the foxes could subsist during winter, nor is there open water to be found for a distance of many miles through which food might be floated to the shore. Moreover the sea-birds, on which these foxes elsewhere prey, leave these inhospitable shores in October. Nevertheless, a considerable number of foxes winter in Spitzbergen, where they are as active during the long polar night as during summer, when their barking is so frequently heard. Apparently, therefore, the foxes of Spitzbergen must collect provisions for the winter, as is the case with those inhabiting other districts. During the British Polar Expedition of 1875 a large number of dead lemmings were found hidden in clefts of the rocks, where they had been placed by the foxes as a winter store.

The most abundant rodent of the tundra is the common lemming (*Lemmus norvegicus*), whose distributional area extends from Norway through Siberia, and whose place is taken by other species in North America. Lemmings have very small ears, a rather stout body, an arched and rounded head, an extremely short tail, long claws, and thick fur; the different species varying to some degree in size and coloration. About 5 inches is the length of the common Norwegian species. This kind hibernates in winter and does not turn white. The Arctic lemming (*Dicrostonyx torquatus*), which undergoes such a colour-change, is remarkable for the fact of its developing two claws to each front-toe with the assumption of the winter dress, the additional claw being used for digging. Lemmings subsist on grass, reindeer-moss, birch-catkins, and probably roots; but in seasons of scarcity they migrate in enormous numbers to other districts. If a mild winter be followed by an early spring and warm summer, lemmings increase rapidly, but the dry summer diminishes their food



NORWEGIAN LEMMING.

store, and thus induces them to travel long distances in search of a fresh supply. Not only do these tiny rodents cross mountains, valleys, rivers, and lakes, but sometimes they fall in such numbers into wells and rivers that all the water in the country is contaminated and undrinkable.

The Boreal zone is far richer in birds than in mammals, among its larger feathered inhabitants two kinds of swan being common on the tundra of the Siberian area. Of these, the whistling or whooper swan (*Cygnus cygnus*) is but little known in Europe, although it regularly crosses the North Sea and Baltic on migration. This species is abundant in the bays of Rügen and Usedom but appears on the Frische Haff in such numbers as to make the meadows look white. On its journeys it passes through England as well as northern Germany, and is seen as far south as the Lake of Constance and the Swiss lakes, and sometimes even crosses into northern Africa. Most whistling swans winter, however, in south-eastern Europe, and thousands have been seen at Varna on the Black Sea, as well as in Asia Minor. Those wintering in Europe and Africa mostly

come from Lapland and northern Russia. But this splendid swan inhabits not only the north of Europe and Asia, but also the Boreal zone of North America. In Iceland some remain throughout the year, but these resort to the open sea when the inland lakes are frozen. In America the swans migrate as far south in winter as Virginia, Carolina, and Louisiana. The Siberian birds winter partly on the Black Sea, and partly on the Caspian, but some remain on the large lakes of southern Siberia and China; and in the latter country are sometimes seen in numbers on the lakes near the imperial palace at Peking.

In disposition the whooper is a decidedly quarrelsome and tyrannical bird, which flies very high while migrating, when it often utters the deep "whoop" from which its familiar name is derived. Of practically the same size as the mute swan, it lacks the peculiarly graceful movements of the neck of that bird. Like the mute swan it is wholly white, but may be distinguished from the latter by the jet black feet and the colouring of the beak, which is yellow from the base to beyond the nostrils, and elsewhere black. The much smaller Bewick's swan (*C. bewicki*) is another species travelling south every winter, when it passes through Finland, crosses the Baltic, and visits Scotland, England, Holland, and north Germany on its way, journeying almost regularly every year in October and March. Bewick's swan inhabits nearly the same countries as the whistling swan, but seems to go farther north; it has been met with nesting in Novaia Zemlia, but its principal breeding-area is northern Siberia, whence it visits southern Siberia, northern China, and Mongolia, where it spends the winter. In Turkestan and Persia it has apparently not yet been observed, but in Astrakhan it has been seen passing in great numbers, which probably winter on the shores of the Caspian. This bird much resembles the whistling swan, but is 10 inches shorter, its length not exceeding 50 inches; the yellow in its beak meets the black just at the nostrils, beyond which it does not extend.

Geese.

The geese are represented in the north Asiatic tundra by the bean-geese, and the white fronted species, which are both breeding birds in this area, as well as by the snow-geese (*Chen hyperboreus*), which is seldom seen in Europe. All these birds rarely winter on the Caspian, but are seen in innumerable flocks in China, Japan, and Korea, and in the southern states of North America, and occasionally wander to Mexico and the West Indies. The snow-geese is a common bird in the Arctic zone of North America, whereas in north-eastern Asia it nests on the inland lakes and swamps within the Arctic Circle. It is caught in great numbers by the natives of the north for the sake of its savoury flesh and its excellent feathers, which are preserved in pits dug in the frozen ground of the tundra, where they are covered up with earth. With the exception of the black tips of its wings, the plumage of the snow-geese is entirely white, but the feet and beak are bright red.

Harlequin Duck.

The beautiful harlequin duck (*Cosmonetta histrionica*), which belongs to the diving-ducks, appears in winter on the shores of England and Germany, occasionally on the Rhine, the Main, and the upper Danube, and less frequently on the Lake of Constance. It inhabits the Arctic zone of Europe, Asia, and America, but is particularly abundant in Siberia, where it is found nesting down to the Caspian and the Sea of Aral. It is more frequent

in America than in Asia; in Iceland, where it does not appear in very large numbers, but seems to be resident, with a marked preference for flowing water, it is called stream-duck. The nest is found on the shores of rapid rivers, well hidden under willow-bushes or other covert. The bird obtains most of its food from the bottom of such rivers by diving in the roughest and most troubled waters, and subsists on molluscs, small crustaceans, fish-spawn, insects, and aquatic plants, and during the breeding-season on the larvæ of the gnats found in such quantities in places of this description. This duck flies strong and fast, dives splendidly, and nods its head as it swims. It breeds late, the eggs not being laid before the 1st of July. The colour of the male is remarkable, being chiefly greyish blue, with the cheeks, a spot on the ear, a stripe on each side of the nape, and a ring round the neck, white; the white markings being mostly edged with black. The sides of the body are chestnut, as is a stripe on the breast; while the wings are brown, blue, white, and grey with a purple speculum. The female is much more soberly clad, being dark brown, with a white ear-patch, and a white breast marked with brown undulations.

**Long-Tailed
Duck.**

Equally conspicuous is the long-tailed duck (*Harelda glacialis*), which appears every winter in immense flocks on the shores of the Baltic and North Sea. Also a diving-duck, this species nests on the Arctic coasts of Europe, Asia, and America, and though most abundant in Siberia, often nests on the large inland lakes of Lapland. Its European breeding-area includes the lakes and shores of northern Norway, while in other parts of the Continent it probably appears only on migration, which does not take it far to the south. Some winter in Iceland, some in the Hebrides where it is known as the musical duck, some in the Orkneys where it is termed the calloo, many on the mainland of Scotland and the coast of Scandinavia, a few in England, and fewer still in Germany, where it is called the ice-duck. Its southern limits seem to be the Lake of Constance and northern Italy, where a few stragglers occur. This duck measures about 26 inches in length; the males being distinguished by the long and narrow middle tail-feathers. The breeding-plumage of the male is white on the head, the fore part of the neck, and the upper part of the back, the lower part of the back being dark brown; the breast is brown, and the rest of the lower-parts white; the lores and sides of the face are grey, separated by a white line from the beak, which is lead-colour with an orange band. The characteristic middle tail-feathers are black, the outer ones being white.

Scaup Duck.

The scaup (*Fuligula marila*), another common diving-duck in the Arctic regions, winters in thousands in China and Japan, and migrates in the west of its Old World habitat as far south as the Mediterranean, lower Egypt, and Arabia. The nest has been found on Loch Leven in Scotland, as well as in Brunswick, Mecklenburg, and other parts of Germany; but the principal breeding-area of the species is the Arctic zone. This duck feeds more on animal than on vegetable matter, diving for molluscs to depths down to 12 feet. On the German coast it is taken in drift nets of that depth, in the wide meshes of which the birds entangle their heads as they dive. The scaup measures about 20 inches. In colour the drake is greenish black with brown wings barred with white, the back is white or speckled, the lower part of the body white, the beak

bluish grey with a black nail, the feet blue with black claws, and the eyes yellow. The female, which, like the young males, has a white band round the base of the beak, in colour is brown with whitish wavy lines; the wings being much the same as in the male.

Scoters.

Among other northern ducks, six species of scoter are common to both hemispheres, all of which are black in colour, and distinguished by a large knob near the base of the broad and flat beak. The common scoter (*Edemia nigra*) swarms in the North Sea every winter, and appears in thousands on the shores of the British Isles, Holland, and France. It nests, however, in the polar regions, where it is especially numerous on the Siberian coasts, also appearing, although rarely, on the Caspian and the Baltic. Returning to its breeding-area in March and April, this scoter nests mostly in barren localities near fresh water; but it is quite marine in its habits, and seldom seen far away from the sea. Except during pairing-time, it seldom comes on shore, and even then prefers deep open waters. Being a very shy bird, and always out in the open, it is difficult of approach. In length it is about 20 inches from beak to tail, and may be recognised by the reddish yellow mark round the nostrils. The female is brown with whitish tips to the feathers of the under-parts, and a very small knob on the beak.

The velvet scoter (*Æ. fusca*), which is unknown in Arctic Iceland and Greenland, and represented in America by *Æ. deglandi*, much resembles in habits the common species, with which it associates in large flocks. The feathers are as valuable as those of the eider-duck; and the species is much hunted in Kamchatka, where the natives drive it into the bays with boats, where it is killed with sticks. They also take scoters in nooses, using a stuffed female bird as a decoy; few are, however, shot, as these birds sink the body deep into the water while swimming, only showing the head and neck above the surface. The velvet scoter is rather larger than the common species, from which it may be distinguished by the white speculum on the wing, the white spot below the eye, the red feet, and the reddish yellow beak, of which the base and edges are black.

Grey Plover.

The plovers of the far north are represented by a species easily mistaken for the golden plover, but recognisable by its superior size, stronger beak, and the presence of a small hind-toe. This bird, the grey plover (*Squatarola helvetica*), during migration is often seen on the North Sea, more seldom on the Baltic, and very rarely inland, though now and then visiting peat-moors. Inhabiting the north-east of Europe and the north of Asia and America, the grey plover migrates in August and September, and returns in March, April, or May. Migration takes it as far south as Cape Colony, the Malay Archipelago, and Australia, and in America it is met with in Brazil and Peru. The grey plover is mostly mottled white above and black below, except the abdomen and tail-coverts, which are white. The wing has a white bar when open, and the tail is white with six or seven black bars.

Bar-Tailed Godwit.

The bar-tailed godwit (*Limosa lapponica*), which breeds on the large swamps and inland waters of northern Sweden, Finland, and Lapland, on the Peninsula of Kola in northern Russia, and the tundras of northern Siberia, migrates to central and southern Europe, and appears in

thousands in the autumn and spring on all the shores of the North Sea, swarming on the beach as the tide turns, and eagerly following the receding waves. Feeding on molluses, insects, and crustaceans, this species may be distinguished from the black-tailed godwit by the brown-barred feathers of the tail and axillaries, and the brown-spotted back, of which the lower part is whitish.

An allied species inhabiting the Arctic zone from Norway to southern Siberia, and visiting in the Mediterranean area, or even still farther south, is the spotted or dusky redshank (*Totanus fuscus*). This bird nests in the highest north, beyond the Arctic Circle, whence it migrates south in August, in which month, or September, it may sometimes be seen in flocks of six to twenty on the shores. During their spring migration in April and May these birds often appear in solitary inland places. One of the largest of the sandpipers, this species is about a foot long, and may be recognised by the white lower half of the



LITTLE STINT.

back, and the brownish bars on the white secondaries. The beak is almost black, with the lower mandible red at the base, and the legs are red with black claws.

The stints, which breed in the far north beyond the limits of tree-growth, are small birds frequenting the sea-shore, where they are found on the sands. Sociable in disposition, they breed in colonies, and winter on in large flocks which generally migrate under the leadership of a single other species. The little stint (*Tringa minuta*) selects as its dwelling-places, more in herbage, with quiet nooks and smooth water. But seldom leaving the beach, it prefers small bays with muddy soil, or inland waters near the sea. It breeds in the north from Scandinavia to the Peninsula, but in largest numbers in northern Asia beyond the Urals. It migrates as far as Cape Colony and Ceylon, and occurs in almost every country of Europe and western Asia. A quiet, brisk, confiding bird, it has acquired its familiar name from its grasshopper-like call of "stint," and having a

twittering trill by way of a song, the little stint is distinguished by the shining white of its under-parts, the chestnut brown of the back, and its small size, the length being only about 6 inches. Temminck's stint (*T. temmincki*), which does not extend so far east in its breeding-range as the last, and travels less far to the south on migration, differs by having the six outer tail-feathers white instead of grey, as well as by the darker colour of the legs, and its somewhat superior bodily size. The Siberian birds winter in India, while those nesting in Europe seem to bear to the west, and are much more frequent in spring and autumn in Britain, France, Switzerland, and Spain than elsewhere. Many have also been found wintering in Senegambia.

Knot. The knot (*T. canutus*) also migrates through the west of Europe, its main route to Africa taking it through Sweden, Denmark, Scotland, England, France, and Holland, the numbers passing through Germany being comparatively few. When migrating across Asia it visits southern Siberia, Lake Baikal, and China, and journeys as far south as New Zealand. As a breeding bird it inhabits the Arctic countries of Europe, Asia, and America, and seems to nest more frequently near inland waters than by the sea-shore. Running with short, quick steps, it holds the wings straight up when crossing soft mud or stepping over watery places. The flight is fast and straight with strong, although not frequent, movements of the widely expanded wings. The knot, which feeds on the smaller animals of the shore, such as insects and their larvæ, is the largest of its kind, being almost as large as the golden plover. In summer the plumage is chestnut-brown spotted with blackish on the upper part of the body; but in winter the colour is ashy grey above, with dark bars on the lower part of the back and the white upper tail-coverts. The throat and under-parts are white, and the feet and beak black.

Purple Sandpiper. Frequenting steep and rugged shores, where the sea washes the wildest rocks and sprinkles them with its spray, the purple sandpiper (*T. maritima*) in May repairs inland to nest on some elevated plateau or in some moorland valley, where it is often found in numbers. When surprised, the young birds hide away, while the old ones, uttering the most pitiful cries, scud about with ruffled feathers, drooping wings, and body almost touching the ground. At other times the purple sandpiper is less mindful of its safety. It walks gracefully, swims well, and has a strong undulating flight, while in character it is sociable and peaceable. In diet it differs in some ways from its relatives, since it subsists principally on small shell-fish. The breeding-area, which is circumpolar, extends to a higher latitude than that of any other sandpiper, embracing the shores of Hudson Bay, Labrador, Greenland, Iceland, Spitzbergen, Novaia Zemlia, northern Lapland, and northern Siberia, and seeming to include the Farne Islands in its southern boundary. In winter this bird migrates to the Mediterranean, and the Azores on one side of the Atlantic, and the Bermudas on the other. About 8 inches long, the species is distinguished by the blackish upper tail-coverts, the white bar on the wings, and the yellow feet.

Broad-Billed Sandpiper. The broad-billed sandpiper (*Tringa platyrhynchos*), which is found in muddy shallow places in stagnant water, where grass does not grow too abundantly, and where cattle drink and leave innumerable foot-

prints, nests in the Scandinavian mountains and the swamps of Finland, although its true breeding-grounds are in the tundras of Arctic Europe and Asia. In autumn this bird migrates as far south as Formosa, Bengal, and Madagascar. In habits it is as much a snipe as a sandpiper. In colour it is blackish brown above, with a white eye-stripe, and a brown spot in front of the eye which is placed well in the centre of the side of the head; the beak is broad in the middle



RED-NECKED PHALAROPE

and longer than the head, curving slightly downwards at the point. It is not a large bird, being only some 6 inches in length.

Sanderling. Another well-known member of this group is the sanderling (*Calidris arenaria*), which inhabits flat and sandy shores, being seldom seen on muddy ground. During the nightless summer it breeds within the Arctic Circle, its area extending all round the pole; and on migration it reaches Borneo, Java, Ceylon, Cape Colony, Patagonia, and the Sandwich Islands, leaving representatives during the winter in almost every country on the way.

The sanderling walks daintily and briskly, with an occasional short run, and flies fast and energetically. Its food consists of worms, molluscs, crustaceans, and other small inhabitants of the shore. The plumage of the upper part of the body is grey in autumn and chestnut in spring, while the under-parts are white, with the exception of the brown-spotted breast, and the beak, legs, and feet, which are greenish black. In length it is about 8 inches. The sanderling is best recognised by its three toes and the large amount of white in its plumage.

Phalaropes.

The phalaropes, that is the fringed feet—from their toes being lobed like those of the grebes—are also birds of the far north where they wander about in summer on the shores and feed on insects, molluscs, and algæ, leaving them in winter to find their food on the surface of the sea. The red-necked phalarope (*Phalaropus hyperboreus*) nests in the Arctic regions, mostly in the neighbourhood of the sea, but sometimes also far inland, where it is not found at other seasons. Breeding as far north as Novaia Zemlia, and as far south as Ireland, this bird is abundant in northern Asia and North America. On migration the American birds journey down the continent into Chile, while those from Asia are met with on the shores of the Indian Ocean and the islands of the Malay Archipelago. Phalaropes spend most of their time on the water, swimming high and lightly, and are very grebe-like in their habits, although, owing to the closeness of the feathers and the lightness of the body, they cannot dive. They rise as easily from the water as from the ground, and are as graceful on the wing as when swimming. The red-necked phalarope, which is 7 inches in length, may be distinguished by its thin, tapering, black beak. The head and shoulder-feathers are dark grey, those of the back and wings being darker, with light edges; the breast is ashy grey, the neck chestnut, except at the nape, while the under-parts are white, and there is a white bar on the wing. The female, which is larger than the male, has a brighter coloured plumage. Unlike most birds, she selects her mate, and does all the courting, the pair taking turns in sitting on the eggs.

The grey phalarope (*P. fulicarius*) frequents similar haunts, breeding all round the North Pole, although most abundantly in northern Siberia, where it nests on the small pools in the lower parts of the tundra. On migration this bird traverses nearly half the globe, having been met with off the coasts of Chile and New Zealand. The grey phalarope is more gregarious than its red-necked relative, being rarely seen alone and often in flocks of fifty or more. In other respects the resemblance between the two is close, the females of the present species being also larger and richer in plumage than the males, and making all the advances during the pairing-season. The eggs of both species are four in number, and both have the same extremely pointed shape, but those of the grey kind are larger and not so deep in their brown ground-colour. On the upper-parts the grey phalarope is dusky grey, and below chestnut; the tail has the two middle feathers more than half an inch longer than the rest: and the beak is flat and broad, and yellow, with a black tip.

Snowy Owl.

The snowy owl (*Nyctea scandiaca*) not only breeds, but is permanently resident, in the Arctic regions of both hemispheres. Naturally it is most abundant where prey is most easily obtained. Although in

winter the plumage is pure snowy white, in summer it is flecked with brown, thus exhibiting in a modified degree the colour-change so conspicuous in many Arctic mammals. The food of this great white owl comprises Arctic hares, lemmings, mice, and birds. If these animals are compelled by the winter cold to move southwards, the snowy owl follows them. In America it is said to reach Florida and Texas; in Europe it winters in Lithuania and Poland, and rarely in Denmark and Great

Britain; in Asia it has been found in the valley of the Indus. Its nest is a small heap of moss on the ground; and the eggs are from four to seven in number, being more than are hatched by any other owl of the same size. The adults, which seek their prey by day as well as by night, select prominent hillocks for their look-out stations. At rest they generally sit erect with the wings partly hidden under the fluffy side feathers; and when fluttering and hovering across the tundra they make an audible beating with their wings, so that the flight is not silent like that of other owls. In length the snowy owl measures about 24 inches. Its



SNOWY OWL.

plumage is white with dark brown mottlings or bars in summer, but tends to become lighter with age, and, as already said, in old individuals becomes pure white in winter. The toes are thickly feathered; most so in American examples.

Gerfalcons. The gerfalcons are distributed round the North Pole in several species differing so slightly from each other that they might almost be classed as varieties. During three months of the year they find abundant food

within the Arctic Circle, but when the animals on which they prey are driven southward by the winter, these falcons follow them. Above the tree-line the eggs of these birds are laid on rocks; within it the nests are built on trees, the old nests of other birds being sometimes occupied and relined with grass and moss. The eggs, from three to four in number, which are laid in May or June, vary much in their markings, but have always a white ground-colour. This is more or less clouded—sometimes entirely—with reddish brown. The young falcons are plentifully provided for by their parents, mainly with birds caught while on the wing. In the Middle Ages gerfalcons were highly valued for hawking purposes, and are still so used by the tribes of the northern steppes. From 19 to 22 inches is the usual length of these birds, which vary greatly in colour, some being nearly white, while others are of all intermediate shades between this and dark grey. Light and dark birds have been found in the same nest, but none quite white, as the whiteness seems to come only with old age. The species known as *Falco candicans*, the Greenland falcon, has white plumage, with or without brown markings, the tail being white, the flanks without bars, and the beak yellow. The other two northern species have blue beaks and barred flanks, *F. islandicus* having a white head with narrow black streaks, while in *F. gyrfalco*, the grey gerfalcon, the crown is grey mottled with black. The Iceland falcon appears peculiar to the island from which it takes its name. The Greenland falcon nests on Bering Island and throughout Arctic America, while the grey species builds in the north from Norway to Hudson Bay, and is the one most abundant in Arctic Siberia.

Rough-Legged Buzzard. The rough-legged buzzards (*Archibuteo*) differ from the true buzzards by the completely feathered legs, and from the eagles—which they resemble in having the tarsus reticulated behind—by the weaker and shorter beak, and by the nostrils being concealed by an overhanging shelf. The species common in Arctic Siberia, *A. lagopus*, is an inhabitant of the tundra, but breeds in Russia as far south as 56° N. latitude. When driven south by the inclemency of the winter in October and November, it is seen in the British Isles, central Europe, and central Asia. In March it returns north to nest on the dwarf birches, or the beds of reindeer-moss, or even on the bare ground. The food of these birds is generally similar to that of the true buzzards, but in Siberia principally consists of lemmings. The rough-footed buzzard carries its wings somewhat lower than usual, and its flight is slow and straight. The toes and cere are yellow, the head and neck white; and there is much white in the plumage, of which the colour is mainly brown above; the tail is, however, white marked with black bars, which are most numerous in old birds. The female has less white in her plumage than the male, and is, as is usual among birds-of-prey, rather larger, being 26 inches in length, while the male measures only 22½ inches.

Snow-Bunting. Passing on to a very different group of birds, we find the snow-bunting (*Plectrophanes nivalis*) living beyond the boundaries of tree-growth all round the North Pole, but more abundant in mountainous districts than on the tundra. In Scandinavia this strikingly coloured bunting is found only on the highest peaks of the Dovrefjeld, and in northern Lapland close to the boundary of perpetual snow. It is also met with in Spitzbergen, Novaia

Zemlia, and Iceland, and has been found nesting even in Grinnell Land in latitude 82° 33' N., while it not infrequently builds in the north of Scotland. Every autumn these birds migrate in immense flocks to milder regions when the deep snow makes it impossible for them to find food in the north. They do not, however, come south before the middle of November, and by the beginning of March they have all disappeared on their northward journey. Meanwhile they have been wandering about on the fields and roads free from snow, and even in village-

streets, thus showing, while in their winter-haunts, that they are not forest birds, as they never perch on trees, but always settle on stones or rocks. In their breeding-area they frequent bare cliffs, and other solitary spots where nothing but stunted willow-bushes, heather, or a thin carpet of mountain-plants covers the ground, and no human footstep breaks the silence. The snow-bunting is a lively, peaceable bird, with a walk like that of a lark. When a flock is searching for food on the ground, it looks as if it were rolling along, owing to the hindmost birds flying ahead of their leaders as soon as the latter have settled down. In summer the snow-bunting lives on the gnats and flies of the tundra, as well as on seeds and tender plants. In length the adult bird measures about 7 inches. The species differs from others of its tribe by the length of its wings which reach almost



SNOW-BUNTING

to the tip of the tail. The plumage is black above, with white wing-coverts, and black and white primaries and tail. In winter the black feathers have pale brown edges, so that the dark plumage becomes rufous.

Another member of the same group, the Lapland bunting (*Plectrophanes lapponicus*), also breeds in the far north, but inhabits the low-lying swampy parts of the tundra, and not the bare uplands, avoiding, when it can, the snow, before which it retires gradually south. For winter-quarters this

bird chooses fields without trees, and when the snow falls keeps to the high roads. Nesting all round the pole, in America it has been seen as far south as Colorado, and in Europe it visits northern Italy, while the Siberian birds descend to the valley of the Yang-tsi. Among the conspicuous features of the plumage is a broad white eye-stripe, continued down the sides of the neck; the crown, throat, and breast are black; the nape is bright chestnut, the rest of the upper-parts being dark brown streaked with white or rufous, and the under-parts white, while the wings are spotted. The beak is yellow tipped with black, and the legs are wholly black; the hind claw is nearly straight, and longer than the toe, thereby differing from that of the snow-bunting. The whole length of the bird is about $6\frac{1}{4}$ inches.

The distribution of this species is very similar to that of the snow-bunting; but to Great Britain it is only a casual autumn and winter visitor, almost unknown in Scotland and the neighbouring isles, although a specimen was recorded from the Flannan Islands in the Outer Hebrides in 1904. In Ireland it appears to be altogether unknown; and no instance of its nesting in the United Kingdom has been recorded. In this it is unlike the snow-bunting, which breeds regularly in the Shetlands and on Ben Nevis and in certain other parts of Scotland.

On account of the length of the claw of the hind-toe, which exceeds that of the toe itself, the Lapland bunting, together with two nearly allied North American species, is frequently separated generically from the snow-bunting under the name of *Calcarius lapponicus*, but such distinction seems unnecessary and it is therefore here included in the genus *Plectrophanes*, which is typified by the snow-bunting.



SIBERIAN PICA.

CHAPTER II

THE ANIMAL LIFE OF SIBERIA

THE Siberian tract is bounded on the north by the line of tree-growth, on the west by the Ural Mountains, on the south-west by the Kirghiz steppes, and on the south by the mountain-ranges extending from the Pamir Plateau in the south-west to the Sea of Okhotsk and forming the north-western slope of the central Asiatic highlands. The climate of this vast area, speaking generally, is very like that of the Baltic area of Europe, of which indeed Siberia may be regarded as an eastern extension where the original conditions have been less altered by agriculture and settlement.

The greater part of this tract is situated within the forest and pasture belts of the northern temperate zone, the forests being more distinctly separated into those of deciduous trees and those of conifers than is the case elsewhere, although mixed forests exist whose origin, as in Europe, may in great part be due to human agency. Wherever forestry has not interfered with the original primitive conditions, forests of pine generally occupy the colder districts, and those of deciduous trees the warmer areas, that is to say, such as are situated in the south and within the maritime zone. Exceptions there are, indeed, due to peculiarities of the situation or the soil. Sandy and peaty ground will, for instance, be covered with conifers even within the zone of deciduous trees; while birch-forests may occur more to the northward and at a greater elevation than pine-forests. In comparing the Siberian fauna with that of Europe, it will be interesting to

contrast also the forests, although, unfortunately, only in very small areas in Europe has even an approximation to the old primeval conditions been retained. In Bohemia, on the estate of Prince Adolf of Schwarzenberg, there is, however, a large stretch of forest still retaining much of the primeval wild state, a condition which it is intended to preserve in perpetuity. Unlike woods due to human agency, these virgin forests consist of a mixture of firs, pines, beeches, alders, elms, and sycamores; and it is only at a considerable elevation that firs begin to reign supreme. Everywhere the ground is cumbered by fallen trunks, from the mouldering remains of which have sprouted younger trees. The soil, covered with a carpet of luxuriant moss, produces a plentiful undergrowth of beech, fir, and pine, which only await the falling of some forest giant to develop to their full height. Generally speaking, it may be said that the trunks of such trees have reached a diameter of only from 4 to 8 inches in from a hundred and twenty to a hundred and sixty years. A different reason is accountable for the slow development of the Siberian trees; the climate, especially in winter, being poor in moisture, so that the trees are exposed to long and dry frosts, and consequently grow very slowly. The forests consist principally of larches, but partly also of pines, firs, and beeches, and have no brushwood, although farther north the long wreaths of blackish grey mosses and lichens hanging from the trees give an appearance of recent origin, which on closer examination proves deceptive.

The southerly and maritime forests of the area situated in a milder climate stamp the landscape with a different character; the dense forests of Kamchatka, for instance, being interspersed with fertile meadows. In these latter the principal plants are perennial grasses (mostly growing in tufts, and seldom creeping) with flat green leaves, which do not roll up in dry seasons. These grasses, with a few included plants, form a compact sheet of verdure, but on poor ground there are wide tracts covered with moss alone, while some localities are actually bare, thus changing the character of the country from that of meadow-land to that of a steppe, or giving it the appearance of an ordinary field. The meadows are mostly of smaller extent than the original steppes, especially where, owing to a moist climate, pastures and forests alternate with one another. Probably landscapes of this description once extended all over Europe, since the climate of the Continent is favourable to the growth of both grass and trees, and produces numerous plants not belonging to the sylvan flora, which seem to prove the existence of natural meadows at earlier periods. These by cultivation have been transformed into the fertile meadows of the present day, which are certainly widely different from their prototypes. Siberia, however, has preserved these primitive meadows in their natural condition, and amid the grass are many taller plants, especially spiræas and umbellifers, some of which exceed the height of a man.

The forest and meadow zone of Siberia gradually merges into the tundra in the north, while to the south, especially to the south-west, it passes into the area of the steppes. The steppes, being situated in a climate with cold winters, are less abundant in grasses than the plains of warmer countries, although they contain more plants with woody stems, and more dwarf shrubs than the meadows. The steppe-grasses have narrower leaves than the meadow-grasses, and are in conse-

quence curled up in dry weather—a preservative against the evaporation of sap, which is also prevented by the wax-like nature of the leaves, and close tissue of the epidermis. Animals, as well as perennial bulbous plants, are more frequent in the steppes than in the meadows; and the evergreen shrubs are mostly small-leaved, with a protective covering of fine hairs.

Ungulates.

Owing to the milder climate and more abundant vegetation, the Siberian fauna is more varied than that of the tundras and includes representatives of a larger number of groups. Among the hoofed group, the elk is the largest of the Siberian mammals; the Asiatic habitat of this species extending from the boundaries of European Russia to the Siberian forest-zone, although the precise limits of its range are still undetermined.

The true deer are represented by the Manchurian wapiti (*Cervus canadensis xanthopygus*), the isubra of the natives, which although long confounded with the red deer, is now known to be a near relative of the American wapiti, from which, among other features, it is distinguished by the reddish tinge of its summer coat. From Manchuria the range of this wapiti extends into Amurland. The Siberian roe (*Capreolus pygargus*) is a much larger and lighter-coloured animal than its European relative, with heavier and more rugged antlers, larger and more thickly haired ears, and a greater amount of white on the rump. Manchuria is also the home of a smaller kind of roebuck (*Capreolus bedfordi*), apparently more nearly akin to the European species.

The musk-deer (*Moschus moschiferus*) is likewise found in Siberia, although apparently not so commonly as in the tract farther south. The wild sheep of this area is the Kamchatkan bighorn (*Ovis canadensis nivicola*), a near ally of the northern forms of American bighorn, but distinguished by certain peculiarities in coloration and the conformation of the skull. Information with regard to the precise range of this handsome sheep is much required, but it is known to extend from Kamchatka to the Stanovoi Mountains. Horns measuring from 35 to 38 inches along the curve have been recorded. A small member of the argali group (*O. ammon storcki*) has also been described from Kamchatka.

Picas.

With the exception of the beaver the largest of the rodents in the Siberian area is the mountain hare, a species also found in the tundra. The Siberian pica (*Ochotona alpina*) is, on the other hand, an inhabitant of the steppe, where the entrances to its burrows may often be seen in hundreds or even thousands. Besides holes in the ground, these picas live in rocky clefts or among crumbling rocks; and when grazing near their homes often betray themselves by the loud whistling, from which they take their name of whistling hares, a title, however, not applicable to all the members of the group.

Picas drink but little, and never hibernate, although many of the places inhabited by them are under snow for months. In autumn they collect large quantities of grass, which is their principal food, and in Siberia build this up in stacks a yard or more high, to afford a supply during the winter. Not infrequently these hay-stacks are annexed by sable-hunters, as provender for their horses.

The Siberian pica is about 9 inches long, and greyish brown in colour, with a yellowish tinge on the under-parts.

Squirrel and Chipmunk. The European squirrel inhabits the Siberian forest zone from the Ural in the west to the Pacific in the east; this eastern representative of the species being light grey in colour. In the same area lives the striped Siberian ground-squirrel or chipmunk (*Tamias asiaticus*), which extends as far west as the Dwina in Russia, and as far east as Amurland. In North America it is represented by a number of allied species.

Susliks and Marmots. Susliks also are represented in northern Asia, the long-tailed species (*Spermophilus eversmanni*) being the most abundant in the north-east. The bobac marmot (*Arctomys bobac*), ranging from Galicia and southern Poland to the Amur countries and Kamchatka, is also abundant. This species inhabits plains or low hills, where it digs its many-chambered burrows, each large enough to contain a numerous family. Early in the morning the marmots appear at the entrance of their burrows, after the manner of their kind, to feed on roots, herbs, and grass. They use hay to line their burrows, and spend the whole winter in deep sleep; the young, which are born in spring, and half-grown by the middle of summer, are not so numerous as in the Alpine species, there being frequently only one at a birth. The bobac is a smaller animal than its cousin of the Alps, measuring only some 15 inches from the nose to the root of the tail. In colour it is uniformly grey and rusty yellow, and its front teeth are white instead of orange. It is believed to be the animal in which bubonic plague originates.

Flying-Squirrel. The lovely Siberian flying-squirrel or polatouche (*Sciuropterus volans*), which is a rare animal in museums, is one of the smallest of its tribe, being only about 6 inches in length. In colour it is brown above and white below, the tail being grey superiorly and chestnut underneath. With its large expressive eyes this little creature is one of the prettiest of all rodents. It inhabits Siberia as far east as the Lena, and is also found in Lapland and northern Russia; ranging as far north as the boundary of forest-growth, and to the south-west occurring in Lithuania and the Russian Baltic provinces. In the European parts of its area, however, especially in the west, it is becoming rare. The haunts of this species are the forests, sometimes of fir, but more often those of birch, in the latter of which it is almost invisible in winter owing to its white winter coat so exactly matching the silvery bark. Although not hibernating during the cold season, it ventures out of its retreat only in mild weather. Its food, which it eats in squirrel-fashion, consists of the buds and bark of the birch, and all kinds of seeds and fruits. As this rodent is not entirely nocturnal, it may often be observed in the day-time, but becomes most lively towards dusk. Dwelling entirely in trees, in the branches and holes of which it makes its nest, in its flying leaps it often covers a distance of 100 feet from stem to stem; its flying apparatus acting, of course, as a parachute, and not as wings.

Other Rodents. One of the European dormice, the tree-dormouse, is also found in Siberia. The largest northern rodent, the beaver, occurs in many places on the Obi, but seems to have disappeared from eastern Siberia. The hamster also ranges into Siberia, but not farther east than the Obi. The water-rat, however, ranges over the whole area; and on the lower Yenesei, its fur is used for clothing purposes and forms an important article of trade.

The habitat of the northern field-mouse (*Microtus ratticeps*) extends from Sweden and Lapland through northern Russia over the greater part of Siberia, where this rodent lives in the forests and their outskirts; its principal food consisting of roots. The root-vole (*M. œconomus*), which derives its name from its habit of gathering stores of edible roots, inhabits Siberia and Kamchatka. These mice live generally in pairs, and in spring migrate in vast numbers to the west, whence they return in autumn anxiously expected by the fur-hunters for the sake of the valuable furs yielded by the small carnivora which follow the host in large numbers. Other kinds of field-mice, or voles, also inhabit Siberia. Lemmings are represented in northern Asia and North America by the banded species (*Dicrostonyx torquatus*), whose popular name appears to be derived from the black stripe down the back. Among other members of the mouse tribe, the harvest-mouse is found in Siberia, as is also the long-tailed field-mouse, although only in the western portion of the country. The house-mouse and the brown rat are as frequent in human habitations throughout this tract as they are in similar situations in Europe. The Asiatic representative of the jumping-mice (*Zapus*) is said to reach Siberia, although its main habitat is the Sze-chuan district of China.

Cat Tribe.

The lynx ranges all over Siberia; but the common wild cat is replaced in Asia north of the Himalaya by Pallas's cat (*Felis manul*), which is, however, more particularly indigenous to central Asia. The Manchurian race of the tiger (*Felis tigris longipilis*), which occurs in the south of the area, can hardly be regarded as a true Siberian animal; and the same is the case with the snow-leopard, which ranges but little farther north than the Altai. The fox ranges all through Siberia, while the wolf extends beyond the forest zone into the tundra, and is even said to venture out on the ice of the Arctic Ocean as far as the Kuriles, occasionally crossing to America.

Wild Dog.

Unlike the wolf and the fox, the Siberian wild dog (*Canis [Cyon] alpinus*) does not belong to the fauna of Europe, but to an Asiatic group of *Canidae*, all the members of which have one tooth less on each side of the lower jaw than the true dogs. They have also a proportionately shorter muzzle, long hairs between the pads of their feet, and twelve to fourteen teats instead of ten. This group, which in some respects approaches the hunting-dog of Africa, ranges over Siberia and central Asia as far as Amurland, and also occurs on the island of Saghalin, as well as throughout India, Burma, and the Malay countries, but, so far as is known, is absent from northern China and Japan. Although some other name than wild dogs would perhaps have been more appropriate for these animals, from their habit of hunting in packs, their fine and handsome appearance, and their courage, the Asiatic wild dogs in one way fully deserve their title. The Siberian wild dog, which inhabits Siberia at least to the Altai, and probably still farther south, appears now and then on the open steppe, but prefers forests, especially those covering the mountains, as on the eastern shore of the Yenesei. It is not found everywhere within this area, but only locally; its distribution depending, perhaps, partly on the nature of the country, and partly on the supply of suitable prey, which in some parts includes even deer. The Siberian wild dog, which is distinguished from its Indian and Malay relatives principally by its larger upper true molar teeth, varies in hue either individually, locally, or according

to season, but generally speaking its colour is like that of a fox in summer and whitish in winter.

Kamchatkan Brown Bear. The brown bear is another mammal ranging all over Siberia, and is particularly large and numerous in Kamchatka, where it is represented by the race known as *Ursus arctus piscator*, but the Siberian race may be distinct. In Kamchatka bears make paths of about a couple of feet wide along the wooded banks of the rivers, at a distance of some two yards from the water, which sometimes follow the rivers all through the forests. These paths are partly made for the sake of reaching the salmon on which this bear feeds during certain seasons in Kamchatka. In places they are littered with half-devoured fish, the heads of which are crushed, but the tails and intestines left untouched. When fishing, the bears are said to wade slowly into the water, and in a depth of about 18 inches wait motionless for their prey, as they swim upstream, probably killing them with their paws, and then carrying them ashore to feed on the best parts.

Sable. The European pine-marten ranges into Siberia, which is the special home of the much more valuable sable (*Mustela zibellina*). Although a near relative of the pine-marten, the latter is distinguished by the more conical head, the larger ears, the longer and stouter legs, and the proportionately larger feet. Of a blackish colour above, with a dark grey nose, grey cheeks, a chestnut-brown neck and flanks, greyish white or light brown edges round the ears, and an orange-coloured throat, the sable sometimes shows a few white hairs among the dark fur of the back; the nose, cheeks, and under-parts being white. Occasionally, however, it is yellowish brown above and nearly white below, with only the legs black.

The sable originally ranged from the Urals to Bering Sea, and from 68° N. latitude to the mountains bordering Siberia on the south, but it has been so much hunted that it has disappeared from many districts, and is now met with only in the forests of the northern mountains, especially those of eastern Siberia, and in Kamchatka. Dwelling in the most inaccessible and unfrequented localities, deep in the primeval forest, it avoids the proximity of man, and but very rarely appears near villages. Mainly nocturnal, and sleeping beneath the roots of trees, or in holes in their trunks by day, it is a dangerous enemy to hares and most other small mammals, as well as to birds of all kinds, and it also feeds on fishes and berries. Once a year in April the female gives birth to four or five young.

Siberian Mink. The beech-marten does not belong to the fauna of Siberia, but the polecat occurs in the southern provinces. The ermine is distributed throughout the area, as is also to a great extent the weasel, although the latter is not found so far north. More noteworthy is the Siberian mink (*Mustela sibirica*), which ranges east of the Yenesei, and also occurs in northern and central Europe. This species resembles generally the polecat, or rather has dark and light markings on the head and face similar to those of the latter. Both above and below it is uniform tan-brown in colour. Of its habits scarcely anything is known.

Wolverine. Although by no means confined to the Old World, or even to Siberia, the glutton or wolverine (*Gulo luscus*) may be regarded as a characteristic animal of the latter. So much has been written, both true and

false, regarding this animal, that our notice here may well be brief. Although undoubtedly voracious, it does not appear to be so gluttonous as has been asserted. Neither does it attack reindeer, unless they be sick or wounded, devoting its attention to foxes and other mammals of a size more suited to its powers. In addition to feeding on carrion, it is active enough to catch hares and many kinds of birds. If it comes across the carcass of a deer left by hunters it will not touch the inviting banquet the first night, but revisits the kill the second night, when it eats its fill, burying in the ground what it cannot eat. So partial indeed are wolverines to carcasses, that they will gnaw through thick wood, or even dig a hole several feet into the ground in order to get at a slain deer.

Of other Carnivora, the badger is widely distributed in Siberia, ranging as far east as the river Lena; while the otter is found over almost the whole area, its northern limits nearly reaching the Arctic Circle.

Insectivora and Bats. Of the insect-eating mammals, the hedgehog ranges as far east as Amurland; while the shrews are represented in Siberia by the common shrew and the pigmy shrew throughout the country from east to west. The water-shrew is spread along the south of the tract, and the spider musk-shrew ranges into the north-eastern districts. The northern limits of the mole extend to some portion of the valley of the Lena. A large number of bats inhabit smaller or larger areas in Siberia, but as all these are essentially southern types they can in no sense be regarded as characteristic of this vast tract.

Arctic Blue-Throat and Ruby-Throat. The Siberian area is much richer in birds than the Arctic region; the perching-birds, which are there so scarce, being represented by quite a number of species. One of the Siberian songsters is the Arctic blue-throat (*Cyanecula succica*), which breeds also in northern Scandinavia and northern Russia, and seems to be the only blue-throat of northern Asia. It appears in Germany on migration, but so seldom, that in travelling during the night it would seem to take about nine hours to fly from the German coast to Egypt. In Siberia, where it nests in great numbers, it is found as far east as Kamchatka. This bird, which has a light eye-stripe, is distinguished from the central European blue-throat by a red in place of a white spot on the throat. An allied species, the ruby-throat (*Calliope camchatkensis*), on its return from winter-quarters in India, southern China, and the Philippines, appears in southern Siberia in April, although it does not visit the tundra before the snows have melted. Thickets and underwood are the haunts of this shy, solitary bird, whose song—much superior to that of the blue-throat—resembles the music of the nightingale. The silky plumage of the male is of uniform olive-brown above, with the chin and throat of a brilliant scarlet-red, the breast grey, and the cheeks and eye-stripe white. The wheatear is as common in the north of Asia as in the north of Europe, and so is the dipper.

Thrush Tribe. Of the thrush tribe, the rock-thrush, although local, is abundant in Siberia, while the fieldfare, missel-thrush, song-thrush, and redwing abound everywhere in summer. On the other hand, the red-tailed fieldfare (*Turdus naumanni*) and red-necked thrush (*T. ruficollis*), which inhabit northern and central Asia, are species equally common, but unknown in Europe. From the



GLUFTON OR WOLVERINE.

same districts the dark thrush (*T. obscurus*) as well as the Siberian thrush (*T. sibiricus*) visit Europe as birds of passage.

Accentors and Warblers. The Alpine accentor ranges from the south of Europe to the cliffs of the sea of Okhotsk, although its European relative, the common hedge-sparrow, does not range much farther east than the Urals. Another species, the mountain accentor (*Accentor montanellus*), is found right across the continent, being common round Lake Baikal, as well as in the Stanovoi Mountains and eastern Siberia generally. From western central Asia, where it also appears, it sometimes migrates to the Crimea, Hungary, Dalmatia, and Italy, where, as in Pekin, it is caught, and kept for sale in cages. Both the garden-warbler and the blackcap have been found near Omsk in western Siberia, while the white-throat also occurs in that region, as well as the lesser white-throat, which ranges much farther east. Another species, Eversmann's warbler (*Phylloscopus borealis*), which is found with the blue-throat in the high north, winters in the Malay Archipelago. This warbler has a strong beak, thick at the base, brown legs, and a broad yellow eye-stripe; in colour its plumage is greenish and olive-brown above and greyish white with a yellowish hue below, the wings having yellow edges and two whitish bars.

Goldcrest and Tits. Another song-bird visiting Siberia is the goldcrest, which may be seen wherever there are forests suited to its habits. The great and the coal tit also nest in the country, but the crested tit does not breed east of the Urals, being replaced by other species. The same holds good for the marsh-tit, which occurs in western Siberia, and is represented in the eastern districts by the mandarin tit (*Parus camchatkensis*). The blue-tit's distributional area ends in western Siberia, but that of the azure tit (*P. cyanus*) extends as far eastward as the Amur. This tit also inhabits northern Europe, where it has been found nesting in Bosnia and Herzegovina. In colour its plumage is blue and white, the head being white with a blue band through the eye, the wings blue with a white bar and white tips, while the tail-feathers are blue, the outer ones broadly tipped and edged with white. This handsome little bird migrates to milder countries in autumn, to return to its breeding-area in March or the beginning of April. Living in similar localities to the marsh-tit, it nests in hollows of trees, and feeds on insects and partly also on seeds and berries. Searching every crevice of the bark, it climbs the thinnest twigs for its food in a brisk manner, chirping or uttering the peculiar "terr terr" by which it may be recognised at a long distance. The long-tailed tit ranges from west to east; but the bearded tit is represented by the closely allied Siberian tit (*Panurus sibiricus*), which is lighter in plumage than the European bird.

The nuthatch is also found in Siberia, as is the creeper, the latter being indeed indigenous to the mountains of central Asia.

Larks, Wagtails, and Pipits. In Siberia the larks are represented by several species, among these being the skylark, which ranges throughout the area. The other larks visiting the country are, however, mainly restricted to the southern and western districts. The horned larks (*Otocorys*), distinguished by ear-like tufts on the back of the head, include one truly northern species, ranging not only over northern Asia, but also over North America and northern Europe. This bird, the

shore-lark (*O. alpestris*), appears as a winter visitor to Britain and the German coast, reaching as far south as Carinthia. Some 7 inches in length, it has a yellow crown and throat, with a broad black band across the crown. In habits it resembles the skylark. Both the grey and the white wagtail are breeding-birds in Siberia, although the latter does not reach the Arctic Circle. Another kind, the blue-headed wagtail, is represented in northern Asia, from Scandinavia to eastern Siberia, by the grey-headed wagtail (*Motacilla borealis*). Of the pipits, the tree-pipit, water-pipit, and the meadow-pipit are also Siberian breeding-birds, but

most especially so is the red-throated pipit (*Anthus cervinus*), as it is to be met with throughout the north. This bird visits Germany and Austria on migration, and has been caught in Bohemia, Salzburg, the Tyrol, and Styria. Another species, the Scandinavian rock-pipit (*A. rupestris*), which is resident in Scandinavia and Finland, is known in India as a bird of passage, and thus seems widely spread over northern Asia. It is distinguished from the rock-pipit resident in the British Isles by the vinous tint of the breast.



PINE GROSBK.

Buntings.

A considerable variety of buntings inhabit Siberia, among them being the snow-bunting and the Lapland bunting. The yellow-breasted bunting (*Emberiza aureola*) commonly ranges from northern Russia to south-eastern Siberia, but has been shot in Austrian Silesia. The pine-bunting (*E. leucocéphala*), which inhabits the same localities, has been taken in lower Austria. The little bunting (*E. pusilla*) inhabits Siberia and northern Russia, and winters in India, Burma, and China; and from Lapland to the Pacific is found the rustle bunting (*E. rustica*), a species also abundant in China during winter.

Crossbills and Grosbeaks. The crossbills are mostly natives of the north, the common European species inhabiting central Asia and the greater part of the Siberian area, while in Siberia the pine-crossbill ranges as far north as the boundary of tree-growth, as does the larch or two-barred crossbill (*Loxia bifasciata*). The latter bird is distinguished by two white bands on the wings, owing to the greater and median wing-coverts as well as the secondaries being tipped with white. It has a stouter beak than the American white-winged crossbill, which it otherwise much resembles. The northern representative of the bullfinch, the so-called *Pyrrhula major*, is spread over Siberia from west to east, as is the scarlet grosbeak (*Carpodacus erythrinus*), a native of the forests of Siberia, distinguished by the scarlet hue of its plumage. Wherever, in the vast uninhabited forests of the high north, pines and firs are interspersed with juniper bushes, there lives and breeds the pine-grosbeak (*Pinicola enucleator*), which feeds on the seeds of the cones and the berries of shrubs, particularly those of the southernwood, though it also supplies its young with a considerable amount of insect food. In April this bird makes its nest, which may be recognised by the way it is fastened to the trunk and adjacent bough of the tree on which it is placed. At the proper season it generally contains four eggs, much like those of the bullfinch, but larger. In October and November this grosbeak migrates to Russia, southern Sweden, and north-eastern Germany, a few stragglers visiting other countries farther west and south. Breeding close up to the Arctic Circle in both hemispheres, it may be distinguished by its red head, tail-coverts, and under-parts, the red being replaced in the female by yellow of a deeper tone above than below.

Finches and Linnets. The goldfinch is another Siberian bird, while the siskin ranges through the country to the Pacific. Siberia is also the principal breeding-area of the mealy redpoll (*Linota linaria*), one of the linnets, which nests in the birch-forests of northern Europe and Asia, building on low trees, often scarcely 4 inches from the ground. This bird is restricted to birch-woods, from the fact of its food consisting principally of birch and alder seeds, though in its winter-quarters it does not confine itself to these. It also feeds on gnats, which in its native home envelop the shrubs like clouds, and serve principally as food for its young. The mealy redpoll arrives in the south in November and returns to its northern home in February and March. It ranges as far westward as the British Isles, and in hard winters migrates to southern Europe and northern Africa. In Germany it is generally found on the plains or in valleys, in forests with alder and birch trees, and in the open fields with trees and bushes near by, or even on bare stubble. It is said to sleep on the snow if surprised in the fields by night, but otherwise in high thick hedges. These redpolls, which are exceedingly tame and lively, climb like tits, often upside-down, on the thinnest twigs, and are so sociable that they always fly in flocks, frequently accompanied by siskins and sparrows and by other linnets. When breeding, it is quite silent, but at other times it has a low and insignificant song, practically a mere twittering. In length it is about 5 inches; in colour the crown is red, the wing white, the chin black, and the breast pink. The female lacks the pink on the breast so distinctive of her partner. Although both the greenfinch and the chaffinch are found in western Siberia, the real finch of the Asiatic and European north is the brambling (*Fringilla*

monticola), which breeds in immense numbers in the stunted birch, fir, and pine forests of the mainland of Siberia, as well as on the larger islands, like Japan, although, on account of the absence of forests, it is unknown in Iceland. From the first half of September until October it migrates to Spain, southern France, and Italy, and in hard winters even to Greece, Asia Minor, and Algeria. The brambling flies slowly, sometimes in enormous flocks, and is mostly found in forests rich in beechmast. In March it returns just as leisurely to its northern home. A true forest-bird, it prefers conifers to deciduous trees, and often travels distances of from six to eight hours in order to roost in its favourite pines. In its winter-haunts it associates with chaffinches, yellow buntings, sparrows, linnets, and other birds, and is occasionally seen in inhabited districts. In its breeding-area it consumes insects during summer, with which it also feeds its young. The nest is higher from the ground than that of the chaffinch, and generally is partly constructed of birch-bark. The low, chirping, screeching song of the brambling is not comparable to that of the chaffinch, which the bird resembles in so many ways. From that species it may be distinguished by its blackish head, blackish back, white rump, and the white spot on the wing.

The group of cherry-finches is represented in Siberia west of Lake Baikal by the European hawfinch, but elsewhere in Asia by other species. So far north as corn is grown in Siberia the house-sparrow may be found, while the tree-sparrow is met with all through Siberia from west to east.

Starling and Oriole. The starling has a similar distribution to the hawfinch, ranging as far north as latitude 70°. The golden oriole, on the other hand, is a more southern bird, although it inhabits Siberia as far east as Dzungaria.

Crow Tribe. Almost all the crow-like birds of central Europe are found in Siberia, but the nutcracker is represented by the slender-beaked race (*Nucifraga caryocatactes macrorhyncha*), which ranges as far as Kamchatka to the east, and generally lives in pine-groves, the seeds of which form its principal food. The jays are represented in the north of Europe and Asia by the Siberian jay (*Perisoreus infaustus*), which is found in great numbers, especially near Yakutsk, in the Stanovoi Mountains, and also on the southern shore of the Sea of Okhotsk, while in Scandinavia it is met with south as far as Stockholm and Christiania. Its breeding-area extends as far north as firs of any size can grow; but in its winter-haunts, in milder climates, it lives among birches and other trees. Very early in spring it returns to its nest, which is placed in the thickest branches of some pine or fir close to the stem, and is built of lichens and dry twigs, and lined with hair and a few feathers from the breast of the builder and others borrowed from the ptarmigan. The nest is by no means easy to find since the birds are very quiet when in its neighbourhood, and perch, with bristling feathers, quite close to the trunk of the tree in their endeavours to remain hidden so long as possible. When, however, closely approached, they suddenly fly off through the tops of the trees with loud cries. The jerky, bustling flight is similar to that of the common jay, which the Siberian bird resembles in its habit of establishing stores of nuts and other food, and also in feeding on insects and the eggs and young of the smaller birds. At times these birds are so greedy for animal food that the Laplanders are obliged to chase them away with sticks from the places

where they dry their meat, although they welcome them as a rule on account of their catching the gadflies which torment the reindeer. Bird-lovers appreciate this species for the reason that it is easily tamed, and amusing in its ways. About 12 inches in length, in colour it is principally light grey, with the crown and nape blackish brown, the upper tail-coverts rusty red, the under-parts rufous, and the tail-feathers grey, the four feathers on each side of the tail being red with grey tips. Of other members of the group, the jackdaw is found as far east as the Lena, but is represented in north-eastern Asia and Japan by the white-collared Pallas's daw (*Corvus dauricus*). The ordinary European rook appears in Siberia, and along with it the closely allied *C. pastinator*, in which the area at the base of the beak does not become bare in adult life.

The habitats of the two commonest crows are separated in Asia in the same way as in Europe, the Yenesei forming the boundary of that of the Siberian hooded crow (*C. sharpei*) on the east, and of the Siberian carrion crow (*C. orientalis*) on the west. On the Lena River and still farther east only carrion crows are to be seen, and these range into Japan. The raven is found all through Siberia.

Among the shrike tribe, the red-backed species is common in western Siberia, while the great grey shrike ranges as far east as the Lena. The flycatchers are represented by the red-breasted species, which is found right across the continent, and by the spotted flycatcher, whose area is bounded on the east by the Altai Mountains.

The waxwing (*Ampelis garrulus*) is an irregular visitor to the west and south of Europe, but a breeding-bird in the north of Europe and Asia, as well as in Alaska. In the forests of its northern home this splendid bird feeds during summer exclusively on the myriads of gnats which fill the air; but later on eats the berries in which the region abounds. When the trees and shrubs are covered with snow, the waxwing migrates to the forests of southern Sweden, Russia, Poland, and Lithuania, which it visits regularly every year on account of their abundance of berries. In very hard winters it has to go still farther afield, and extends its wanderings to the British Isles, northern Italy, and Turkey, which form the limits of its southern range. In northern Germany it appears as a rule every two or three years, and sometimes regularly every year, but to Britain and France its visits are not so frequent, though there as elsewhere it arrives in flocks and never as a straggler. Waxwings swallow berries whole, drink very seldom, and catch gnats in the air as if they were flycatchers. They are generally seen in parties sitting quietly together on one tree, on the ends of the branches, where they can be recognised from afar. Very trustful of man, they nest in colonies, on either firs or birches, each nest being on a branch near the stem. The nest is built of fir-twigs, moss, and black hair-lichen, lined with hair and feathers. The waxwing is $7\frac{1}{2}$ inches in length. In colour it is purplish red below and greyish brown above, with a chestnut crest; the tail ends in a broad yellow band, and the secondaries have their shafts prolonged into the scarlet wax-like points from which the bird derives its name.

The swallows are represented in Siberia by the same species as in Europe, the house-martin ranging as far east as Tashkent, while the chimney swallow reaches the valley of the Yenesei, eastwards of which its

place is taken by an allied species, *Hirundo gutturalis*. The sand-martin inhabits Siberia throughout. The swift ranges as far east as Lake Baikal, but not so far as Kamchatka.

The European nightjar is also a western species, as is the blue roller, while the hoopoe reaches the shores of the Pacific. The kingfisher, though in a smaller and more brilliantly coloured form, also extends to the same shores; and the woodpeckers of the Baltic area are found right through Siberia, as are the wryneck and the cuckoo.



WAXWINGS.

OWLS.

Several kinds of owls are indigenous to the Siberian area; but the barn owl, which, although nearly cosmopolitan, dislikes countries with a cold climate, is unknown in this tract. On the other hand, Tengmalm's owl (*Nyctala tengmalmi*), which has been found nesting in the Carpathians, and straggles as far west as the British Isles, is a true northern type, although

nowhere of frequent occurrence. During the day it keeps to dense bushes or hollow trees, and never, like the little owl, enters buildings. Although appearing in greater numbers in spring and autumn, it is a shy and solitary bird, only rarely seen. Its nest is placed in firs, beeches, and other trees at a height of some 50 feet from the ground, generally in holes with a wide opening. The young begin to chirp early in the morning, but are silenced by the plaintive notes of the female, which resemble a low human wailing. This owl flies so noiselessly that even a mouse does not hear it, the flight being very like that of a kite with much hovering and fluttering, and never in jerks and curves like that of the little owl. Tengmalm's owl is $9\frac{1}{2}$ inches long and has the facial disc nearly complete, the toes heavily feathered, and the plumage thick and fluffy. It is brown above, much spotted with white, and white below irregularly barred with brown, but the spots on the wings and tail disappear with age.

The favourite residences of the hawk-owl (*Surnia ulula*) are the birch-forests of the north of Europe and Asia; but its breeding-area does not extend so far north or south as that of the snowy owl, although the bird is everywhere more frequent, especially in the Ural Mountains. Avoiding rocks, this species is essentially a bird of the woods, which frequents the plains and is often seen in marshes and swamps where there are bushes. The northern winter drives it southwards, when it regularly appears in the Baltic countries down to Denmark in the west, and occasionally straggles to the British Isles, southern Germany, and also to similar latitudes farther east. In March these owls return to the north to breed among the birch trees, the trunks of which they resemble in colour and marking. When it does not make use of the hollow of a tree, or the re-lined nest of a crow, the hawk owl builds a nest of its own of thin twigs, leaves, and moss, on some tall tree. So courageously does this owl defend its nest against other birds, that there is scarcely a bird in its native forest safe from its attacks. It seizes jays as they fly, and kills the willow-grouse and other birds much superior to itself in size and weight; but it chiefly preys on voles, mice, and lemmings, on which it darts down like a falcon and strangles with its claws. For a while it sits waiting for prey on some dry bough, like a shrike, soon to fly hovering and searching close to the ground, after which it suddenly settles on some point of vantage to watch again. Its beautiful flight has much of the gracefulness of the kestrel, for which it might indeed be mistaken, did not its thick head serve to show its owl nature. It soars like a kestrel by day, and especially in the afternoon, as also at dusk. Its quick and agile movements and its habits so much resemble those of diurnal birds-of-prey that it well deserves its name from these traits, as it also does from the dark undulating hawk-like lines on the lower parts of the body. The head is flat and low, the face narrow, without a disc, the tail long and graduated, the wings slightly pointed, the feathers of the crown smooth, and those of the sides of the head bristled. It has neither ear-tufts nor an operculum, and its legs are covered with greyish feathers. In length this owl measures about 14 inches. The back and wings are brown with white spots, the tail is brown with nine white cross-bars, and the face white with a black edge on each side.

The same localities are inhabited by a still more exclusively northern species, the Lapp owl (*Syrnium lapponicum*), which breeds in the far north of Europe

and Asia from Lapland to the Sea of Okhotsk. Rare in Finland and farther south, it is never driven far away from home by the cold of winter. It follows the migrating lemmings as far south as central Scandinavia, and nests in hollow trees, on the ground among shrubs, and probably also in rocky clefts. It is as strong and courageous as the snowy owl, and lives on much the same kind of food. The Lapp owl somewhat resembles the hawk-owl, but is more slender, although considerably larger; it may always be recognised by its large head and long body. In length it is from 27 to 28 inches, the female being larger than the male. In colour it is ashy brown streaked with white above, and below whitish grey with brown stripes.

The eared owls are represented by the short-eared owl, which is found almost everywhere, and the long-eared owl, which ranges across the continent and reaches Japan. The eagle-owl, which also inhabits the Siberian area, ranges down to central Asia, where it is replaced by *Bubo turcomanus*, distinguished by its paler plumage.

Falcons and Hawks. Of falcons and hawks, the first on our list is the little merlin, which has been found as far north as Novaia Zemlya, and inhabits Great Britain, central Europe, and western and central Asia, but does not apparently reach as far east as Kamchatka, though known as a visitor to Korea, China, and northern India. Where trees are to be found, the merlin builds in them, but on the tundra and large moors and heaths it nests on the ground, and in mountainous country, on ledges and in rocky clefts. Sometimes the nest is a mere scratching in the ground, in other cases it is roughly made of heather and other dry plants. The young birds migrate in August and September with the old ones. Those inhabiting Europe resort to the Mediterranean countries and North Africa. During March, April, and May merlins return to their breeding-area. In habits the merlin is in many respects very similar to the hobby. It is one of the boldest of the falcons, and attacks not only smaller birds but many larger than itself. Like the hobby, after flying several times round its sleeping-place in the evening, it suddenly drops down like a stone. When on the wing, it may be distinguished from the hobby by the shorter body and wings, and it has also a somewhat paler colour. The tail is slaty blue tipped with white and barred with black, the last bar being broader than the rest. The cere and feet are yellow, and the throat is white. The male, which is about 10 inches long, is slaty blue above with black streaks, the lower parts being rufous white, with brown lancet-shaped spots. The primaries are bluish with black shafts, and barred with white on the inner webs. The grey gerfalcon, the peregrine, and the kestrel are found within the area, the last ranging up to the Polar Circle, and even farther north, but the hobby, although reaching Kamchatka, prefers the southern parts of Siberia.

The golden eagle is distributed not only over Europe, but also over Asia from the Himalaya northwards, and is thus found in Siberia. The white-tailed sea-eagle also inhabits Siberia, but is replaced on the coast of the Pacific by the larger Steller's sea-eagle (*Thalassaëtus pelagicus*). This, the largest of all eagles, is 41 inches in length. In colour it is principally black and brown, with a white wedge-shaped tail and thighs, and white on the lower part of the back and wing-coverts.

Like its relative, the almost equally large black and white Korean species, this giant eagle possesses a remarkably loud and piercing cry.

The osprey, an inhabitant of almost all countries, is also a member of the Siberian fauna. The honey-buzzard, which inhabits not only Europe but has been found in Japan and near Peking and breeds in Scandinavia up to the Arctic Circle, is probably indigenous to the greater part of Siberia, in which country the black kite ranges as far east as the Lena, while its relative, the red kite, begins to be rare at the Urals. The sparrow-hawk and the gos-hawk are, however, met with right across to the far east. The marsh-harrier, although more frequent west of the Altai, reaches the Amur. The hen-harrier is found within the same latitudes as far east as Japan, but does not range far north, the same being the case with Montagu's harrier, whose habitat extends to China.

As regards its game-birds, Siberia is very similar to central and northern Europe, the black-cock ranging as far east as the Stanovoi Mountains. The hazel-hen is also found thus far; but in Kan-su, and perhaps farther north, is replaced by Severtzow's hazel-hen (*Tetrastes severtzowi*). The capercaillie ranges into this part of northern Asia, as do the willow-grouse and ptarmigan. The quail is met with as far east as northern China; but the partridge is represented in the area under consideration by the bearded partridge (*Perdix daurica*), which also inhabits Mongolia and China. Somewhat smaller than the European partridge, this is distinguished by the bright buff breast, the black patch on the lower surface, and the long feathers on the chin and throat.

With the bare mention that neither the ring-dove nor the turtle-dove is found very far east, it may be observed that the herons are chiefly restricted to warmer countries, although the common species, which is of very wide distribution, occurs in Siberia, where it is more abundant along the southern border. The bittern is also found there, at least in certain localities; and the warmer parts of Siberia are visited by the two European representatives of the stork tribe, the white and the black stork.

Among the rail-like birds, the European coot ranges from Europe to China and Japan; the little bustard is found as far east as China, while south-west Siberia is the northern home of the land-rail, which reaches the Lena River; the water-rail ranging to the Amur. The European crane occurs in Kamchatka, but the great bustard is unknown beyond the Lena.

The snipe family is represented by the European woodcock, which is a true northern bird, in the farthest east, while western Siberia is the principal home of the jack snipe, and the common snipe ranges as far east as China and Japan, as does the great snipe.

The curlew is common not only in northern Europe but also in Siberia and as far east as Japan, while its relative the whimbrel (*Numenius phaeopus*) is a true northern bird. The latter breeds in the north of Asia and Europe, whence it migrates south, to appear regularly every year on some parts of the shores of the Baltic, as, for instance, on Rügen and the neighbouring island Hiddensee, on the coasts of Schleswig-Holstein, and the German shores of the North Sea as far as east Friesland. It arrives in considerable numbers in Holland and the British Isles, but in France, Switzerland, and central

Germany is very rare. In winter it has been seen in south-east Africa. In shape and colouring this species is a miniature of the curlew, which it resembles also in voice and habits. Thunderstorms do not alarm the whimbrel, which is most active when the weather is about to change, so that it is regarded as a weather-prophet by the peasants of many countries. Its clear, flute-like calls are shriller than those of the curlew, but are otherwise very similar. If these be well imitated, the whimbrel may be lured within shooting-distance, as it readily follows the calls of its fellows, towards which it is socially disposed, although it does not seek the society of other birds. The whimbrel is 15 inches in length, the colour of its plumage being principally dark brown streaked with black.

Among a host of other waders visiting Siberia in the breeding-season, the spotted redshank and the greenshank (*Totanus canescens*) frequent flat shores, and seek their food in still, shallow waters. Although the latter bird is frequently seen during migration on the muddy shallows of the coast, it prefers fresh waters, avoiding those surrounded by trees and bushes, but liking to wade among aquatic plants. Never resorting to covert, if it cannot escape by flight from birds-of-prey, it will lie flat down on the ground, or even on the water. Sometimes it will dive, and will continue to do so until the enemy retires. The greenshank feeds on small fish and insects, and closely resembles a sandpiper in general habits, gait, and flight. Its breeding-area is northern Siberia as far east as the Stanovoi Mountains; and on the autumn migration it travels as far south as Cape Colony. During autumn and spring it visits all parts of Europe, either on its outward or homeward journey, as it does not appear to return by the same route as the one by which it went. In length it measures some 13 inches. It is ashy brown above, mottled with white, and white below, the lower part of the back and tail being also white, while the wings are grey beneath and the legs olive-green. Like the greenshank, the spotted redshank ranges from the tundra to the south. The sandpiper, the redshank, the green sandpiper, and the wood-sandpiper are thorough Siberian birds, as is also the ruff.

In addition to the little stint, Temminck's stint, the knot, and the purple sandpiper, there are two other Siberian species indigenous to northern Europe, namely, the curlew-sandpiper and the dunlin.

The former (*Tringa subarquata*), whose home is in upper Sweden, Esthonia, Finland, Russia, and Siberia, migrates to the countries on the North Sea and the Baltic, the shores of the Mediterranean, the African coast down to the Cape of Good Hope, India, and even Australia. It appears in flocks of hundreds on the coasts of Holland and France, and visits the German and Swiss lakes. The autumn migration begins at the end of July and ends in the middle of October. On the spring migration in April and May the curlew-sandpiper appears much less frequently along the German route. By no means timid in disposition, this bird returns to its favourite haunts even when driven away, and prefers muddy flats and shingly beaches to the banks of rivers and brooks. It breeds on the lower Yenesei, where its nest and eggs were found in 1897. In length this sandpiper measures about 7 inches. The beak is slightly bent at the tip. The tail is grey, the rest of the plumage, save for the white tail-coverts, being very similar

in colouring to that of the dunlin. In habits the dunlin (*T. alpina*) closely resembles the curlew-sandpiper, but is of much more common occurrence. Its breeding-area extends to the Arctic Circle and throughout Siberia from west to east. The nest is a mere depression amid heather or rushes, or on a dry patch in grass. The young, which are hatched in sixteen days, run as soon as their down is dry, when they are taken by their parents to grassy or muddy ground to search for the worms and insects which form their principal food. The dunlin appears in great numbers on the shores and islands of the Baltic, and still more numerous on those of the North Sea, as well as on the shores of the Mediterranean, which it crosses into Africa, where it goes as far south as Zanzibar. During migration it is found everywhere on inland lakes, ponds, marshes, and rivers, but not in such large numbers as on the seashore, where these birds follow the tide out and in, sleeping while it is at flood. When disturbed they fly in circles out to sea, their flight being peculiar and characteristic owing to the moderate expansion of the wings. In its summer dress, with the coal-black shield on its white breast, the dunlin is one of the handsomest of the sandpipers. It is about 7 inches in length and in colour rusty brown with dark markings above, and white below, the tail being light brown with white shafts and narrow white fringes to the feathers, and the beak and legs black.

In addition to the golden plover, the group of plovers is represented in Siberia by several kinds, northern Siberia being the home of the dotterel and little ringed plover. The breeding-area of the European lapwing extends through Siberia as far as Kamchatka; and ranging across more to the south is found the thicknee.

Duck Tribe. Swans, geese, and ducks abound in Siberia, but all belong to species already noticed. Of the former, Bewick's swan and the whooper, although birds of the far north, also inhabit Siberia along the southern boundary of the tundra, while the mute swan is found on all the larger lakes. The geese need no special mention, and the same is the case with many of the ducks; among the latter the wild duck, shoveller, gadwall, wigeon, pintail, and teal are species indigenous not only to the north of the Old World but also to North America, all of them breeding in Siberia.

The sickle-winged duck (*Eunetta falcata*), which visits eastern Siberia and Japan, is not indigenous to Europe, although said to have been shot in solitary places in Bohemia and Hungary. It is most common from Lake Baikal and the Yenesei eastwards, where it arrives in April, while it winters in more southern countries, especially China and Japan. This duck, which is found in the Stanovoi Mountains, is about 18 inches long, and is distinguished by its five long narrow shoulder-feathers, which are bent like a sickle, as well as by a mane-like tuft on the nape. The head is of a copper hue, the neck white with a bright green ring, the body marked with black and white lines, the tail yellow on each side with black upper and lower coverts, and the wings grey with a wide black speculum.

A number of the diving ducks also frequent Siberia; among them the harlequin-duck, the long-tailed duck, and the scaup range from the tundra down to the true Siberian area. The golden-eye and the tufted duck are found all through Siberia from west to east, while the pochard is indigenous to the warmer districts.

The range of the scoter and the velvet scoter extends from the polar region some distance southwards. Of the mergansers the goosander abounds on Lake Baikal. The red-breasted merganser ranges up to 70° N. latitude in the Old World, as well as in the New, and is indigenous to Siberia. The smew (*Mergus albellus*) is another inhabitant of the north which appears regularly every year in central Europe. Although absent from Iceland and very rare in northern Norway, it is common in European and Asiatic Russia, near or a little south of the Polar Circle. Migrating as far south as the Black Sea, Turkey, and Greece, it visits Poland, Hungary, Switzerland, and France, less frequently Denmark and Sweden, and rarely Holland and Great Britain. The smew is characterised by rising from the water without apparent effort, and its rapid flight, from which it drops suddenly on to the water. It frequently associates with the golden-eye, which it resembles when seen from a distance, although distinguished by the smaller body, and the more pointed head, marked with more white. When flying, it appears more slender, with a longer neck and narrower wings. The smew is 17 inches in length, and principally white in colour, although the face, back, edges and middle of the wings, the larger wing-coverts, and two narrow bands running from each side of the back to the breast are black. The long crest is greenish black, the sides are delicate grey, the tail-feathers grey with whitish tips, the beak bluish with a paler nail, and the feet bluish grey. The female is grey above, with a white throat, a blackish neck, and the crown and nape reddish brown.

Other Sea Birds.

The cormorant ranges right across northern Asia; and on Lake Baikal and elsewhere the shag, which is really a bird of the sea, appears in myriads. The black tern, the common tern, and the laughing gull may be mentioned as species indigenous to the north of Europe and Asia and North America.

Of the grebes, the great crested, the red-necked, and the black-necked species are also not only European but likewise Siberian and North American in habitat. The same remark applies to the eared grebe (*Podiceps auritus*), which migrates through Germany, Holland, France, Switzerland, northern Italy, and Hungary, and breeds in Greenland, Iceland, Britain, Scandinavia, Jutland, and the corresponding latitudes of Russian Asia and North America. The last-named species, which is 12 inches in length, has a black hood on the top and chestnut plumes on the sides of the head, and is deep chestnut on the neck and sides.

Reptiles and

Amphibians.

Like the birds, the reptiles and amphibians of Siberia are essentially of a European type, although, owing to the severity of the climate, the number of species is but small. Of the lizards, the viviparous species, which in Europe reaches Lapland, inhabits Siberia from west to east, while the European sand-lizard is met with only in the south-west. The viper reaches the Polar Circle and ranges to the Pacific, and the ringed snake is found as far east as Lake Baikal and as far north as the sixty-fifth degree.

Among the amphibians common to Europe and Siberia mention may be made of the edible frog, whose northern boundary is 59° N. latitude, and whose eastern limit extends to the Pacific. The same is the case with the common frog, which inhabits Europe as far as northern Scandinavia; but the moor-frog is not found so far east, although it occurs in western Siberia. The common toad ranges to

Japan, although it is not a very northerly form. The green toad, which reaches 52° N. latitude in Siberia, but whose eastern boundary has not yet been fixed, is sometimes found in Mongolia; and the tree-frog, which inhabits Europe up to 58° N. latitude, is found right across the Asiatic continent.

Fishes. Of the fishes of Siberia it must suffice to state that these are in the main specifically identical with those of northern Europe, the perch, carp, crucian carp, spiny loach, pike, salmon, and sea-trout, as well as many others, ranging into the Siberian rivers, which probably also harbour the lamprey. Mention must, however, be made of the abundance of salmon of the genus *Oncorhynchus* in the rivers of Siberia and Kamchatka; the group being represented by several species, such as *O. orientalis*, *O. lycaodon*, *O. lagocephalus*, and *O. proteus*. These arrive at the mouths of the rivers from May to August; each species having its own particular time, which is wonderfully constant in spite of annual differences in the seasons. Although a few remain throughout the summer near the mouths of the rivers, and return to the sea in the autumn, practically the whole host ascend the rivers to spawn, after which they perish, in some cases actually choking the rivers with their bodies. It is these spawning and moribund salmon which form the prey of the Kamchatkan bears, to which reference is made above. Such a waste of life as occurs in the case of these salmon is very remarkable.



CARACAL.

CHAPTER III

SOUTH-WESTERN ASIA

THE Siberian area is bordered on the north-west by the Baltic province, and on the west by the eastern European tract. On the south-west it touches the Caspian province, the fauna of which is nearly related to that of the Mediterranean region; the latter, as stated above, including a large part of south-western Asia. Besides Asia Minor, Syria, Palestine, and the Sinaitic Peninsula, this region embraces the northern half of Arabia; other south-western countries comprised in the Mediterranean region being Mesopotamia and, generally speaking, the basins of the Euphrates and Tigris and, farther east, Persia and Afghanistan so far as they are not included in the basins of the rivers flowing into the Caspian and the Sea of Aral: but Baluchistan and the greater part of the Indus countries, as well as Kashmir, belong zoologically to the Mediterranean region. The non-Asiatic part-

of this region comprises North Africa about 20° N. latitude, the Iberian Peninsula, the south of France, including the greater part of the Rhone valley, the Apennine Peninsula, the Balkan Peninsula (except its northern districts, which belong to the valley of the Danube), and the islands of the Mediterranean.

Generally speaking, the climate is characterised by its wet winters, the rains occurring in the cold season, and the summer in many parts of this tract being almost or completely rainless. These countries, with their winter rains and long summer droughts, are the home of evergreen trees and shrubs which with their hard, thick, leathery leaves give the Mediterranean landscape its principal character. The trees are mostly low, with the stems gnarled, the branches dense, and the leaves of the general character of those of the laurel or oleander, but usually smaller, and in most cases indeed very small. Both sides of such leaves are frequently provided with gland-hairs, which secrete fluids, while air-conducting hairs are absent, or confined to the under side. Notwithstanding, the leaves are seldom bright in colour and are often overspread by a bluish film, probably in consequence of a resinous secretion, their hard leathery condition being owing to the compact arrangement of their cells. Compared with other plants of dry climates, these trees are remarkable not only for their evergreen leaves but also for their absence of thorns and of protecting covers to the buds.

At a distance large stretches of country appear almost devoid of vegetation, owing to the colouring of the dusty and sparse bushes being so similar to that of the ground. Such apparently barren spots occur, however, only on limestone soil, and indicate the remnants of former forests in which the ilex (*Quercus ilex*) and the Aleppo pine (*Pinus aleppensis*) were predominant. The vegetation on gravelly soil is much more abundant, the shrubs growing denser and higher, and representing the brushwood of primeval forests, the trees of which have nearly all disappeared. Here ilex and the Aleppo pine are scarce, being replaced by the cork tree (*Quercus suber*) and the maritime pine (*Pinus maritima*). The stone-pine (*Pinus pinea*), on the other hand, which occupies so important a place in Mediterranean landscapes, grows on sandy soil, and seldom forms extensive woods.

Many of the woodlands chiefly consist of monotonous groups of mastic trees (*Pistacia lentiscus*), this monotony being, however, in some degree broken by the intermixture of shrubs of other kinds.

Among the hard-leaved types, the olive (*Olea europea*) occupies a conspicuous position on account of its massive stem, branching at a small height, its gnarled branches, its thick and deeply cleft bark, but more especially on account of its small, narrow, hard leaves, covered on both sides with sparse scale-like hairs, which give to the under surface a silvery tinge. As regards its leaves, the ilex is not unlike the olive, the foliage of both being of the small and hard type. The oleander (*Nerium oleander*), again, which grows on the banks and islands of rivers with little water, like the bay (*Laurus nobilis*), can scarcely be regarded as a tree of this tract; but the myrtle (*Myrtus communis*) with its stiff leaves, the rosemary (*Rosmarinus officinalis*), the lavender (*Lavandula latifolia*), and thyme (*Thymus serpyllum*), are common, as is also the sage (*Salvia officinalis*); the last, with its wide, felt-like, soft-haired leaves, differing greatly from the others. The species of rock-rose (*Cistus*), with their large white or carmine-coloured

blossoms, are among the more beautiful plants of the Mediterranean countries; their leaves being either leathery and brilliant, or sticky from resinous secretions, or else closely haired and consequently softer. The peculiar character of the hard-leaved plants is distinctly shown in one of the spurge-laurels (*Daphne gnidium*), as well as in an asparagus (*Asparagus acutifolius*) with its needle-shaped evergreen leaves, and also in the tree-heather (*Erica arborea*), distinguished by its almost tree-like mode of growth. In spots less densely covered with shrubs than elsewhere, bulbous plants grow abundantly, in association with grasses, hard-leaved evergreen perennials, and short-lived spring annuals which die soon after ripening their seed. Poplars, ash, and other deciduous trees, unknown among the evergreen woods, make their appearance near water and in damp soils. Forests of northern trees, such as horse-chestnut, do not exist in the countries round the coasts, but are restricted to the mountainous tracts, which have quite a different climate.

The Mediterranean region consists in a great degree, if not in the greatest degree, of deserts, whose origin is, of course, primarily due to a small annual rainfall. In deserts, indeed, vegetation depends not so much on rain as on warmth and the dryness of the air in summer, when these are at their maximum, the life of desert-plants being more or less quiescent.

Within the Mediterranean region is included the desert-tract crossing North Africa, Arabia, southern Persia, and Baluchistan, throughout which the winter climate is generally mild; only the more northerly districts being visited by slight frost and rapidly melting snow. The summer temperature is one of the hottest known, rising in July over the greater part of the area to 96° or even higher. The vegetation is of the same type as that of the Sahara. Rocky table-lands, sandy valleys, hilly or flat stony plains, undulating expanses of sand, and broad basins of clay lands are the leading physical features. Yet the desert is by no means completely devoid of plants: its stony table-lands are the poorest in vegetation, their only vegetable life being a few small thorny bushes. Less barren are the sandy valleys and especially the banks of the (for the most part) dry water-courses. The oases, which are the deepest valleys and the best-watered parts, afford a sharp contrast to the rest of the tract, being abundantly clothed with trees and plants. The distribution of desert-plants is much more dependent on underground waters than on casual showers. In all deserts there is, however, probably a short-lived flora due to the brief rainfall in spring. Called to life by the moisture, there shoot up a number of plants, which as a rule die at the end of the rainy period, leaving the recently green ground as barren as before. Many perennial desert-plants bear leaves and blossoms only during the rainy period, not because their deep-seated roots are watered by the moisture, but because the evaporation of their sap is checked by the moisture in the atmosphere.

There is, of course, a complete transition from a true desert to ordinary country, and some of the tracts of intermediate type may be called semi-deserts. That part of Arabia lying southward of the 20th degree of latitude may, for instance, be termed a semi-desert, its fauna showing affinity in the main with that of Africa south of the Sahara, with some admixture of forms characteristic of the Mediterranean region. Central Asia Minor, Armenia, Kurdistan, south-western Persia,

Afghanistan, and the valley of the upper Indus are likewise semi-deserts, and the lower part of the valley of the Indus, Baluchistan, part of Persia, and that portion of Arabia north of 20° N. latitude are occupied by real desert. On the other hand, the Asiatic shores of the Mediterranean and the Black Sea are clothed with hard-leaved forests.

Deer.

Several of the mammals of south-western Asia are the same as those of Europe, among the hoofed group being the eastern race of the red deer, whose range extends from Asia Minor into northern Persia, where the animal becomes very dark-coloured on the under-parts. The fallow deer, as a member of the Mediterranean fauna, is indigenous to Asia Minor, where it is found principally in the Taurus. The mountains of Luristan, between Mesopotamia and



PERSIAN IBEX.

Persia, are the home of the Persian fallow deer (*Cervus mesopotamicus*), distinguished from the common fallow-deer by the form of the antlers, in which the trez-tine is closer to the brow-tine and the latter smaller than in the common fallow deer, while the palmation begins below, instead of above the middle of the beam. In other respects the Persian fallow deer, which may perhaps be spotted the whole year round, is closely related to the ordinary species. The roebuck of south-western Asia, which is spread over Caucasia, Armenia, and Asia Minor as far as Palestine on one side and Persia on the other, is so little different from the European animal that it may be regarded as specifically identical.

**Ibex and Wild
Goats.**

Although there are no wild representatives of the ox tribe in the area under consideration, there are several forms of wild goat. Among these is the Arabian race of the African ibex (*Capra nubiana sinaitica*),

which inhabits the Sinaitic Peninsula, Arabia Petraea, and Palestine, and is represented by another variety (*C. nubiana mengesi*) in south Arabia, the typical (*C. nubiana*) being an inhabitant of Egypt and the districts as far south as the tropic of Capricorn. The Arabian race is of special interest as indicating a transition from the more typical ibex towards the wild goat. The Persian race of the latter (*C. hircus ægagrus*) is found from the Caucasus and the mountains of Asia Minor to Persia and Baluchistan, passing in the last-named country into the Sind race (*C. hircus blythi*). In former times other races of the wild goat inhabited all the islands of the Greek Archipelago, but at the present day they survive only in Crete, Antimilo, and perhaps Gyaros, in a truly wild form. In Sind and Baluchistan wild goats range from the sea-level upwards, and in Persia inhabit the mountains to a height of 12,000 feet. Horns of the Persian wild goat are known which exceed 55 inches in length. They are scimitar-shaped and sharply keeled in front, but rounded behind, the front keel bearing a number of irregular bosses or knobs, unlike the regular transverse knots of the horns of the true ibex. Although sometimes widely separate, they are generally more or less close together. The does carry much smaller horns, which are quite smooth and bent backwards, slightly compressed, oval in section, and farther apart at the base than those of the bucks. The old bucks are furnished with a flowing beard, and in winter grow long hair on the neck and shoulders. In winter the general colour of the pasang is brownish grey, in summer yellowish, or reddish brown, the under-parts of the body and the inner sides of the thighs being whitish or white, but there is considerable variation in this respect according to age. In contrast to the general tint the black of the face, shoulders, and legs stands out very conspicuously.

Domesticated Goats. Many domesticated breeds of goat, as for instance the Caucasian, still retain a strong resemblance to the wild goat, although others are distinguished by the form of their horns and other characters. Some breeds, for instance, approach the markhor in their corkscrew-shaped horns, although the horns of nearly all domesticated goats are twisted in a direction opposite to those of the markhor. Many domesticated goats are, however, hornless, while in others an additional pair is developed. Besides the differences in the size and shape of their bodies, there are variations in the length of their hair. The hair of many domesticated goats hangs almost down to the ground, while that of others is very short and of all colours between white and brownish black. The hair of the Egyptian goat is short, generally brownish, but yellow on the legs, and often piebald, with light round spots on a dark ground. This goat, like the Hausa sheep, is distinguished by the strongly arched profile, as well as by the throat-lappets and drooping ears, the horns being either absent or very small, while in most cases there is no beard. The Sudan goat, again, is characterised by its short horns of 3 or 4 inches in length, which are bent at first backwards and outwards while their tips point forwards, as well as by the long black beard which reaches down to the chest and spreads over the shoulders and the upper part of the fore-legs. Among the long-haired breeds, the Angora goat, indigenous to Asia Minor, but introduced into different parts of Europe and South Africa, is distinguished by its large size, great hanging ears, long compressed spiral horns, and long, wavy silky hair. Another long-haired breed is the Tibetan shawl-goat, which is of rather small size with a short

neck, fairly long, hanging ears, and long flat horns, keeled in front and curving outwards, backwards, and inwards. The hair of the Tibetan, or miscalled Kashmir, goat is as celebrated as that of the Angora goat. The Syrian or mamber goat has long, shaggy, silky black hair, a short beard, semicircular horns in both sexes, and a strongly curved profile. In this breed the ears are longer than those of the Egyptian goat, being in fact so long as to form its most distinctive feature.

Very different from the wild goat and ibex is the markhor (*C. falconeri*), distinguished by its spiral horns and the long hair of the beard continuing on to the shoulders. There are several local races of this fine goat, distinguished, among other characters, by the shape of the horns, which in some form a close spiral like a screw, while in others the spiral is more open and corkscrew-like. They are compressed and keeled both before and behind, although the hind keel tends to become rounded in old age. The range of the markhor extends from Bokhara, Cabul, and the trans-Indus mountains through Astor and Hazara to the Pir Panjal mountains of



SULEMAN MARKHOR.

Kashmir. The typical form is the Astor markhor, in which the horns make an extremely open spiral. In the Pir Panjal race (*C. falconeri cashmiriensis*) the spiral becomes closer; and this closeness of the twist becomes more marked in the Cabul race (*C. falconeri megaceros*). In the small Suleman, or straight-horned race (*C. falconeri jerdoni*), the twist becomes like that of an ordinary screw. In the Astor and Pir Panjal race the colour is reddish brown in summer and greyish

in winter, being always paler on the under-parts, with a dark stripe down the lower part of the legs. Young animals are greyish brown, with a dark stripe down the back.

Unlike the ibex, which frequents rocky regions above the tree-line, the markhor is generally found among forests on rocky ground, where it keeps much in covert, coming out to graze in the open only in the mornings and evenings. The markhor is perhaps the most imposing of all the wild goats, and surpassed by none in agility, strength, or weight. In height it reaches 41 inches at the withers, and horns measuring 56 and even 60 inches in length are known.

South-western Asia possesses several well-marked forms of wild sheep, foremost among these being the red, or Gmelin's sheep (*Ovis orientalis*), which is a reddish-coloured species, often with a faint white saddle-mark in old rams, and the horns curving outwards and backwards in reverse direction to those of the mufion, so as sometimes to nearly meet behind the neck. The ewes are hornless. About 33 inches at the withers is the ordinary height of this sheep: and horns measuring 36 and 40 inches are known, although the ordinary length is much less. In colour the rams are russet yellow or foxy red above, and whitish on the fore-part of the head and below, with a dark patch on the throat, where there is a fringe of hair, and a dark mark on the front of the fore-legs, the aforesaid whitish saddle-patch on the back being more or less conspicuous. This animal inhabits eastern Persia and Asia Minor, being especially common on the Cilician Taurus. This sheep, of which one race inhabits Armenia, another Anatolia, and a third the southern flank of the Elburz range, is represented on certain islands in Lake Urmi, in Persia, by a race known as *O. orientalis urmiana*; and in the Troödos mountains of Cyprus its place is taken by the typical Cyprian race, whose shoulder-height is only about 28 inches. In this the fringe on the throat is smaller, and there is a dark line along the side dividing off the reddish yellow flanks from the white under-parts. An allied sheep from the Luristan district of Persia has been named *O. isphahanica*.

Very distinct is the urial or sha (*O. vignei*) typically from Astor and Ladak, but represented in the Salt Range of the Punjab by the race known as *O. vignei cycloceros*. Another race, *O. v. blanfordi*, inhabits Baluchistan, while a fourth, *O. v. arkal*, is found on the Kopet-Dagh, between Turkestan and northern Persia. The rams have a long ruff of hair hanging down their neck, starting in two tufts at the chin, which join together on the chest. The horns are coarsely wrinkled and triangular in section, their bases being close together, but above this they sweep outwards, upwards, and finally forwards, seldom forming more than a complete circle. Those of the females are short and almost straight. The colour is reddish brown or fawn in summer and light greyish brown in winter, the lower-parts being whitish. The ruff is sometimes black, but generally blackish brown interspersed with white, and in the rams is always white in the front, growing gradually black towards the hinder part. In height the Punjab urial measures 32 inches at the shoulder. The Ladak sha is larger and is said to reach a height of 36 inches or more.

The third group of hollow-horned ruminants found in south-western Asia is that of the antelopes. Familiar as is the name antelope, yet it is one exceedingly difficult to define, as there is an almost complete

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W. Kuhnert

transition from the goats to members of this group, while the group itself is very large and comprises a number of widely different types. As a matter of fact, "antelopes" really comprise a number of groups of ruminants. The great majority of the antelopes are inhabitants of Africa. Elsewhere, with the exception of a few species in Syria and Arabia, together with the blackbuck, the nilgai, and the four-horned antelope of India, the chiru of Tibet, and the saiga of Russia and western Asia, there is only the numerous and wide-spread group of the gazelles. Typically these are rather small or moderately large antelopes, of graceful build, with large eyes, a rather short tail, sharp hoofs, a white streak bordered with brown running down the side of the face towards the nose, and usually tufts of long hair at the knees. The colour is fawn or sandy, in harmony with the desert country these antelopes generally frequent. Gazelles are spread all over northern, eastern, and southern Africa, in suitable districts, as well as western Asia as far as India, and a great part of central Asia. Of the Asiatic forms the Dorcas gazelle (*Gazella dorcas*) is common to Africa and Asia, occurring, for instance, in Syria, Palestine, and the adjoining districts of Asia Minor, although its principal habitat is Africa. Three kinds inhabit southern Arabia, namely, *G. arabica*, *G. marica*, and *G. muscatensis*, while others, such as the Baluchi (*G. fuscifrons*), the Persian (*G. seistanica*), and the Indian (*G. bennetti*), occur farther east. A well-known species is the goitred gazelle (*G. subgutturosa*), of which there are several local races. This species inhabits an extensive area in south-western and central Asia, extending from the table-land of Persia, Asia Minor, and the Caucasus through Afghanistan, the Altai and the confines of the Gobi desert. The does are usually hornless. The bucks carry lyrate horns, diverging from the base, with the points turned towards each other. Seen from the side the horns appear to be S-shaped, and have sixteen to twenty-five strongly marked rings. In colour the typical Persian race of this gazelle in summer is pale fawn above, and white below and up to the root of the tail, though not around it. The colours are distinctly separate at the sides, and round the white rump-patch is a dark band; the tail is blackish brown.

Oryx. Very characteristic of Mesopotamia and Arabia is the beautiful beatrix oryx (*Oryx beatrix*), whose allies are all African. This small species stands about 35 inches at the shoulder, and is mostly white in colour, with brown legs and brown markings on the face and throat, as well as a tail-tip of the same colour. Its horns are straight.

It may be added that the wild boar is a denizen of much of the area now under consideration.

Onager. Passing on to the horse tribe, the onager or Asiatic wild ass (*Equus onager*) is an inhabitant of Syria, Asia Minor, the Euphrates districts, Kurdistan, Persia, Baluchistan, Afghanistan, Sind, Kach, and other districts of northern and western India. This species, of which there are several local races, has moderately large ears, an erect mane, and a tail covered at the base with short hair which grows longer towards the tip. It is fawn or chestnut-brown above, and white below, the back being marked with a dark brown, partly white-edged, stripe, running down the middle. Sometimes there is a shoulder-stripe and sometimes the legs are barred with reddish brown. The shoulder-height is about

48 inches, and the total length about 80 inches, while the tail measures about 23 inches. The colour is darker at the ear-tips and round the hoofs, and the tip of the tail is blackish. The typical race is the ghor-khar of Persia and the Caspian area, which is replaced in Baluchistan and Sind by *E. o. indicus*, and in Syria by *E. o. hemippus*, the wild ass of the Bible.

The Asiatic wild ass, which inhabits desert and semi-desert plains, is generally found in herds very difficult of approach, and subsists on such vegetation as is to be met in those arid districts. An exceedingly swift animal, it is rarely overtaken by a single horseman, and is generally caught when young by being tired out by a number of horsemen taking up its pursuit one after the other.

The group of hyraxes (Hyracoidea), although mainly African, Syrian Hyrax. have an outlying representative (*Procavia syriaca*) in the Sinaitic Peninsula, Palestine, and Syria. This little animal—the miscalled coney of the Bible—is covered with rather soft shaggy hair of a yellowish or fawn colour, with a small oval glandular patch of yellow hair on the back. Like all its kindred, it is very wary, and must be patiently waited for at sunrise or sunset, when it appears in front of its hole. The young, generally four in number, are born in a nest of hair and grass. The flesh is dark-coloured like that of the hare, and although rather dry and insipid is much appreciated by the Arabs.

Squirrels and Dormice. Many of the rodents of southern and western Asia are European species, the common squirrel, for instance, ranging into Asia Minor. There are, however, some eastern types. Thus a striped Indian member of the group, the palm-squirrel (*Funambulus palmarum*), whose habitat extends from southern India to Sind and Baluchistan, enters the Mediterranean region. Again the Afghan marmot (*Arctomys dichrous*) inhabits the neighbourhood of Cabul and other parts of northern Afghanistan; and the European beaver has also a wide distribution within this region. It is not improbable indeed that the latter rodent occurs in Asia Minor, as it has been observed near Aleppo. Another European rodent inhabiting south-western Asia, is the larger dormouse which ranges into Syria; and the tree-dormouse is represented in eastern Persia by a brighter-coloured relative, the Persian dormouse (*Glis picta*).

Mice, Rats, and Voles. The common house-mouse has reached many parts of the region, especially in the neighbourhood of the coast; but in Sind, Ladak, and Kashmir it is replaced by the nearly allied *Mus bactrianus*, whose range extends from north-western India to Egypt. In many respects resembling the European mouse, this species generally has a shorter tail, and is of a light sandy brown or fawn colour above, and white below. One of its relatives, the Persian field-mouse (*M. arianus*), is distributed over central Asia, inhabiting Persia, eastern Turkestan, and the centre of the Tian-Shan range. This mouse is a near relative of the European wood-mouse, and is found in fields and pastures close to forests, entering houses in winter. Reddish brown above and pale yellowish grey below, it has a total length of rather more than 4 inches.

In south-western Asia the black rat is represented by the Alexandrian rat (*M. rattus alexandrinus*), which is reddish and brownish grey above, and yellowish white below, with a total length of $6\frac{1}{4}$ inches, the tail measuring $7\frac{1}{2}$ inches. The original habitat of this rat extends from North Africa and the



Asiatic part of the Mediterranean area to India; but it has been carried on board vessels to Italy, whence it has spread to south-eastern France and Switzerland. It has also been observed in south-western Germany and in North America, having been carried across the Atlantic in ships. This rat has been called the roof-rat, because it is often seen in Italy on the roofs of the houses. As it is unknown in Persia and Afghanistan, it did not originally belong to the south-western fauna.

In Afghanistan there occurs one of the Oriental bandicoot-rats (*Nesocia hardwickei*). All these bandicoot-rats are indigenous to the Indian region and the adjoining parts of south-western and central Asia, but the spiny mice are partly inhabitants of the Mediterranean region although unknown in the European portion of the same. They occur, however, in North Africa as well as in south-western Asia. These mice, which in eastern Africa range down to Mozambique in the south, are small desert-haunting creatures of about the size of house-mice, but resembling tiny hedgehogs, in having the lower part of the back clothed with stiff spines instead of hairs. The pale spiny mouse (*Acanthomys dimidiatus*) inhabits Egypt, northern Arabia, Palestine, and Sind, but may range much farther over south-western Asia. It is sandy coloured above, and white below, with a total length of 8 inches, half of which is taken up by the tail. The Oriental bush-rats are also represented by one species (*Golunda ellioti*) in Sind; and in Quetta and Afghanistan we have the so-called Quetta mole (*Myospalax fuscicapillus*) as a representative of a genus allied to the lemmings, with other species from central Asia and Kurdistan. Ranging up to 5000 feet in the mountains, this rodent constructs long passages in the ground, from which are thrown up heaps of earth like those of the European mole.

The hamsters are represented by the grey *Cricetus* (*Cricetulus*) *phæus*, which ranges from Russia to central Asia, as well as by other species of the same and allied sub-genera. Equally numerous are the graceful little gerbils, which are such essentially desert-rodents. The common Indian species (*Gerbillus indicus*), for instance, inhabits the barren parts of north-western India, Sind, the Punjab, western Rajputana, Baluchistan, and southern Afghanistan. It is found up to a height of 4000 feet, lives in sandy deserts or semi-deserts, and is most common in Sind, where it burrows everywhere beneath the roots of bushes, or in sandy hillocks. Its food consists of roots and seeds of all kinds. In colour it is sandy grey above and dirty white below, its length ranging from 5 to 7 inches, that of the tail being a little less. Somewhat smaller than the Indian gerbil is the Afghan *G. erythrura*, which also inhabits Baluchistan and southern Persia. Although frequenting barren country, this is often found in the neighbourhood of human habitations. The dwarf gerbil (*G. nanus*), first discovered in Baluchistan and Sind, probably also inhabits Arabia and the coast of Abyssinia. Several other species have been found in Sind, the east European province, and the Oriental region.

Among the hares, the Afghan *Lepus tibetanus* ranges over a large area in Afghanistan and Baluchistan as well as the valley of the upper Indus; but farther east, in Sind, Kach, and the districts adjoining the Punjab, it is replaced by the Sind hare (*L. dayanus*), which is a true animal of the desert.

Hares and Picas.

The picas, so numerous in northern and central Asia, are represented in the south-west by the Afghan pica (*Ochotona* or *Lagomys rufescens*), which is not found below 5000 or 6000 feet, and lives in colonies in rocky clefts or burrows of its own making, which it leaves at mornings and evenings in order to feed. It measures about 7 inches in length.

Of the jerboas, a group unknown in Europe, there are several forms in south-western Asia. Foremost among these is the five-toed Afghan species (*Alactaga indica*), which inhabits south-eastern Persia, Afghanistan, and northern Baluchistan. This rodent, which is rufous above and white below, has a length of almost $3\frac{1}{2}$ inches and a tail double as long. It dwells in great numbers on the stony plains of Afghanistan, where it burrows deep holes in the ground, and hops about with astonishing agility. Leading a nocturnal life, it hibernates from October to April. In habits it is much the same as the better-known alagdaga, or Kirghiz jerboa, of Persia, and the steppes of south-eastern Russia, the Caspian area, and central Asia. The three-toed jerboas are also represented in south-western Asia, although the best-known species, the Egyptian jerboa (*Dipus jaculus*), which inhabits northern Arabia, has its principal area in the north of Africa.

The south-western Asiatic portion of the Mediterranean region forms approximately the centre of a semicircular area extending from south-eastern Europe to lower Egypt which is the habitat of the mole-rats, as typified by the great *Spalax typhlus*. This extraordinary rodent has rudimentary ears, and the small eyes completely covered with skin. The fur is as soft as the mole's, and the hairs may be directed either forward or backward with equal ease, thereby facilitating the movements of the animal along its subterranean passages. In colour it is yellowish brown with an ashy grey hue above, and is ashy grey with white spots and streaks below. From the moles it differs widely, not only in structure, but by the circumstance that it subsists solely on vegetable food, although it resembles those animals in the form and construction of its burrows.

Although the porcupines are represented in Asia as well as in Africa, the species found in south-western Asia, whose area extends to the Caspian and Black Sea, does not appear to be satisfactorily determined. The porcupine of south-western Asia was formerly identified with the species indigenous to southern Europe and North Africa, but is really much more like the Indian porcupine (*Hystrix leucura*), of which the south-western Asiatic form is regarded merely as a local variety.

Passing on to the cat tribe, among the beasts-of-prey, it is not yet definitely known how far the European wild cat extends into south-western Asia, although it appears to be represented by a local race in the Altai. In a large portion of the area under consideration that species is, however, replaced by one of the races of the jungle-cat (*Felis chaus*), which is one of the commonest wild cats in British India. The habitat of the jungle-cat extends from Burma to the Caucasus and north-eastern Africa, while in India the species is found from the Himalaya to Cape Comorin, and from the sea-level to a height of over 7000 feet. It also inhabits Ceylon and perhaps the Andaman Islands; and although frequenting primeval forest as well as the plains, is

particularly fond of high grass and sugar-plantations, while it is often seen in the neighbourhood of villages, where it is said to pair with domesticated cats. Like the latter, it breeds twice a year, each time giving birth to three or four kittens. In length it is from 22 to 26 inches, the tail measuring only 10 or 11 inches, and the height at the shoulder is from 10 to 11 inches. Although the tips of the ears carry a few long hairs, these do not form regular tufts, like those of the true lynxes. The jungle-cat holds indeed an intermediate position between the latter and the more typical cats. In colour it is chiefly sandy brown or greyish brown, darker above and lighter below. The limbs are sometimes marked by dark cross-stripes, and towards the end of the black-tipped tail there are black rings. Occasionally a black, or melanistic, phase is met with.

Caracal.

Like the jungle-cat, the caracal (*F. caracal*) is indigenous to both Asia and Africa; and is distributed over the greater part of India, where it is most abundant in the Punjab, Sind, Kach, and the north-west generally. The caracal is a slender, long-legged lynx without whiskers, and with a tail about one-third the length of the body. It is smaller than the European lynx, the length of the head and body being between 26 and 30 inches, and the shoulder-height 16 to 18 inches. The caracal connects the true lynxes with the jungle-cat, just as it is connected through the latter with the true cats. In general colour it varies on the upper-parts between reddish grey and brownish red, the sides of the upper lip having a blackish spot, while below the colour is lighter, or even white, sometimes with indistinct reddish spots. The tail, which is of the same colour as the body, has a black tip; and the ears, which are white inside, are always black, or nearly so, externally, with a terminal pencil of long black hairs. The caracal lives amid bushes and high grass, and hunts gazelles, small deer, and hares, as well as birds, frequently capturing the latter while on the wing by leaping high in the air, and knocking them down with a blow of its paw. It is sometimes trained for the chase, and in former times was kept in great numbers by Indian princes for hunting purposes.

Lion.

The distributional area of the lion (*F. leo*) includes the whole of Africa from Cape Colony to Algeria and Abyssinia, but this area has many gaps, since in some districts the species has been exterminated, the greatest of these gaps being the one separating the African area of the lion from its Asiatic habitat. In former, even historical, times, this gap was more or less filled up, for the lion was found not only in Arabia and Syria but apparently also over a large part of south-eastern Europe, as for instance Greece and Rumania. In prehistoric times it was spread over Italy, Spain, Germany, France, and Great Britain. In all these latter countries it may have been, at least partly, destroyed by change of climate, but the lions of south-eastern Europe and south-western Asia were mostly exterminated by man. At the present day the lion is much more abundant in Africa than in Asia; sometimes it is seen south of the Euphrates, and it is still frequent in the deltas of that river and the Tigris, fresh traces of these animals having been noticed daily among the ruins during the excavations at Babylon. It also occurs on the upper course of the Tigris, and its range extends from the swampy banks of the Euphrates and Tigris to Kurdistan and the mountainous country south of Shiraz. The Mesopotamian and Indian lion respectively represent distinct races.

Tiger, Leopard. Tigers are found, as mentioned above, in the Caucasus, and also
etc. in Persia in the Caspian provinces, Mazandaran, and Ghilan, lying northwards of the Elburz range, and corresponding in part to the ancient Hyrcania, so famous in classic times for the size and numbers of these animals. The Persian tiger is a somewhat rough-haired race of the species, known as *Felis tigris virgata*. The leopard, which is absent from Sind and the Punjab, is found in many districts within the limits treated of in the present chapter, the Caucasian and Persian representative of the species forming a local race known as *F. pardus panthera*, and it may be this form which occurs in Kashmir. The Indian fishing-cat (*F. viverrina*) enters the Mediterranean region in Sind. In Rajputana a little to the north we meet the Indian desert-cat (*F. ornata*), which may thus be ranked with the animals of south-western Asia, as well as with those of India. The hunting-leopard, which belongs to a different genus, is distributed over a great part of Africa, and through Syria, Mesopotamia, Persia, and India, so that it belongs as much to south-western Asia as to Africa or India, although it is more familiar in connection with the Indian area.

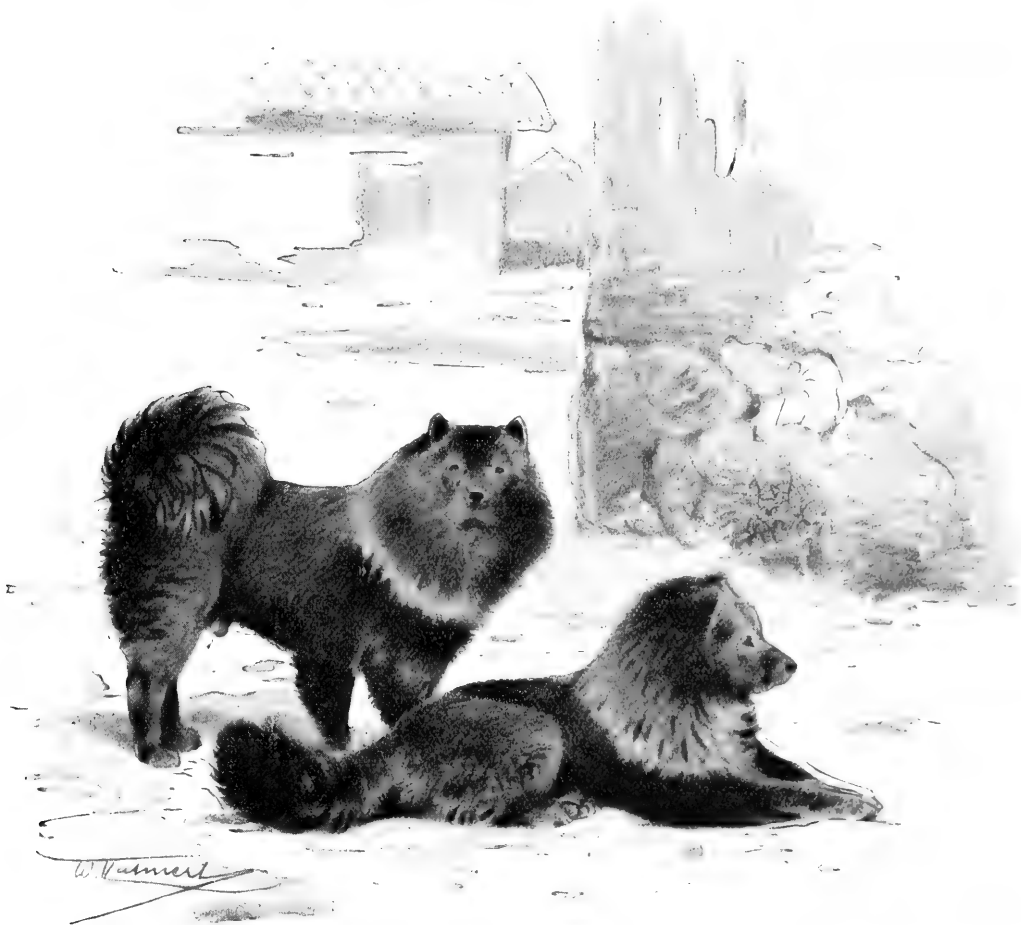
Wolves and Jackals. The European wolf is known to occur as far east as Baluchistan and western Sind, and its distribution probably extends into the northern Punjab. The south-western boundary of its range is the Indus, and as that is at the same time, generally speaking, the western boundary of the Indian wolf (*Canis pallipes*), the latter may enter the Mediterranean region in this district, as it certainly does the Ethiopian region in the south of Arabia.

The typical jackal (*C. aureus*) has full claim to be called an animal of the Mediterranean region, as it ranges from Burma to the Caucasus, and farther west through Turkey and Greece to Dalmatia. In North Africa it is replaced not only in Egypt and Abyssinia but also in the countries between the Mediterranean and the Sahara by other species (*C. anthus* and *C. lupaster*). The hairs of the tail are reddish brown, but black at the base and tip. The Asiatic jackal, whose tail measures, like that of the other species, one-third of the head and body, and whose length is from 24 to 29 inches, is yellowish, or pale rusty red mingled with black above, and paler below; the ears and the inner sides of the legs being redder than the other parts of the body, and the tip of the tail black. The variety inhabiting eastern Europe and Asia Minor resembles the Indian form, and is of a pale dirty yellow with a rusty red hue. The Egyptian jackal (*C. lupaster*) is much larger, and has shorter ears, the sides of the body being yellowish grey and the hind-legs reddish yellow. The jackal of north-western Africa (*C. anthus*) is, on the other hand, a smaller, paler, sharper-nosed, and more elegantly built animal.

The jackal lives on plains and mountains, in forests and fields, even in populous towns. It is found in the Himalaya up to a height of 4000 feet and even higher, especially in the neighbourhood of the hill-stations, and is common on the Nilgiris of southern India. It occurs solitary, in twos, or in packs, sometimes of considerable size. Mainly but not exclusively nocturnal, during the cold season jackals may be seen wandering about at all hours of the day, not unfrequently even in villages. Its food is of various kinds, and consists not only of freshly killed mammals and birds, but also of carrion, and in case of need of vegetable substances, such as sugar-cane.

Domesticated Dogs. Here a few words may be appropriately introduced with regard to domesticated dogs, some of which are derived from the wolf and the Indian wolf, while others have been considered to trace their origin from jackals. None, however, come from the fox. The number of different breeds of domesticated dogs is so large and their relationships so involved, that it is difficult to group them with accuracy.

As exceptional in their habits and environment, mention may be made of the wolf-like Eskimo breed of Arctic America and Greenland. Closely allied to



CHOWS.

this breed is the spitz, or Pomeranian, of which two strains are known, a larger and a smaller. It has a representative in the Chinese "chow," which is usually reddish brown in colour, with a bluish tongue and muzzle. While the spitz and the Eskimo betray close relationship to the wolf, many other breeds exhibit an unmistakable resemblance to the local wolves or jackals. In some breeds, on the other hand, this resemblance is very much in abeyance, as for example in the Tibet dog, which is not unlike a mastiff, but distinguished by its shaggy coat and thick under-fur, as well as by its long, bushy, curly tail. It is probably related to the St. Bernard.

Foxes.

South-western Asia is the home of several species of foxes, in addition to the European fox which also occurs within the area. One of these is the desert-fox (*Canis leucopus*), which seems to be widely spread over south-western Asia, as it occurs near Muscat in Arabia, as well as in Baluchistan, Afghanistan, Sind, Rajputana, the Punjab, and the United Provinces as far east as Fatigarh. It is almost exclusively an animal of the desert, and in India



TIBET DOG.

lives principally on gerbils. It is rarely found in the same localities as the Bengal fox, though both inhabit the desert-like country, occupying the greater part of Sind.

The hoary fox (*C. canus*) inhabits Baluchistan, southern Afghanistan, and perhaps also the east of Sind, while in Europe it is represented by a few stragglers. Principally ashy grey in colour above, and white below, it is smaller than the Asiatic desert-fox, being only 33 inches long inclusive of the tail, which measures

15 inches. From the east the little Bengal fox (*C. bengalensis*) just enters the Mediterranean region, but does not range westward of Sind and the Punjab; while from the west Rüppell's fennec (*C. famelicus*) seems to extend over south-western Asia. The latter is intermediate between the North African fennec and the true fennecs, having proportionately smaller ears than the African forms, although these appendages are larger than in other small foxes.

Bears.

Two races of the brown bear are found in south-western Asia, the one the silvery grey Syrian brown bear (*Ursus arctus syriacus*), and the other the Himalayan brown bear (*U. arctus isabellinus*), which, at least in immature animals, displays a more creamy or "isabelline" tone of colour. A very different species, the Himalayan black bear (*U. torquatus*), also enters the Mediterranean region in Kashmir and the adjacent countries.

Weasel Tribe.

Among the representatives of the weasel tribe met with in the area under consideration, the beech-marten is found in Palestine, Syria, and Asia Minor, although probably not in Persia, and only in northern Afghanistan. In Kashmir the yellow-throated Indian marten (*Mustela flavigula*) enters the region. The polecat is replaced near Kandahar and Quetta, and perhaps also in other countries bordering on south-western Asia, by the mottled polecat (*M. sarmatica*). The European ermine does not range very far south, although its habitat extends into Asia Minor, Persia, and the Himalaya. The weasel probably inhabits much the same part of the region as the ermine. The badger ranges to the Caucasus, but in southern Spain and perhaps Asia Minor is replaced by an allied species or race (*Meles mediterraneus*), while farther east the latter is succeeded by the smaller and paler Persian badger (*M. canescens*). The limits of the range of the European otter in south-western Asia are still unknown, although the species has been stated to occur in Mesopotamia and Persia. Elliot's otter (*Lutra ellioti*, or *barang*), which is common in Sind and elsewhere in the Indus country, though not farther west, extends from India into the Mediterranean region.

Mongoose.

Certain kinds of mongoose demand brief notice, the well-known Egyptian species (*Herpestes ichneumon*) being found in the European and African, as well as in the Asiatic portion of the Mediterranean region. This species (which is represented in Spain by a local race, *H. i. widdringtoni*) reaches a length of about 20 inches, with a tail-length of about 16 inches. The general colour of the fur is greyish brown, the hairs being ringed with reddish brown and pale yellow, and the tip of the tail black. This species shows the antipathy to snakes characteristic of its kindred and is immune to their venom, but whether it eats crocodile's eggs in the numbers reputed is not ascertained. The ancient Egyptians kept the ichneumon as a domesticated animal, and perhaps their modern descendants may do the same, as it is an excellent mouser. For this useful quality the ancient Egyptians considered it sacred, and represented it in various ways on their wall paintings and elsewhere.

The small Indian mongoose (*H. auropunctatus*) ranges from the east into south-western Asia, being found in the Punjab, Sind, Baluchistan, southern Afghanistan, and Persia. This mongoose, which is, moreover, indigenous to northern India from Kashmir to upper Burma, is about half the size of the

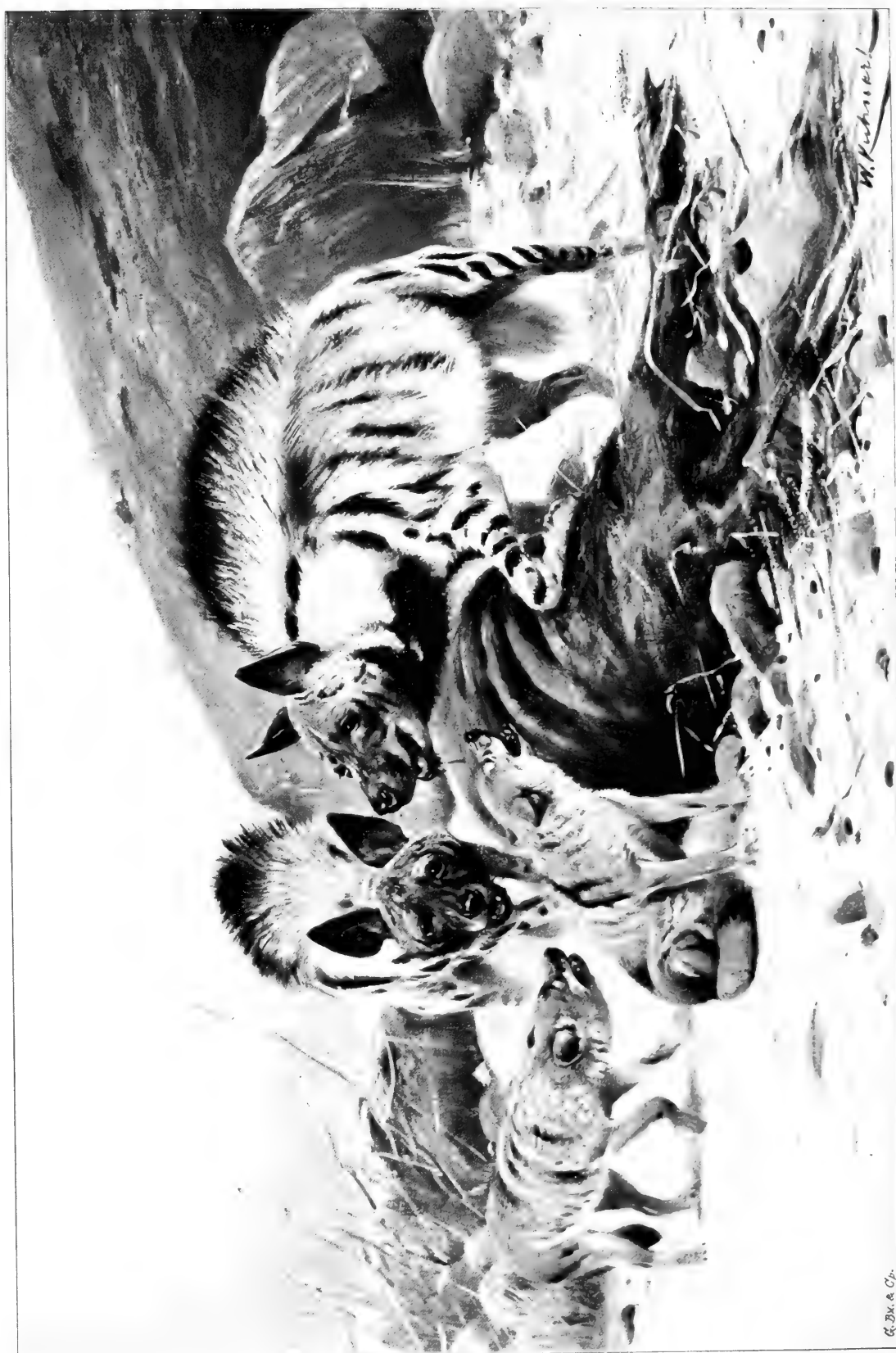
ichneumon, and in the Mediterranean region is much paler in colour than in the Indian region, where it varies from light grey to dark brown, and is sprinkled with small white or yellow dots. The common Indian mongoose (*H. mungo*) occurs in Baluchistan.

Genet. A distant relative of the mongoose, the European genet (*Genetta vulgaris*) inhabits southern France, Spain, parts of south-western Asia, and North Africa. An exceedingly supple animal with graceful movements, and a good mouser, it is domesticated in Barbary, and occasionally also in southern Europe. Like other genets it has a valuable fur. The prevailing colour is light grey, with three or four longitudinal rows of oblong blackish spots on the sides. Above and beneath the eyes and at the base of the upper jaw are white spots, and the tail is marked with white and black rings. The length of the head and body is about 19 inches, and that of the tail 16 inches.

Striped Hyæna. The hyænas, which in former times were spread over the greater part of Europe, and eastwards into China, are at the present day confined to the warmer countries of the Old World, ranging from Africa into India. Only one of the three existing species, the striped hyæna, inhabits both Africa and Asia; the other two, the spotted hyæna and the brown hyæna, being confined to Africa. The striped hyæna (*Hyæna striata*) was widely spread in early times over the greater part of Europe, although less common there than the spotted species. At the present day it is abundant in the northern and central provinces of India, but rare in lower Bengal and unknown in Ceylon. From India it ranges through Baluchistan, Persia, and Mesopotamia, to the Caucasus, as well as through Arabia, Syria, and Palestine. In Africa it inhabits Egypt, Abyssinia, and the countries north of the Sahara, while in east central Africa it is represented by the race known as *H. striata schillingsi*.

The striped hyæna, which has a total length of about 5 feet from the nose to the end of the tail, is distinguished by its large pointed ears, and the erect mane extending from the head to the base of the long-haired tail. The hind-legs are shorter and have smaller feet than the fore-limbs. In colour it is dirty grey, striped with black on the sides and legs. This species prefers open country with hills, or sandy plains, and in Syria and Palestine is often found among the tombs in the rocks. In India, where it often frequents ruins, it hides in caves or among the rocks on the slopes of ravines. Leading in the main a nocturnal life, it is sometimes seen by daylight, especially early in the morning or late in the evening. During the night it covers long distances, no tracks being more common than those of this animal, which might be mistaken for dogs' spoor, were it not for the smaller impressions of the hind-feet. Unlike the spotted species, the striped hyæna leads a solitary life, and it is seldom that more than one or two are seen at a time.

Hedgehogs. Among the insect-eating mammals the hedgehogs are represented by several species in south-western Asia, the European form inhabiting Asia Minor and Syria, while the large-eared hedgehog (*Erinaceus auritus*) ranges from the Caspian district into Mesopotamia. In Persia, Baluchistan, and near Kandahar and Quetta dwells the long-spined hedgehog (*E. macracanthus*), distinguished by the long spines on its head, some of which are as much as



SIBERIAN TIGER AND CUBS

G. B. & Co.

1½ inches in length. This species measures about 9½ inches in length, the tail being a little over an inch, and the pointed ears two inches long. The Afghan hedgehog (*E. megalotis*), which has equally long ears, is about a foot in length without the tail, which measures 1½ inches. This species is distributed over the greater part of Afghanistan, where it lives on worms, insects, lizards, and especially snails. During the day it sleeps, and from October or November to February it hibernates in deep holes in the ground. Another hedgehog of south-western Asia is Jerdon's hedgehog (*E. jerdoni*), which inhabits Sind and the Punjab, and is about 7½ inches long without its tail, which measures a little over an inch in length. The collared hedgehog (*E. collaris*), which is found in the Punjab, Sind, and other parts of north-western India, has long ears, and a length of 7 inches, exclusive of the tail, which measures about an inch. It is dark in colour with a whitish chin, and a band of white running along each side of the lower jaw up the neck. This species frequents sandy plains, where it hides beneath thorns or in long grass during the day. Its food consists mainly of insects, but it also eats lizards and snails. Stoliczka's hedgehog (*E. pictus*), which ranges from the east of the Mediterranean area into India, is a very small species, the males being only about 8 inches in length exclusive of the short tail, while the females are smaller. It inhabits north-western India, the Punjab, Sind, Kach, and Rajputana, and extends as far east as Agra. By day it hides among grass or in holes, such as those abandoned by foxes, and is said to be common in the dry parts of north-western India, but as it has been seldom observed, its habits are not well known. All the hedgehogs, it may be noted, are immune to snake-poison.

Bats.

Passing on to the bats, several noteworthy species deserve mention, among them being the Indian pipistrelle (*Pipistrellus abramus*), which is very common, and whose habits have been well observed. It is found beneath roofs, in sheds, old houses, etc., much oftener than in woods, and flies early in the evening, often in the neighbourhood of human habitations. With a body-length of 1½ inches and a tail-length of almost 1¼ inches, in colour it is dark brown above and paler brown below. Its range extends from northern Australia and, at least in summer, over central Europe as far north as Sweden. In India, where it is found up to the height of 7000 feet in the Himalaya, it is one of the most common bats. It flies quickly, but smoothly; and in its pursuit of flying insects suddenly drops in its flight and hovers for a while over the same spot.

Another species, Kuhl's bat (*P. kuhli*), is reddish or blackish brown above and more yellowish below, but is specially characterised by the yellowish white hind edge of the flying-membrane which extends from the fifth finger to the foot. The length is just over 3 inches, the tail measuring 1½ inches, and the expanse of wing 8¾ inches. Its range extends from the valleys of the southern Alps through southern Europe to northern and north-eastern Africa and south-western Asia. In southern Europe it is the commonest bat, and may be seen flying in great numbers along the streets and between the houses of towns and villages; it is also found on the rocky shores of the Mediterranean at the foot of the Maritime Alps and along the shores of the Adriatic. This bat flies with great swiftness, although not so high or in such bold curves as its two northern relatives. Neither does it range

so high up the mountains, never being found higher than 1000 feet on the southern slopes of the Alps.

The desert-bat (*Myotis desertorum*), which inhabits Persia, Baluchistan, Afghanistan, and probably other parts of south-western Asia, assimilates in colour to the desert-sand. Another bat of this area is the widely distributed *Miniopterus schreibersi*, which ranges from southern Europe through Asia, Africa, and Madagascar, to Australia. Its powerful flight and the graceful movement of its wings make it almost the equal of the swallow in speed. In length it is $2\frac{1}{4}$ inches, the tail measuring about the same; in southern Europe and northern Africa it is grey, in India generally dark brown.

The remarkable long-tailed bat (*Rhinopoma microphyllum*) is of almost equally wide distribution, ranging from Egypt to Burma. It is at once distinguished from all other bats by its extremely long, thin, whip-like free tail. In length the body measures only 3 inches, but the tail is nearly $2\frac{1}{2}$ inches long. In colour it is sombre greyish blue both above and below. It may be added that a few species of monkeys inhabit Kashmir, but as these are obviously outlying Oriental forms, and not distinctive Mediterranean types, they need not be further referred to in this place.

**Bulbul and
Chats.**

The birds of south-western Asia include a great number of central European types mingled with others unknown in the former area. The nightingale, for instance, is found in Asia Minor, but in Persia and Turkestan is replaced by the bulbul or Persian nightingale (*Daulias hafizi*, or *golzii*), which is of rather larger size, with a longer and more rounded tail and a paler colour. In the neighbourhood of the Caspian the nightingale lives mostly amid dense brambles. Another European species, the black redstart, occurs in Asia Minor; and the stonechat of central and southern Europe ranges through the corresponding latitudes of Asia as far as Japan, while the whinchat is met with as far south as Persia. The wheatear, again, is represented in south-western Asia and north-eastern Africa by the eastern black-throated wheatear (*Saxicola melanoleuca*), which breeds in Greece, southern Russia, and Asia Minor, and on migration visits the Nile valley and the regions as far south as Zanzibar. Like all the wheatears, it is a brisk, restless bird, which feeds on beetles, grubs, caterpillars, and other flying and creeping insects. In habits it resembles the other members of the group, but dwells on low mountains among barren rocks or on sandy shores, often appearing near human dwellings and making its nest in walls and stone-heaps. In length it is over $5\frac{1}{2}$ inches. The males are black on the side of the face and the throat, and on the scapulars and wing-coverts, and pale rusty red mingled with white on the upper part of the head and back.

Dipper.

The dippers have a representative in this area which differs from the European form in certain details of coloration. The white-necked dipper (*Cinclus albicollis*), as it is called, is indigenous to Asia Minor, North Africa, and southern Europe. Although very like the common species, it is paler and greyer in colour.

Rock-Thrush.

The rock-thrush of this region is the blue species (*Monticola cyanus*), which inhabits the shores of the Mediterranean from Spain to Greece and is further distributed through Asia Minor, Persia, and central Asia,

as far as the eastern coast of China. This species frequents quiet isolated rocky districts, and is a real bird of the rocks, never perching on trees, and when disturbed flying to the highest spot attainable. It avoids the society of other species, and is generally seen only in company with its mate, searching every crevice and turning over every stone for its food, which consists of insects, spiders, centipedes, and berries, especially currants. It is a favourite cage-bird, and has a fine rich song, consisting of a few loud notes, with rather unmusical interludes. During nesting-time the male keeps close to the nest, and often performs his graceful "love" flight, fluttering slowly up into the air, and coming down in regular curves. In colour the cock is slaty blue, with blue edges round his wing and tail feathers, the female being mainly brown. The thrushes are less well represented in the Mediterranean area, but, like the blue rock-thrush, the European blackbird breeds in Asia Minor.

Warblers.

Among the warblers, the blackcap breeds in Asia Minor, as does also the whitethroat; and the Orphean warbler (*Sylvia orpheus*) has its principal habitat in the Mediterranean countries. In the west it is reported as a straggler into England, and has been met with in Belgium and more frequently in Luxemburg; eastwards its range extends through Asia Minor as far as Turkestan. Although perching more in the tops of trees than in the brush-wood below, this bird nests in the latter. In Spain it is found in pines of 50 feet in height, as well as in clumps of fig, olive, and carob trees. In Algeria and Tunis, where it is very common, it seems to prefer mountain woods to plantations and gardens in the plain. In August and September it migrates to central Africa and India, and in the beginning of April returns to its breeding-area. Its song is loud, clear, and melodious, including a succession of resounding notes, which the bird, perched on an olive bough, with puffed-out throat, is never weary of repeating, the melody being continued even while the songster is fluttering to the ground with expanded tail and quivering wings. In olive plantations, where the trees are planted at wide intervals, the bird is very wary, but in the dense tops of fig-trees and carobs it may be watched without difficulty. Like the others, this warbler feeds on insects and fruit. It is distinguished by the black crown and sides of the face, and the brown and white tail. In size it is about the same as the barred warbler.

Among other members of the group occurring in south-western Asia are Bonelli's warbler (*Sylvia bonellii*) and the olivaceous warbler (*Hypolais pallida*), which is common to south-western Asia, northern Africa, and southern Europe. The latter resembles the garden warbler, but is much smaller, and distinguished by having the first primary longer than the coverts. The olive-tree warbler (*H. olivetorum*), inhabiting Asia Minor and Syria, is somewhat larger and darker, and brownish grey instead of olive-brown above. The grasshopper-warblers are represented by Savi's warbler (*Locustella luscinioides*), a species ranging as far north as Great Britain, and eastwards into southern Russia and western Asia. Resembling its relatives in habits and haunts, it generally frequents river-banks covered with dense shrubs, but for its nesting-place chooses a more open spot, where reeds are interspersed with other marsh-plants. Its song resembles that of the grasshopper-warbler, but is sweeter and more musical, although so

monotonous that the bird is known in the fen-districts as the reel-bird. In length it is about 5 inches; in colour reddish brown above, and white on the throat, the under tail-coverts being pale chestnut. The sedge-warblers are represented in this area by the moustached sedge-warbler (*Luscinola melanopogon*), which inhabits Asia Minor, northern Africa, and southern Europe, where it dwells among swamps covered with reeds, here and there varied with low bushes. By no means shy, it will continue hunting for insects when its haunts are approached. It may be easily distinguished from the reed-warblers by its peculiar habit of spreading the tail aloft and shrugging its wings. Of the size of the common reed-warbler, it has a dark, rusty brown back due to the feathers having dark centres. The head is nearly black, the first primary broad and long, and there is a distinct greyish white eye-stripe.

Cetti's warbler (*Bradypterus cettii*) is one of the best songsters of the Mediterranean area, in some parts of which it remains the whole year round, singing every month. Living in impenetrable thickets, this warbler makes a nest near the water, in which it lays bright red, unspotted eggs. In length it is $5\frac{1}{2}$ inches. The plumage is a rich russet-brown above, and white on the throat and breast. The tail-feathers are ten in number.

Wrens and Tits. Both the wren and the goldcrest occur in south-western Asia, while still more common is the fan-tailed *Cisticola cuspitatus*, which is light brown with darker streaks above and white shading into brownish below, the general appearance being that of a small reed-warbler with a curved beak and fan-shaped tail.

The coal-tit ranges as far west as Japan, the blue tit into Persia, while the sombre tit (*Parus lugubris*) of the south of Europe occurs in Asia Minor and Palestine. The last-named species somewhat resembles the marsh-tit, which it exceeds in size by about an inch, and is further distinguished by the black chin and throat, the browner crown, and the white edges to the wings and tail. A shy, unsociable species, inhabiting mountain valleys with wild fruit-trees, it appears on its breeding-grounds at the end of April, to leave again for the south at the beginning of September. The bearded tit (*Panurus biarmicus*), distinguished by its curved beak and the length of the tail, in which the feathers are graduated, also enters the Mediterranean region. The favourite haunts of this bird (the sole representative of its kind) are reed-beds, especially near the sea. Not infrequently it is found in small patches of reeds, and when these die down it betakes itself to dense willow bushes, and occasionally trees. The nest, always well hidden, is placed on the ground in a bunch of reeds, and is made of grass and flags lined with reed-flowers. The bearded tit still breeds in the vast reed-thickets of Friesland and south Holland, but has become somewhat rare in England. It is more frequent in southern France, especially in the Rhone delta, and it has been observed in Spain. Very rarely it is found in Germany, as, for instance, in Oldenburg, on the Moselle, Münster, and Mecklenburg. Its chief habitat includes south-eastern Europe, Asia Minor, and western Asia as far as the Saisan Lake at the foot of the Altai. It is a lively bird with a soft, twittering song, incessantly busy in climbing up and down the waving reeds, and feeding on snails and aquatic and other insects, especially aphides. In autumn and winter it collects in flocks to feed on the seeds

of the reed. In length it measures about $6\frac{1}{2}$ inches. In colour the crown is grey, the long moustache black, the back orange-tawny, the tail, which is over 3 inches long, fawn-coloured, the wings striped with reddish brown, buffish white and black, and a good deal of black on the coverts. Beneath it is mostly rosy grey, and the feet are black and the bill yellow.

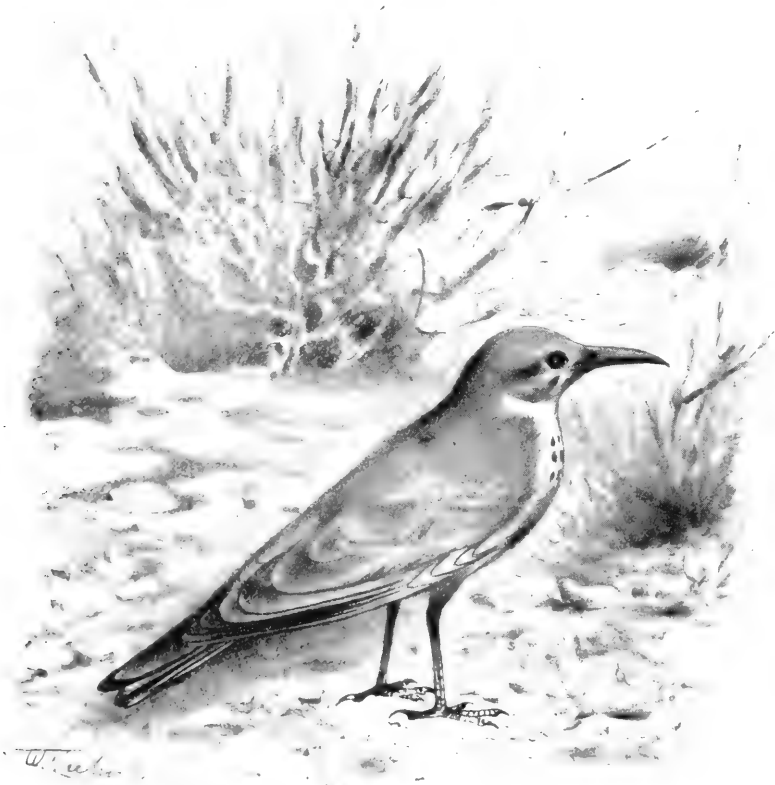


BEARDED TIT.

Nuthatches. Two species of nuthatch, the European and the rock, or Syrian (*Sitta neumayeri*), occur in the Mediterranean area, the latter inhabiting Greece, Asia Minor, and Syria, and ranging as far as Afghanistan, while it also occurs in Bosnia and Dalmatia. From the common nuthatch it differs widely in habits, living almost exclusively on rocks or old walls, in the crevices of which is placed the carefully constructed nest. The bird itself, which measures about $5\frac{1}{2}$ inches in length, is somewhat smaller and rather browner above than the

common species, the lower-parts being whitish, with the exception of the russet feathers on the flanks, abdomen, and under tail-coverts.

The European skylark is replaced in south-western Asia by the **Larks.** short-toed lark (*Calandrella brachydactyla*), which, like its eggs, is of a pale sandy colour, in harmony with the barren plains on which it dwells. In its mode of flight, and especially in singing as it hovers over one particular spot, this species resembles the skylark, its rich full notes being also like those of that bird, although softer. Its habit of collecting in large flocks at certain times



DESERT LARK.

of the year is likewise similar. In addition to southern Europe, this bird inhabits northern Africa, south-western and north-western Asia, especially the districts round the Caspian Sea. According to the climate of the countries it inhabits, it is resident or migratory. Now and then it appears in the British Isles, Germany, and the northern countries of Europe as a straggler, its breeding-area extending from the south of France to Turkestan.

The calandra lark (*Melanocorypha calandra*) is another member of the group, distributed over southern Europe from Spain to Greece, through Asia Minor and the countries round the Caspian as far east as Turkestan, and also inhabiting

northern Africa from Morocco to Egypt and Nubia. Frequenting cornfields and meadows, steppes and deserts, it leads a life similar to that of the skylark, which it resembles in all its habits, including that of nesting on the ground. In winter it associates in immense flocks with larks of other species. An excellent songster, it trills its melody with the addition of many passages from the songs of other birds, so that its chant is full of variety. It is especially vocal at pairing-time when the male soars to such a height that his presence is betrayed only by his melody. This lark, which is 7 inches in length, has a large thick beak, a short tail, and resembles the European skylark in colour and markings, except that the coverts are bright rufous and form a shoulder-patch.

The crested lark ranges from Europe into and beyond south-western Asia, whereas the area of the woodlark does not extend farther east than Asia Minor. The desert-larks are distinguished by their broad flat crest, quite unlike the pointed one of the crested larks, and the long thin beak. One of these (*Alaemon desertorum*), an unmistakable bird of the desert, in its sandy grey colouring, inhabits the whole of the desert-zone extending from north-western Africa to the west of British India, although nowhere very common, being distributed in solitary pairs, each of which claims a territory of its own. The song is short and simple; the nest is made on the sand, and the eggs are greyish with sandy markings.

Wagtails and Pipits. Of the wagtails, the white species is rarer in south-western Asia and the south generally than its common European relative, the grey wagtail, which ranges from central and southern Europe and northern Africa through the corresponding latitudes of Asia to the Far East. The yellow wagtails, in various forms, have a similarly extensive range. The pipits are represented within the present area by the water pipit and the tawny pipit, the former inhabiting the mountains and the latter the plains.

Buntings. Several European buntings are found in south-western Asia and other parts of the Mediterranean area, as, for instance, the corn bunting, the ortolan, the ciril bunting, the meadow bunting, and the reed bunting. Another species inhabiting south-western Asia is the black-headed bunting (*Emberiza melanocephala*), which does not breed in Europe, though it straggles as far west as the British Isles. It inhabits south-eastern Europe and south-western Asia, and ranges from the shores of the Adriatic and the lower slopes of the Caucasus to India, migrating east and west instead of south and north. In India it appears from November to March in large numbers, doing great damage to the fields, and in Asia Minor and Turkey arrives at the end of April in one flock, so that places near the seashore, where not a single bunting was seen the day before, suddenly resound with its song. It nests by preference in sage-bushes and the Christ's thorn (*Paliurus aculeatus*) or on the ground, and feeds on insects and seeds. In length it measures 7 inches, and in colour is light bay with no streaks on the sides, but the conspicuous black cap from which it takes its name. The rusty Cretzschmar's bunting (*E. caesia*) dwells in the desert parts of south-eastern Europe and south-western Asia, where it frequents barren rocky hills and nests among shrubs and isolated rocks. This bird is rather smaller and somewhat more brightly coloured than the ortolan, with a grey head, neck, and chest-band, and a rich chestnut throat and breast.

Finches. Among the finches we find the citril finch in Asia Minor and northern Africa, while the goldfinch is an inhabitant of south-western Asia from Smyrna to Persia. The greenfinch is also to be found in this region, and the chaffinch, which is rare in Persia, is a common bird in Asia Minor, as is also the bullfinch, while the rock-sparrow and the tree-sparrow range as far as Afghanistan. The common house-sparrow is replaced in Asia Minor, although not in northern Africa, by the Italian house-sparrow.

Starlings. Starlings are represented in Palestine, southern Europe, and north-west Africa by the Sardinian species (*Sturnus unicolor*), a near relative of the European starling, but distinguished by the shorter body and the unspotted black plumage, which is of a violet hue on the wings. This starling is found in the Ukraine, Caucasasia, and a great part of south-western Asia, ranging as far as Kashmir.

Crow Tribe. Of the crow tribe, the rook ranges into Syria and Persia. From the north, the hooded crow enters this region, but not the carrion crow. In Persia and Mesopotamia the hooded crow is represented by an allied species in which the markings are white instead of grey. The jackdaw and magpie are also present, but the jay is replaced in Asia Minor by the black-headed jay (*Garrulus krynicki*) and in Syria by the Syrian jay (*G. syriacus*). The chough occurs in Persia where the mountains are sufficiently high, and the Alpine chough ranges from the Lebanon to the Himalaya and Altai.

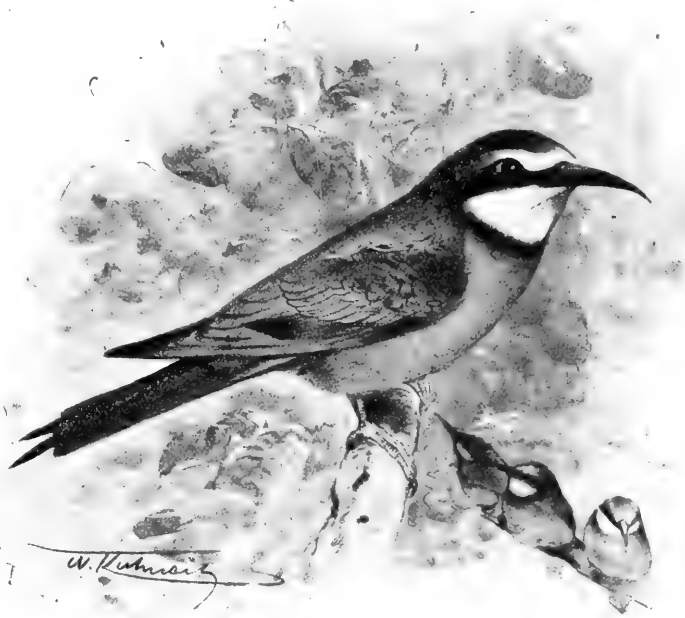
Shrikes and Flycatchers. Another European bird found in Asia Minor and Persia is the lesser grey shrike, which is, however, rare. The commonest shrike is the woodchat, but the red-backed shrike also breeds within the region. The four European flycatchers already described are also frequent in south-western Asia.

Swallows and Martins. The swallows are represented by the European species, as well as by the red-rumped swallow (*Hirundo rufula*) which ranges from southern Europe to Turkestan. Although very like the ordinary swallow, it has a streaked abdomen, the back marked with white, the neck and lower part of the back variegated with chestnut, and a chestnut eye-stripe. It lives by preference among rocks near the sea or large inland waters, and makes beneath projecting ledges a rounded nest of mud and clay, furnished with an entrance tube sometimes as much as 5 inches in length.

The European martin and sand-martin inhabit the latitudes of Asia corresponding with those of their habitat in Europe. Another species, the crag-martin (*Cotile rupestris*), is indigenous to the south of Europe and thence distributed through Asia as far as China. Nesting in the towers and ruins of mountain castles or among high rocks and steep cliffs on the seashore, only in cool mornings and wet foggy weather does it come down from the heights. On such occasions it will associate with other swallows, to return so soon as possible to its mountain home. Here it builds a nest of clay and earth sheltered by a projecting rock. In size it is slightly larger than the sand-martin; the back is light grey, the throat white, the chin mottled with brown, and the lower-parts light rusty greyish brown, the outer tail feathers having a white blotch in the middle of the outer web.

Bee-Eater and Other Picarians. The swifts are represented in south-western Asia by the Alpine swift; and in like manner the nightjar inhabits the latitudes of Asia corresponding to those of its European habitat. The blue roller, whose area extends

from central and southern Europe into western Asia, avoids the magpie everywhere, and never nests in the same localities as that bird. The hoopoe ranges from Europe and North Africa all through Asia to the Pacific. The kingfisher, although not met with quite so far east, inhabits the same latitudes in western Asia as in Europe. The bee-eater (*Merops apiaster*) principally inhabits the countries around the Mediterranean and Black Sea. Like the other members of its kind, this beautiful bird is distinguishable at a glance by the two long feathers in the middle of the tail, which end in sharp points. Generally speaking, this bee-eater lives on the steep banks of rivers, or by the sea, and from there visits sandy plains and flowery meadows, grassy mountains, and the skirts of forests. In flight it is exceedingly graceful, executing the boldest curves, serenely moving in the upper air, or fluttering close above the ground, catching insects as it flies. Like the swallows, it does not walk with ease, and when on the ground moves about with short tripping steps. It perches on hillocks, stones, or bare branches; and resembles the swallows in being gregarious, especially during the breeding-season, where it may be seen in thousands. The nests and sleeping-places are a labyrinth of burrows, excavated close together in sandy or soft



BEE-EATERS.

ground by the beak and claws. The colonies are generally found in river banks and occasionally on flat stretches of sand a yard or two underground. The bee-eater feeds on wasps, bees, hornets, and other hymenopterous insects, and takes up its position near a wasp-nest or bee-hive to catch the owners as they fly in or out.

The bee-eater is a bird of passage, which arrives on its nesting-grounds in April and leaves in August. In Greece it arrives earlier and remains longer. Sometimes it extends its migrations beyond the northern boundaries of its area, and then appears in Britain, Germany, Denmark, Sweden, Finland, and elsewhere: Its principal breeding-grounds are, however, in the Mediterranean countries, and round the Black Sea; but the species ranges from Spain and southern France, through Turkey, Asia Minor, and Persia to Turkestan and Kashmir. During migration the bee-eater is found throughout northern Africa, and even makes its

way to Cape Colony. This beautiful bird is about 10 inches long; the head and mantle are chestnut, the back creamy buff, the lower part of the back being marked with blue, while the tail-feathers are green with blue edges; the bright yellow throat has a black edge, and the rest of the under-parts are light greenish blue.

Cuckoos. The crested cuckoos, which are about the size of the common species, are distinguished by the slender body, the thin but fairly strong beak, and the pointed crest. Most of the species are African, but one inhabits the south of Europe and south-western Asia, and two others are Indian. The great spotted cuckoo (*Coccyzus glandarius*) is the Mediterranean species, which is found in Africa as far south as the Congo, and has straggled as far north as England and Germany. It is an active bird, less wary than the ordinary cuckoo, and feeds entirely on insects. Its haunts are in forests and gardens abounding in trees, particularly mimosa-forests; and it deposits its eggs chiefly in the nests of rooks and other members of the crow tribe. In length it is about 16 inches; and in colour it is ashy brown above spotted with white, and creamy white below with a buff hue on the chest, the crown and crest being dark grey.

Owls. So far as the central European birds-of-prey are not exclusively inhabitants of the north, they are probably all found in suitable districts of the Mediterranean countries. Among the nocturnal kinds, the barn, the little, and the tawny owl range into Asia Minor, Syria, and Palestine, while the scops-eared owl is a typical bird of the Mediterranean countries.

Falcons. Among the falcons, the noble and widely spread peregrine is found in the Mediterranean, as in other districts, in the mountains, while the lanner (*Fulco feldeggii*) prefers the plains. The latter species nests in oaks and other tall forest-trees near rivers, or on the ledges of steep cliffs. It inhabits southern Europe and northern Africa and the corresponding latitudes of central Asia as far east as China. Its European breeding-area comprises Spain, Bohemia, lower Austria, Hungary, Bosnia, Galicia, Poland, southern Russia, Bulgaria, and, although rarely, Greece; while it builds frequently in Asia Minor. It is also found in forests near Vienna and all down the Danube as far as the Dobrudscha, where it generally uses the abandoned nests of other birds-of-prey. In winter the lanner resorts to warmer climates, for instance Egypt, where it arrives with other birds on the lagoons and swamps of the Nile Delta, but soon settles down to a hunting-tract of its own in places where it has a good view of the surrounding country. While the morning mist still hangs above the lagoons, and the geese, ducks, and other water birds fill their shores with a deafening noise, the lanner suddenly dashes down and seizes—amid the momentary silence caused by its appearance—a victim from the midst of the flock, which it carries off to the nearest elevated spot. When young, this falcon resembles the peregrine, but later may be easily distinguished by its superior size, more pointed wings, and the buff bars on the tail. In flight it is swifter than the peregrine, and works its wings more vigorously, while when at rest it crosses them over the narrow tail and holds the body erect. The kestrel ranges from southern Europe and North Africa into India, while the lesser kestrel (*F. cenchris*) breeds in southern Europe, the Grecian Archipelago, Asia Minor, Persia, Turkestan, and farther east, as well as in

northern Africa. Its European range comprises Spain, southern Italy, Greece, the Dobrudscha, and southern Russia. It breeds as far north as Styria and occasionally appears as a straggler in the British Isles. In August and September it migrates to South Africa, whence it returns in March and April to its breeding-grounds. Although it may sometimes eat lizards, mice, and small birds, its principal food appears to be the larger insects, especially locusts, and on this account it is protected in Turkey and Russia. In size the lesser kestrel measures about 12 inches. The head and tail are grey, the chestnut of the back is not spotted, the claws are white, and the feet, lores, and eyelids yellow. The beak is deeply notched.

Eagles. With respect to the eagles, the golden eagle is a breeding bird over the greater part of Asia. Bonelli's hawk-eagle (*Nisaetus fasciatus*) inhabits southern Europe, north-western Africa, and Asia as far east as Madras. Though occasionally building on river-banks, it nests chiefly on rocky cliffs, which form its usual resorts. From these it descends to the plains to seek its prey; and, although a somewhat roving species, never migrates. An active, powerful bird, quicker in flight than other eagles, it may be distinguished from them by its slender form, long tail, and the buff colour of the under-parts, as well as by carrying its body more horizontally and inclining it more forward. It is of fearless appearance, and as courageous as it looks. In India it is known as the peacock-killer, and will not only kill pea-fowl and birds of that size, but even attack the golden eagle and deprive it of its prey. In length it measures about 26 inches. The feathers of the head and back are mostly white at their bases, the white increasing as the bird grows older, so that it becomes predominant in old age. The buff under-parts are narrowly streaked with dark brown, the cere and feet are yellow, and the toes and claws noticeably large. Another member of the same group, the booted hawk-eagle (*N. pennatus*) is mostly found in the forest-regions of the south of Europe, ranging thence eastwards to India and Ceylon. Nesting as a rule in small colonies, where the forest offers a wide view, it uses by preference the abandoned nests of other birds-of-prey; but when it builds a nest this is large, bulky, and finished with green branches. The booted eagle is exceedingly courageous during the brooding-period, which lasts for four weeks, and until the young are fully fledged. In habits the male differs from other birds-of-prey by its dove-like gentleness, and also by the way in which it returns to its mate, perching close by on a branch, and then walking slowly towards the nest with drooping head and puffed-up crop, like a pigeon, uttering all the while a sonorous "kei kei." When hunting for prey in the forest with the same skill as a hawk, this eagle hovers rather nearer the ground, capturing as it goes starlings and pigeons, but more especially lizards and frogs. When loaded with its prey, it is often attacked by kites, to which it occasionally yields its booty. Unlike its kindred, this eagle has a sort of song, consisting of alternating notes, comparable more to the voice of a singing bird than to the shrill scream of a bird-of-prey. It is only 24 inches long, not quite so large as a buzzard, but in shape is a small replica of the golden eagle. A white patch on the shoulder is its most characteristic mark, other features being the pointed feathers on the neck, the bluntness and roundness of the other feathers, and the fact that the tail is completely covered by the wings when at rest.

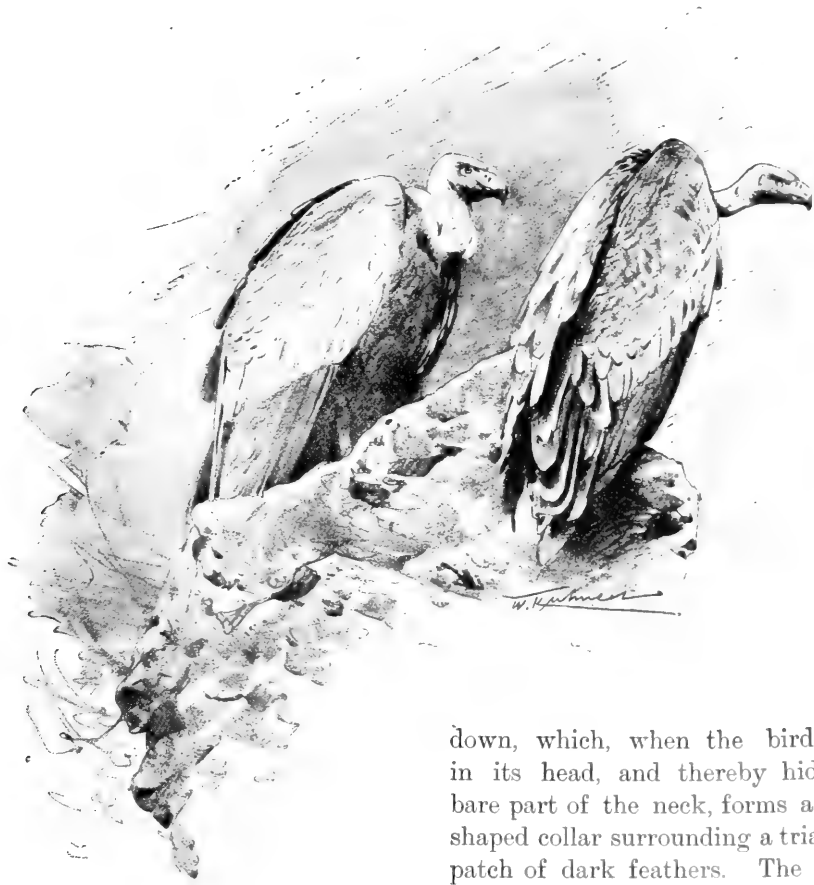
Buzzards, Kites, As regards the buzzards, the European species is met with
 etc. in remote parts of Asia Minor, but in northern Africa, south-eastern Europe, and the corresponding latitudes of Asia is replaced by the African buzzard (*Buteo desertorum*), distinguished by its inferior size and the rusty hue of the tail and flanks. A relative of the buzzards, the serpent-eagle, a species indigenous to southern rather than to central Europe, is widely spread through south-western Asia as far as India. Possibly the sea-eagle nests in some parts of the area, but the osprey, although not fond of warm countries, occurs more frequently. The black-winged kite (*Elanus cæruleus*) ranges across to India, and is also met with in Africa and eastern Europe. Its prey consists of insects and small mammals, especially mice. The nest is often found on lemon or orange trees, especially in Egypt, where the bird is very tame, as it is never harmed. This kite is recognisable at a distance by its colour, which is not unlike that of a gull, being ashy grey above and white below. When hovering, it raises the tips of its wings above the body. Its total length is about 13 inches.

The black kite may be regarded as a bird of the Mediterranean countries; and the same may be said of the sparrow-hawk, which breeds in Asia Minor and Persia, as do the goshawk, the marsh-harrier, the hen-harrier, and Montagu's harrier. The pale harrier (*Circus swainsoni*), on the other hand, which inhabits the south of Europe, especially southern Russia, Turkey, Greece, and the countries of the lower Danube, ranges in Asia as far as India, and is found over the greater part of Africa. Never perching on trees, it spends the night on the ground in high grass or corn. The nest, which is made of grass, flags, and other plants twisted together in a slovenly way, is either placed on the ground before the reeds, grass, or corn are high enough to hide it, or in low bushes. In habits this shy and cautious bird is very like the hen-harrier, quartering the ground at a small height above it in search of prey, and often betraying the nest by indulging in eccentric performances around and above. It is paler above than the hen-harrier, the white upper tail-coverts are barred with grey, and there is no notch on the web of the fifth primary feather.

Vultures.

Passing on to the vultures, the black or cinereous species (*Vultur monachus*) nests on old oaks, beeches, or limes in the depths of the forest; and always where approach is easy from above. A favourite situation, for instance, is on the top of some dead tree which by its bare branches offers a convenient perching place. The nest, which is used for many years, and may sometimes be placed in crevices and on rocky ledges, is always large enough to completely hide the sitting bird from below. It consists of a foundation of stout sticks, with a superstructure of thinner twigs, and as a rule contains but one egg. The young vulture, which is nursed with the greatest care by the parents, is not able to seek its own food till three months old. The black vulture has an easy, sweeping flight, and often rises completely out of sight in the air. Subsisting partly on living animals, as, for instance, kids, dormice, lizards, and tortoises, this vulture feeds chiefly on decaying carcasses, especially those of mammals, the bones of which it gnaws with the sharp notch in its beak, severing the flesh even when hard and dried, and sometimes devouring so much that it is scarcely able to move. Its range extends from the Mediterranean to China, but in northern Africa it inhabits

only the Atlas countries and a part of the western coast, and very rarely appears in Egypt. In Europe it is common in the plains of the Danube down to the Dobrudscha, as well as in Bulgaria, Rumania, Servia, Bosnia, southern Hungary, and Croatia. Farther north it never breeds, although common in Asia Minor and the southern slope of the Ural. It travels enormous distances in search of prey, and on such excursions has occasionally been seen in Holstein. It is 42 inches long, and blackish in colour on the head and neck. On each shoulder it carries a movable tuft of feathers; while the lower part of the neck is covered with



GRIFFON VULTURES.

down, which, when the bird draws in its head, and thereby hides the bare part of the neck, forms a heart-shaped collar surrounding a triangular patch of dark feathers. The rest of the plumage is black with brownish reflections. The very different griffon

vultures, which are about the size of turkeys, are distinguished by their almost erect carriage, the strong beak, which in the middle is as high as half its length, and the somewhat slender head and neck. The legs, which are shorter than the middle toe, are feathered on the upper part, and the neck and head are covered with down. The true griffon vulture (*Gyps fulvus*) is a bird of the rocks, frequenting either mountains, or, more commonly, the plains or sea-cliffs. In the pairing-season this vulture heaps up dry twigs and plants to form a loose nest in a cavity in some steep, inaccessible position, in which is laid some time after the

middle of February the solitary dull greenish white egg, occasionally blotched with brown at one end. In a favourite situation there may be several nests from 100 to 200 feet apart. Sometimes they are in caves, but only in the absence of rocks are they placed on trees. The griffon vulture feeds on carcases, which it discovers from a considerable height, and on which it descends in spirals. Scarcely has one vulture settled on a carcase, when several others, attracted probably by the downward flight of the discoverer, arrive on the spot. Vultures generally alight some little distance from their prey, and then run up in long strides with neck thrust straight out, tail raised and spread, and wings drooping.

The flight of the griffon vulture is easy and falcon-like, in fact, rather hovering than flying, being often continued for some time without any movement of the wings, and yet without diminution of speed. When descending on its prey, a vulture sometimes utters a twittering note, and on alighting croaks hoarsely. Although apparently awkward, these birds move on the ground with great activity; and when lamed can run so quickly as often to be overtaken only with difficulty.

The griffon is the most common of the European vultures, its breeding-area extending from the Mediterranean to Turkestan. It is abundant in Spain, Sardinia, Sicily, south-eastern Europe, Asia Minor, and northern Africa down to Abyssinia, but rare in Italy. In the north of Greece and Turkey it is found breeding, as it is in the Dobrudscha, Bulgaria, Rumania, Bosnia, southern Hungary, Carinthia, and Carniola; but it also ranges much farther north, a straggler having been observed on one occasion in the south of Ireland. In length it measures about 44 inches. The head and a ruff of feathers round the neck are white, the bare skin of the head and neck being leaden. With the exception of a tuft of narrow pointed white feathers at the base of the neck, and the black wings, the plumage is pale reddish and greyish brown.

Scavenger-Vulture. The scavenger-vultures are smaller birds, not much larger than a pheasant, which carry their bodies almost horizontally. They have a slender beak, unfeathered legs, and a bare face and throat, although the hind part of the head is covered with either feathers or down. The common Egyptian species (*Neophron perenopterus*), which inhabits Africa right down to Cape Colony, ranges from Arabia and Syria to central Asia and India, and from Constantinople to Spain and the Canaries. Stragglers wander still farther, and have occasionally reached Britain. The species is rare in Italy and the Danubian countries, but sometimes travels from northern Italy to Switzerland, where it has been found breeding near the Lake of Geneva. In Europe the scavenger-vulture is probably most common in the south of the Balkan Peninsula. Numbers of these birds frequent the Turkish quarter of Constantinople, where they are appreciated and protected, as being of use in clearing up the garbage. They are also well treated in Egypt, where they have been highly appreciated for many centuries. They are excellent street scavengers, feeding upon all kinds of filth; but they will also kill and eat lizards, mice, rats, and other creeping animals. After they have eaten their fill they sit in dreamy silence in the same place until they get hungry again, when they seek their food in company. Large parties of scavenger-vultures are often seen performing complicated evolutions in the air apparently by way of

exercise, but when on a long journey they fly straight ahead, giving a few beats of their wings at a time and then gliding on quietly for a long distance, looking somewhat like storks. In walking they resemble a rook. The Egyptian vulture is generally very tame, but when persecuted soon becomes wary. In certain localities it builds in inaccessible spots, as on narrow ledges of rocks, or in caves; and there are generally several nests near together. In Constantinople it nests on the mosques, in India on almost any building, and in Egypt sometimes on the pyramids. The nest is seldom placed on trees, although in Constantinople it has been seen in cypresses. This vulture does not even use trees for perching, avoiding forests in favour of mountains or rocky ravines and cliffs, and preferring barren country to cultivated ground. At times it visits the seashore, and often follows caravans through the desert for the sake of the carcasses and other waste. The scavenger-vulture has a length of from 26 to 27 inches. The bare parts of the head and neck are yellowish. In young birds the body is dark brown in colour, but later on becomes white, with black wings, the primaries being whitish at the base.

Quail and Partridges. Among the game-birds of south-western Asia are included the quail and the partridge, the latter of which is a breeding bird in Asia Minor. The chukar partridge (*Caccabis chukar*), distinguished by its white lores, is met with all through Asia from Asia Minor to China; while Arabia and the African shore of the Red Sea form the home of the black-headed partridge (*C. melanocephala*), which has a black crown and grey outer tail-feathers. The sisi partridges are smaller birds, not quite the size of quails, without spurs on the legs, and with twelve feathers in the tail. Among these, Bonham's sisi (*Ammoperdix bonhami*) ranges from Arabia and Mesopotamia into north-western India. It inhabits the hills up to the height of 7000 feet; and its colour resembles that of the ground to such a degree that the bird has only to keep quiet to remain undiscovered. The cocks have a band across the forehead continuous with a black eye-stripe, a whitish chin, a grey throat, and the flanks chestnut barred with black; the hens lacking the black and white markings on the head and the longitudinal barring on the flanks. In another species, Hey's sisi (*A. heyi*), which inhabits both shores of the Red Sea and Palestine, and is rather larger than a quail, the hens are very similar in colour to those of the preceding species, but the cocks are much paler, with a chestnut chin, and no black on the forehead or above the eyes.

Francolins. Although very partridge-like in appearance, francolins are more slender in build, with a thinner neck and longer beak. The throat and region round the eyes are often bare, and the legs of the cocks are generally armed with spurs. The typical species (*Francolinus vulgaris*), generally known as the black partridge in India, was formerly common in Sicily, where, however, it now appears to have been exterminated. It is rare in northern Africa, but from Cyprus it is met with more or less abundantly through Syria, Asia Minor, Caucasia, and Persia, to northern India. Its favourite haunts are swampy plains near rivers, where it hides among reeds or long grass, although it also occurs on cultivated land. The neighbourhood of water is indispensable to its existence. Hidden in bushes and high grass, francolins wander about silently and alone in the daytime, now

and then uttering their somewhat subdued call, which Mohammedans regard as a prayer. During pairing-time the cry is heard much oftener. Every morning and evening in spring the cock bird stands on some elevated spot and "crows," his call being answered by one or more of his fellows. The nest is a hollow scratched in the ground by the hen beneath a bush, and lined with grass, roots, and dry bamboo. The eggs, from six to ten, vary in colour from greenish to brownish buff, and are bluntly pointed. The francolin affords excellent sport, and is one of the best-known game-birds of India; indeed so much is it sought after throughout its range that in many places it has been more or less completely cleared off. This regrettable circumstance is largely due to the fact that although a large clutch of eggs is laid, usually only two or three chicks hatch out. The plumage of the cock is noticeable for the white-spotted black under-parts, black throat, white ear-band, and chestnut gorget. The upper half of the back is black spotted with white, the lower part of the back and tail are black barred with white, and the primaries have a row of spots on both webs.

Rock-Dove.

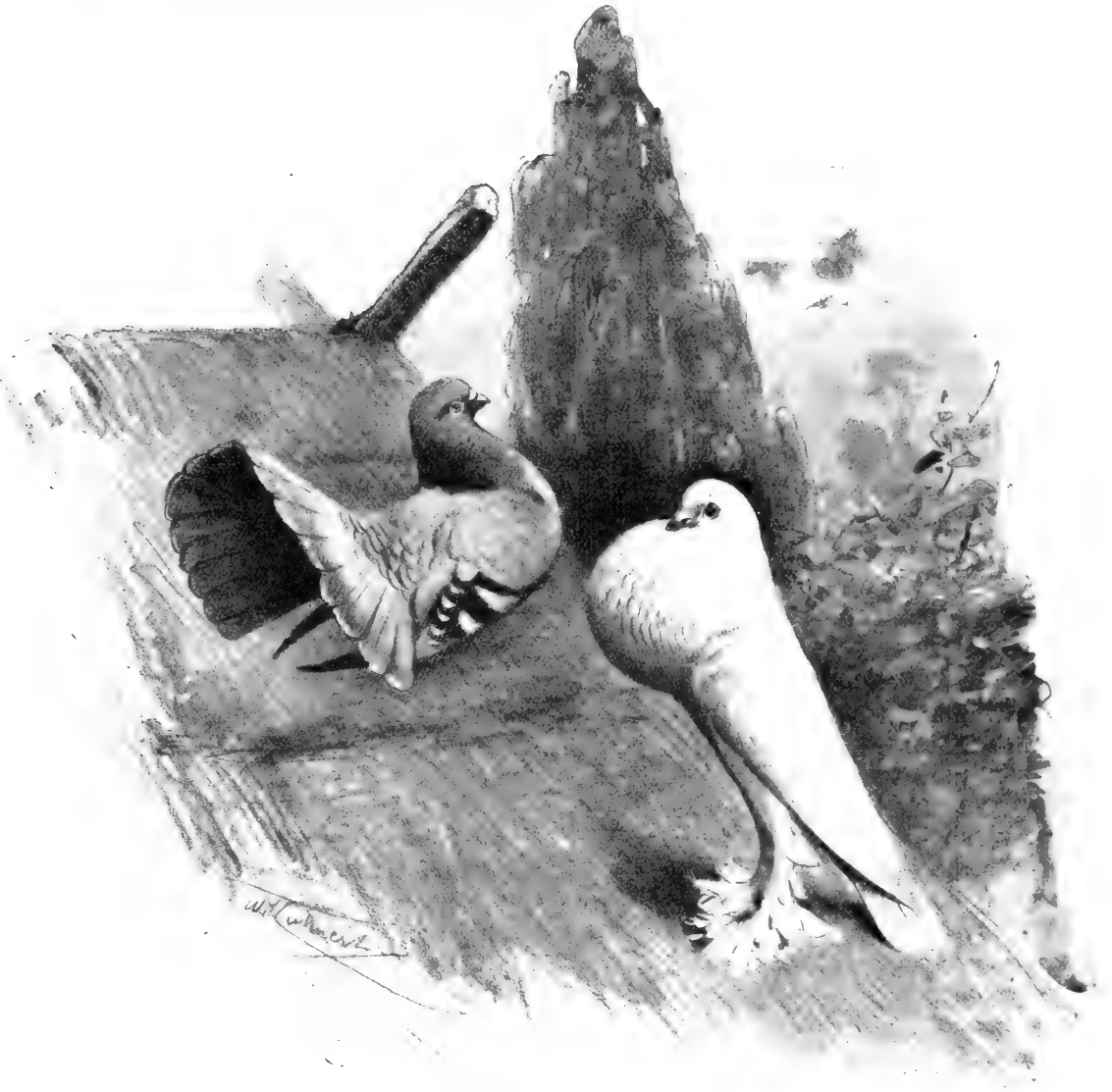
In south-western Asia the most abundant of the three pigeons is the rock-dove (*Columba livia*), so named from the nature of its haunts. Avoiding the forest and seeming to dislike trees, this bird keeps to steep cliffs or projecting rocky ledges, nesting in large gloomy caves or small clefts, sometimes even in the craters of volcanoes or in wells. In the British Isles and other parts of western and northern Europe, it builds by preference on cliffs near the coast, but elsewhere it may also be found inland, and in the south it lives even in the desert when it can find convenient breeding-places. In these countries its numbers are everywhere proportionately small compared with those living in southern Europe. The species is common on the rocky shores of the Mediterranean from Portugal and Spain to Asia Minor and from Morocco to Syria, whence its range extends through Persia to Turkestan and India.

Rock-doves, as a rule, make their simple nests in caves and crevices among rocks. The nest is a slight heap of twigs, grass, and heather, or other plants, on which, twice in the season and sometimes oftener, are laid two white eggs. In India these birds often nest in the neighbourhood of the Alpine swift; and in Egypt they often lay in oval-shaped pots placed by the peasants on the houses for their convenience; and many villages in upper Egypt harbour such swarms of doves that they almost seem to have been built more on account of the doves than of their human inhabitants. The rock-dove is a shy bird, strong in flight, and able to cover long distances on the wing; in fine weather it is in the habit of circling in the air moving its wings slowly when aloft, and closing them as it gently descends. In spring it often extends its wings with such force that the hard quills clap together over its back, as is the manner with many other doves. As it rises it often produces a peculiar crackling sound by beating the ground rapidly with its wings.

Its food includes all kinds of grain and other seeds, as well as the roots of a few plants together with slugs and snails, and occasionally worms. In digging food out of the ground, it uses the beak to loosen the earth, and to aid in the comminution of its food fragments of gravel, chalk, or hard clay containing salt are swallowed. Occasionally a rock-dove will hover just above the water in order to drink, and

sometimes during a shower it will lie on one side and raise the opposite wing to allow the rain to wash the body feathers, this habit being common to other doves.

The rock-dove has a total length of 13 inches, and in colour is chiefly greyish blue. The lower part of the back is white, the wings have two broad black bars,



FANCY PIGEONS.

the axillaries are white, and the legs dark red. In appearance it much resembles ordinary domesticated pigeons, of which indeed it is the ancestral form.

Domesticated Pigeons. The variations in colour and marking and the differences in the shape and size of domesticated pigeons afford a most striking example of what can be done by careful selection during a long period of years. Many of

the existing breeds are of great antiquity, pigeons having been kept long previous to the Christian era. In the Middle Ages the number of breeds was considerable, and these were greatly increased when the sea route to India was opened, and Eastern pigeons introduced into the Netherlands, whence the breeding of fancy varieties as a hobby spread into England, France, and other European countries.

To mention the many varieties now kept would occupy too much space, and to classify them is not easy. The largest are the runts of which there are several well-marked strains; the smallest is the white African owl which originated in Turin. The carriers, dragons, and barbs are distinguished by the development of the eye-wattles, the pouters by the abnormal size of the crop, which, as in the pigmy variety, is so large as to almost bury the head. In the jacobins the head is buried in a hood, in the frills the head in many cases is crested, and all the feathers of the throat and chest curl up so as to form a sort of ruff. In the fantails the fancier has devoted his attention to developing the tail, which spreads out in peacock-fashion. The tumblers, so called from their curious acrobatic flight, are remarkable for their power of staying on the wing for hours. It was this quality which led to their being crossed with the dragons, which are as noteworthy for their speed, and with the smerle, which had a great reputation for strength and intelligence, in order to produce the most useful pigeons now bred, namely, the homers, good examples of which are worth £100 apiece.

The turtle-dove ranges through south-western Asia as far east as **Turtle Doves.** Persia; but in southern Asia generally, west of India, we have the collared turtle-dove (*Turtur risorius*), which is usually regarded as the ancestor of the variety so often kept in confinement. This dove, whose distributional area is bounded on the west by Turkey, is pale brown above and pale ivory-grey below. There is a black band on the sides of the neck, and the middle tail-feathers are brown throughout, while the others are dark brown at the base on the upper side, and whitish towards the tips. This dove is from 11 to 12½ inches long, and has dark red legs and feet.

Of the herons, the common species ranges over the whole Eastern **Purple Heron.** Hemisphere, and the purple heron (*Ardea purpurea*) has a similar distribution although its haunts are quite different. Instead of installing itself in the neighbourhood of running water, the latter bird keeps mainly to pools and swamps where aquatic plants are abundant, amid which it fishes in the usual quiet heron fashion. The nest is generally placed in the middle of the swamp, amongst the densest reeds, or on willows and other bushes near the water, or occasionally, as in Ceylon, on a teak tree. It is built of reeds bent down to form a sort of stage, twigs, leaves, and other materials. When reposing, this graceful bird generally sits down on its hind legs, with its long neck forming a double curve. If surprised, it stands motionless with its neck and beak directed straight upwards, so as to assume the appearance of a crooked stick. This attitude, as in the case of the bittern, is generally adopted at the approach of man, and the bird rarely takes to flight until the intruder is in close proximity. When enraged, it bristles up the stiff feathers on the crown and attacks its adversary with its long and formidable beak. Although less wary, the present species resembles the

common heron in many respects, as for instance in the choice of its food. It nests in some parts of Holland, but more frequently in Hungary, southern Austria, and the Dobrudscha, occasionally straggling to Britain and Germany and ranging into central Asia. In length it measures about 36 inches. In colour the crown of the head and its crest are black, the throat is white, and the neck reddish brown with a black stripe down each side, and another on the nape. The back, wings, and tail are grey, the breast is red, and the thighs rufous.

White Heron. The great white heron or egret (*Herodias alba*) lives amid surroundings similar to those of the purple species, its nesting-sites being dense reed-patches by the side of a swamp, or trees growing in water. Usually only a few pairs make their nests in company, but in winter these herons collect in considerable flocks. They are exceedingly graceful birds, and in the air may be distinguished from common herons by their narrower wings, by the more backward extension of the legs, as well as by the lighter and more buoyant character of the flight. Their food includes fishes, small mammals, and lizards, although insects and snails captured in the water or on herbage in the meadows are preferred. In Europe this conspicuous bird is extremely shy, but in many parts of China it is so well treated by the natives that it has become quite tame, frequently perching on trees near human dwellings, and seeking its food in the neighbouring ponds. Its distributional area extends from southern and south-eastern Europe through Asia to Japan and Australia, the bird wintering in northern India, Burma, and Africa. In Spain, France, and Italy it is rare, but it is rarer still in Germany. As a straggler it is known in the British Isles and the south of Sweden. Formerly it was a frequent breeding species in the Danubian countries from Hungary to the Dobrudscha, but it has been so much sought after for the sake of the plumes known as "ospreys" that its numbers have greatly diminished in those districts. These plumes are the long filamentous feathers developed on the back during the breeding-season, which disappear in autumn. The colour of the plumage is entirely white, with the beak and feet black. In length the great white egret measures about 44 inches.

Little Egret. The little egret (*H. garzetta*) also frequents swamps and gently flowing rivers, although it shuns reed-beds in favour of trees growing in small clumps near or in water. A favourite site for the nest is a pollard willow, some 10 or 12 feet above the water. The nest is a loosely interlaced mass of thin twigs, sometimes lined with reeds, flags, and grasses, its bulk being equal to that of a crow's nest. Towards the end of May it contains three or four (rarely five) bluish green eggs. This graceful bird, whose plumes are not so highly appreciated as those of the white heron, is about 20 inches in length, with white plumage, black beak, and greenish yellow legs and feet. Inhabiting all the Mediterranean countries, especially in the east, this egret is also found in the plains of the Danube, the countries round the Black and Caspian Seas, the valley of the Volga, the Sea of Aral, and other inland waters of central Asia, as well as in China and Japan. It frequently appears in the delta of the Nile, and occasionally straggles into Germany, northern France, Holland, and England, although unknown north of the Baltic. It breeds as far south as Cape Colony, and has been shot in northern Australia.

Squacco Heron.

The squacco heron (*Ardeola ralloides*) also belongs to the Mediterranean region, and is found in similar situations to the last. It nests in colonies in trees amid marshes, the nest being lighter and more neatly made than that of the egret, and carefully lined with twigs, ferns, and flags. From four to six is the number of the eggs, which are of the usual pale bluish green heron-colour, and are laid about the end of May. In structure and habits the squacco serves in some degree to connect the typical herons with the night-herons. It associates with other swamp birds, although but rarely with the little egret, and is distinguishable from a distance by its pale vinous colour and thick neck. In flight it is slow and noiseless, and on the ground rather deliberate and lethargic in its movements, often standing motionless for a considerable time. In districts where it is not persecuted it becomes unsuspicious and easy of approach. The range of the squacco includes southern Europe, Africa, and south-western Asia. It is a common breeding-bird in the valley of the Danube down to the Dobrudscha, but is rare in Italy and southern France, and more so in Switzerland and southern Germany while only a few straggle so far north as Holland and England. In length it measures about 21 inches. In colour it is warm buff on the upper-parts, and yellowish on the head, neck, and shoulders, with white wings and tail, green lores, blue and black beak, and pinkish legs and feet, the soles of the feet being yellow.

Night-Heron.

Night-herons differ from ordinary herons by their shorter bodies and thicker necks, the latter being closely feathered. As regards habits they are distinguished from the true herons in the same manner as are owls from falcons, since they shun the daylight, sleep by day, and are active only after dark. From the bitterns they differ by the closer plumage and the presence of the characteristic long, narrow, ribbon-like feathers at the back of the head. The common night-heron (*Nycticorax griseus*) frequents swamps bordered by trees and brushwood, but never those unprovided with such covert. The nest, which may be described as a cradle of a few dry twigs, sometimes lined with flags and reeds, contains from three to five pale greenish blue eggs at the usual time. During the nesting-season the night-heron is not exclusively nocturnal, the males generally crouching in the daytime near the sitting females, with their necks between their shoulders, their legs bent, and their eyes half, or entirely, closed. In the twilight, both birds go out in search of the small fishes, frogs, mice, beetles, dragon-flies, and larvæ which form their food.

The night-heron has a wide distribution, inhabiting southern and eastern Europe, Africa, Asia, and America, but is absent from Australia. In Europe it is most frequent in the plains of the Danube, but it occasionally wanders as far north as the British Isles, the Faroes, and the south of Sweden. The head is rather large and the neck thick; but the feathers are more compact than those of the squacco and white herons. When standing with its crest erect and the white neck-feathers extended like fingers, the night-heron is a decidedly handsome bird. It is about 18 inches in length. The crown, neck, back, and shoulder-feathers are glossy greenish black, the lower part of the back and tail are dove-colour, while a collar round the neck and all the under-parts are white.

Glossy Ibis. Another swamp-bird of the region is the glossy ibis (*Plegadis falcinellus*), which, as regards habits, resembles partly the phalaropes, and partly the herons and storks. It has a light, measured, striding walk, wades in mud and water, and swims in case of need. This bird inhabits the south of Europe but is really cosmopolitan in distribution, being found not only in Asia and Africa but in Australia and North America. In Europe it is common round the Black Sea, in the delta and plains of the Danube, in southern Russia and southern

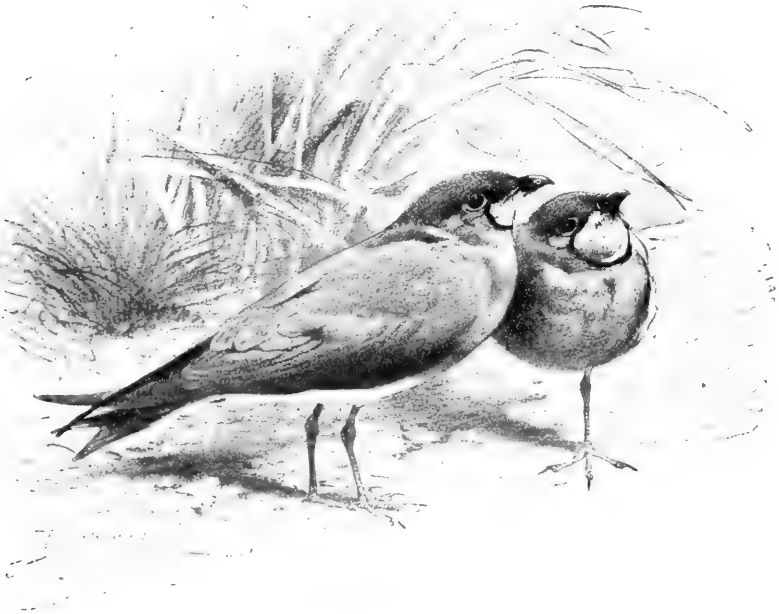


SPOONBILLS.

Poland, while it occurs in Italy, southern France, and Spain. Though rare north of the Alps, it is known as a straggler in Britain, the Faroes, Iceland, and Scandinavia. It is 22 inches long, and bronzy in plumage with metallic reflections, blackish above and brownish below.

Storks and Spoonbill. Both kinds of European stork are known in south-western Asia mainly as migratory birds, although they breed now and then where the climate and conditions are favourable. The spoonbills in many of their habits

resemble the storks. The legs are proportionately longer than those of the true ibises, and covered with hexagonal scales; the tail is straight, and the beak broad and expanding at the tip into the spoon from which these birds derive their name. The common spoonbill (*Platalea leucorodia*) haunts the marshes and fens, and nests either on grassy tussocks or on trees, sometimes in numbers on one tree which is always near or in the water. The young, which remain in the nest till fully fledged and able to find their own food, are brought up like storks, but their food consists of insects and crustaceans, fishes, molluses, frogs, and all kinds of aquatic animals, for which the bird searches the water in duck-fashion with its spoon-shaped beak. It breeds as far north as Holland and straggles into Great Britain and Scandinavia. It is common in Spain and in the plains of the Danube, where



PRATINCOLES.

in some localities it breeds in thousands. Everywhere it is very local though it ranges right across Asia to Japan and down north-eastern Africa to Abyssinia. In length the spoonbill measures about 38 inches. The plumage is wholly white, and the slate-coloured beak barred with black and yellow at the tip.

Of the active little birds known as pratincoles, the Mediterranean region possesses one representative. The distinctive characteristics of these birds are the short, more or less bent beak, the very long middle toe, of which the claw is comb-like, and the long pointed wings, extending beyond the tail, which is frequently forked. The pratincoles, which are spread over Europe, Asia, Africa, and Australia, are all alike in their habits, the one found in the Mediterranean area (*Glareola pratincola*) frequenting treeless steppes traversed by shallow rivers with flat shores. Although as much in need of water as the

larger plovers, it keeps more to dry situations, such as ploughed ground, or the cracking mud of half-dried pools, where it often associates with rooks, starlings, and lapwings. It prefers flying to walking, and is mostly found on open places with a wide view, or cultivated, and especially ploughed, ground, the latter partly covered with water. The nest, which is placed near pools on undulating sandy ground dotted over with sparse plants, or on pastures with short grass, consists merely of a shallow hollow lined occasionally with dry stems and rootlets. The pratincole breeds in colonies, the nests being about 6 feet apart; the eggs, three in number, are heavily marked. The young pratincoles are able to run as soon as hatched, and in case of danger press their bodies close to the ground, which their down resembles in colouring. Pratincoles eat all kinds of insects, especially locusts, grasshoppers, and beetles, capturing their prey in the air, or from plants or on the ground. They are lively, energetic birds, in flight not unlike swallows, and wading and swimming like plovers. When at rest, they look very like plovers, notwithstanding the long pointed wings, and the forked tail which is always in motion.

The common pratincole inhabits the plains of the Danube, especially the Dobrudscha, in flocks of thousands, and is not less numerous near the Volga, the lakes of southern Russia, the Black and Caspian Seas and the Sea of Aral, as well as in the steppes of Turkestan and southern Siberia, Asia Minor, and North Africa. It is common in central Hungary and Greece, although rare in south-western Europe; Italy and southern France see it only on migration, but it breeds in Spain, and a few stray northwards to Germany and Britain. On the muddy banks of the Nile pratincoles appear in immense numbers after the inundation has receded. The common species is about $10\frac{1}{2}$ inches long, and greyish brown in colour above. The throat is buff, girdled by a narrow black band, the lower part of the body and upper tail-coverts are white, the tail is greenish black, white at the base and brown at the tip, the lower wing-coverts are greyish brown, the feet black, and the beak blackish with a red base.

Cream-Coloured

A rare visitor to the British Islands, the handsome cream-coloured Courser. courser (*Cursorius gallicus*) is a common Mediterranean species ranging from the Canaries and north-western Africa through south-western Asia to north-western India. Now and then it has been found breeding in Sicily and Spain, and occasionally it straggles into Great Britain, France, Switzerland and Germany. In length it measures about 9 inches. The head is bluish grey behind, with a white and a black band on each side. Although the larger quills are black, the general colour of the plumage is that of the desert sand, which the eggs so resemble in their sandy brown, ashy grey, and olive-coloured spots and speckles that they are almost indistinguishable from the stones among which they are laid. The courser takes its name from the speed with which it runs, this being so rapid that the legs do not seem to move. These birds appear indeed to roll along rather than run; the male always leads the way, the female keeping about thirty paces behind. At intervals a courser will check itself to pick some food from the ground, and then dart on again as rapidly as before. Thus it will run for hours, never attempting to take wing, and leading the inexperienced to think that it can be caught with the hands, until suddenly, when hard pressed, it shows that it can fly as well as it can run.

Curlew and Stilt.

Although the woodcock breeds in remote places within the region under consideration, and the common snipe may perhaps occasionally nest in northern Africa, the other snipe, as well as the curlews, are essentially birds of the north. The slender-billed curlew (*Numenius tenuirostris*) is, however, an inhabitant of Asia Minor and Egypt and southern Europe from Portugal to Greece. It differs from the common curlew by the shape of its beak and its smaller size. Some of the sandpipers of Europe and northern Asia breed in the Mediterranean area, for instance the redshank whose nest has been found in Asia Minor and Greece, although the majority of this group breed in the far north. The



BLACK-WINGED STILT.

stilts, on the other hand, are dwellers in warmer climates, the black-winged species (*Himantopus candidus*) inhabiting the south of Europe from Spain to southern Russia, although more abundant in the south-east than elsewhere. It also inhabits south-western Asia, its range extending into China; and it breeds in Africa as far south as Cape Colony. In Europe it nests in Hungary, and all down the Danube, to the Black Sea. Stragglers visit the coasts of Germany, Holland, and Great Britain, but in central Germany and Switzerland the stilt is very rare. In spring and summer stilts build a large nest of reeds and grass. They seek their food by wading deep in soft mud or up to the full length of their long legs in water; and they are always found in muddy, shallow swamps, or on low river-banks, where

they feed on insects, molluses, and frogs. Stilts walk in a peculiarly mincing and leisurely manner, carrying the body horizontally. In flight they move the wings slowly, bending their tips downwards; they hold the legs out straight when flying strong, but let them dangle when they hover. The great length of the legs is always sufficient to distinguish a stilt, either on the ground or in the air. In length these birds measure about 14 inches. In colour the tail is grey, the under-parts and lower half of the back are white, the mantle and wings greenish black, the feet pink, and the beak black.

Purple Gallinule. With the bare mention that the two kinds of European bustards range into the Mediterranean area, as does Macqueen's bustard which is principally indigenous to the Caspian region, we pass on to the rail tribe, of which the central European species are found in the area under consideration partly as migratory, partly as breeding birds, while the brighter coloured gallinules are represented by the purple species. These birds are characterised by the presence of a horny plate covering the front and crown of the head, as well as by the relatively deep beak, of which the edges are notched, and the rather long hind-toe. The gallinules, of which there are about twenty kinds, are distributed over the warmer countries of both hemispheres, and distinguished from their near relatives the coots, which they approach in their habits, by the blue coloration of their plumage. The Mediterranean species (*Porphyrio cæruleus*) frequents swamps and marshy localities in Spain, Portugal, Italy, Sicily, Greece, Turkey, Asia Minor, and the Caspian district south of the Terek. It arrives in its breeding-area towards the end of April, and leaves again in September, a few individuals remaining in certain suitable places. Although resembling the coot in its habits, the gallinule has a more stately walk, and contracts the long red toes at every step, and spreads them out as they descend. The slender red legs, which hang down during its short flights, make the bird conspicuous from a distance. The gallinule is an expert swimmer and diver, generally seen on the water, but spending much of its time on land lurking among the vegetation, and in spring robbing other birds' nests of their eggs or young. Its own nest is generally placed in situations difficult of access, where it is concealed amid reeds or growing rice; not unfrequently it is floating on the water. From its relatives the true coots the purple gallinule differs by the circumstance that it feeds its young, which are soon able to swim and dive. It is 18 inches long, and in colour is deep rich blue, the sides of the head, throat, and upper part of the breast light blue, and the under tail-coverts white.

Sand-Grouse. Representing a very different family, the sand-grouse, which are mostly birds of the Mediterranean countries, are distinguished by long and pointed wings, a rounded or wedge-like tail, and feathered feet. In structure they approximate to the pigeons on the one hand and to the game-birds on the other. The large sand-grouse (*Pterocles arenarius*) inhabits northern Africa from Morocco to Tripoli, the south-western districts of the Asiatic part of the Mediterranean region as far as India, and the countries round the Black and Caspian Seas and the Sea of Aral. In Spain both this species and the pin-tailed sand-grouse occur, although each has a province of its own, the two species being apparently inimical to each another. Sometimes the large sand-grouse strays into other countries of

southern Europe, and now and then stragglers appear in Germany. Being an inhabitant of the deserts, it is coloured in harmony with its surroundings; the plumage is sandy yellow and black above, with the throat chestnut edged with black, the chest grey, and the rest of the under-parts black. In length it measures nearly 14 inches. The three eggs are laid in a small hollow on the ground, never very far from water, and are sandy in colour, with greyish and reddish brown markings. These birds are light and strong on the wing and traverse great distances in search of food, which comprises tender buds and leaves, seeds, fruits, and insects. They feed in larger or smaller flocks, the members of which keep up a constant "chucking," like domesticated fowls, or a kind of dove-like cooing. On the wing these birds utter a loud "kadda-kadda," and when startled an indignant "gur-gur-gur."

The pin-tailed sand-grouse (*Pteroclorus alchatus*) is a species of south-western Asia, ranging into Arabia, the Caucasus, and Turkestan. In the west of Europe it is represented by a subspecies (*P. alchatus pyrenaicus*), which breeds in northern Africa and southern Europe, especially Spain and Portugal. This species is a little smaller than the ringed sand-grouse, from which it is distinguished by the length of the two pointed middle feathers of the tail, the eastern form being further differentiated by the yellowish white under-parts. In summer the breast is pale rufous, in winter brownish white; in the western form the plumage is darker, and the breast in summer reddish brown.

To provide water for their young, cock sand-grouse fly off to a pool in which they thoroughly soak the feathers of the breast. On their return to their young, the latter pass the wet feathers of their parents through their beaks, and thus obtain sufficient moisture.

Comparatively few of the anserine birds breed in the Mediterranean area; but the red-crested pochard ranges from Europe as far as Persia and India; and in suitable localities the white-eyed duck, the pochard, and the wild duck are met with here and there, while the grey lag-geese is also occasionally seen. There are, however, no mergansers and no swans.

Duck Tribe.
Pigmy Cormorant. In addition to the common species, the pigmy cormorant (*Phalacrocorax pygmaeus*) frequents the coasts, and is especially common in Hungary, where it breeds from April to September and October. Its distributional area extends from Hungary and Dalmatia to northern Africa, the Caspian, the Sea of Aral, and Persia. In autumn this species migrates south. It lives among deep marshes, and nests in colonies on retired waters amid weeds and willow-bushes, in company with spoonbills, ibises, white herons, night-herons, and crested herons. In these colonies, where the nests are often built on willow-bushes close beside or above one another, those of the present species, to the number of three or four, are placed on the highest branches of each bush. This cormorant, which never nests on tall trees, climbs slender willow-stems, and even reeds, always grasping several at a time with its long toes, aided by its tail. It is a shy and suspicious bird, much smaller than the common cormorant, measuring only from 21 to 23 inches in length. In colour it is mainly black, but the head and upper part of the neck are reddish brown, and the lower-parts marked with long white spots. The dark grey wing-coverts have black edges, and the beak and feet are black.

Whiskered Tern.

Although the terns are represented in south-western Asia by the black tern and the white-winged black tern, the whiskered tern (*Hydrochelidon hybrida*) is much more characteristic of the region. This bird arrives on its breeding-grounds towards the end of April, and nests in swamps and meadows near large ponds among aquatic plants, or if the water be high, on dense willow-bushes and low trees, the nest being an untidy mass of weeds, often afloat and adrift. The young remain in the nest till fully fledged, and are later on fed by the old birds, whom they follow with cries, when on the wing. When disturbed by a bird-of-prey, such as a hen-harrier, the males of the whole colony assemble round the enemy, and noisily chase it away. In habits this species most resembles the black tern. Its range extends over southern Europe, northern Africa, and thence eastwards through the Malay Archipelago to Australia; but the species is not so common in the west as in the east, where it occurs in large numbers, especially round the Caspian and in Asia Minor. As a straggler it is known in the British Isles, in Germany it is very rare, but it is common in southern Hungary and the Dobrudscha. The blood-red beak, the white stripe along the cheek, the grey breast and black crown render this tern easily recognisable. It is 10½ inches long, and grey above and below, with a white edge to the outermost tail feathers.

**Mediterranean
Black-Headed
Gull.**

One of the conspicuous gulls is the Mediterranean black-headed species (*Larus melanocephalus*), whose principal home is in the countries around the Mediterranean and Black Sea. This gull occurs in thousands on lake Sinœ in the Dobrudscha and at Singora in Asia Minor, while in winter and spring it is abundant near Alexandria, where it breeds on small islands, and floating patches of grass and reeds, often at some distance from the sea. In gait and flight it resembles the laughing gull. It has white wings, with a black line on the outer web of the first primary, and a pitch-black head; the delicate pearl-grey of the upper-parts and the fine, pinky white of the under surface, together with the coral-red beak and feet, rendering it a very handsome bird. In length it measures from 15 to 17 inches.

Grebes.

Of the grebes, the little grebe seems to be confined to Europe and Asia Minor, but both the great crested grebe and the eared grebe have a much wider distribution, extending over a large part of the Mediterranean region.

Reptiles.

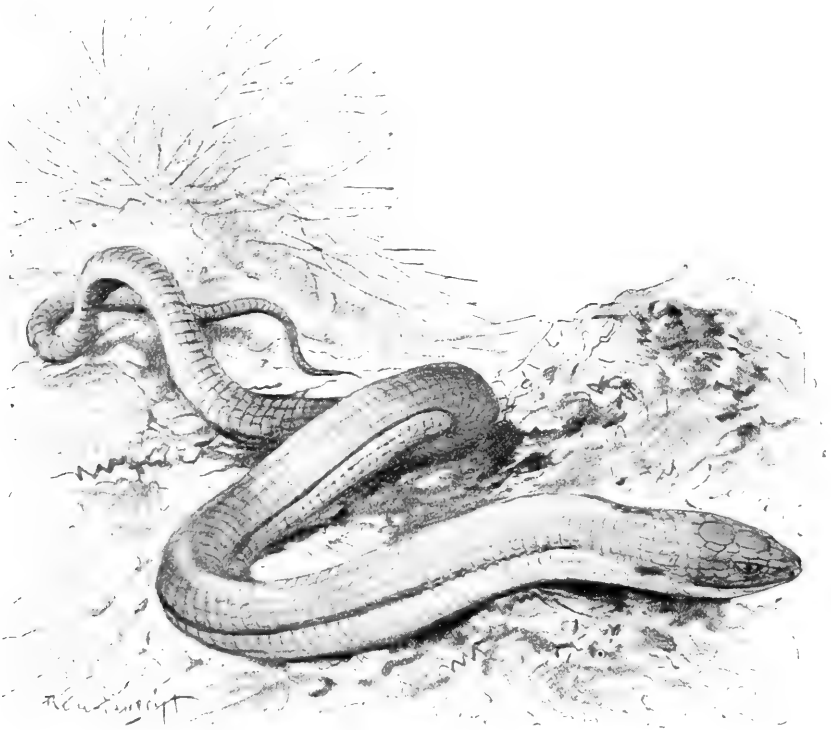
Among the reptiles of south-western Asia, the scheltopusik (*Ophisaurus apus*), a snake-like lizard in which the front legs are absent and the hind pair rudimentary, is very characteristic. It is about a yard long, and in colour chestnut-brown, dark coppery red, or greyish yellow above, and greyish and yellowish brown or reddish brown below. It inhabits grassy and bushy localities in south-eastern Europe, Asia Minor, and northern Africa, where it preys on small animals of all kinds, and will successfully attack even the viper.

Several species of thorny-tailed lizards, such as *Stellio vulgaris*, occur within the area, and one species of *Amphisbæna*. Like the scheltopusik the amphisbænas have only one pair of legs, but in their case it is the front and not the hind pair which persists. The grey species (*Amphisbæna cinerea*), which inhabits Asia Minor, northern Africa, and the Iberian peninsula, is the only European representa-

tive of the family, whose main home is America. Like the rest of its kind, this reptile can creep either forwards or backwards with equal ease; it lives in the ground, especially in ant-hills, and feeds on insects and worms.

In addition to the sand-viper, already noticed in the chapter on Southern Europe, the snakes are represented in south-western Asia, southern Europe, and northern Africa by the Egyptian *Eryx jaculus*, which is sometimes over 30 inches in length. It is variable in colour, though as a rule yellowish with brown or black spots and cross lines; and it feeds principally on lizards.

Of the poisonous snakes a few species are found in south-western Asia as well as in Europe and northern Africa. The blind snakes, which differ in several



THE SCHELTOPUSIK.

points from ordinary snakes, and are remarkable, among other features, for certain small rod-like bones forming the sole vestiges of the hind-legs of their ancestors, are represented by the European blind snake (*Typhlops vermicularis*) in Arabia, Asia Minor, and the Caucasus, as well as in Greece. It is 10 or 12 inches long, and in colour light yellow or light brown above marked with black spots, and white below.

Insects.

While there are no amphibians or fishes specially characteristic of south-western Asia, a few insects are worth mention. Among these is the oleander hawk-moth (*Daphnis nerii*), whose wings are often over 4 inches across. In colour the fore-wings are grassy green, marbled and striped with pink, white, green, and violet, and bearing at the base a dark green spot ringed with white. This moth sometimes appears in the south of England. The caterpillar, which has

a long horn, is green or yellowish in colour, marked on each side by a kidney-shaped, white-centred spot, and a white streak along the body. It feeds on the oleander and the periwinkle from July to September.

The locusts in the Mediterranean region are represented by the migratory species (*Pachytylus migratorius*), which forms a common pest in south-western Asia and north-western Africa, and appears in flocks so great as to darken the sun for hours and strip off every vestige of vegetation.

Spiders. Among the Arachnida of the Mediterranean region are certain representatives of the false spiders, a group common to the warmer countries of both hemispheres. They live chiefly in deserts and steppes, and are dreaded on account of their poisonous bite. One of the most noxious is *Galeodes araneoides*, which inhabits Greece, southern Russia, Persia, and Arabia. It is about 2 inches long, and pale yellow in colour, every part except the upper surface being greyish brown. An allied Egyptian species, *G. arabs*, frequently enters dwelling-houses, where it climbs on tables to catch flies; and other species have been observed to ascend trees. False spiders constitute the suborder *Solifugeæ*.



THE SARMATIAN POLECAT.

CHAPTER IV

THE CASPIAN AREA

By Dr. Paul Matschie, who has devoted much attention to the definition of the Mediterranean region, the Caspian area is regarded as an outlying transitional subregion, whose fauna is connected on the one hand with that of the Holarctic region to the north (especially as represented by the so-called Pontic area of eastern Europe), and on the other with that of what he terms the Chinese region in the east, while to the west it is as intimately connected with the typical Mediterranean region. This tract includes the catchment basins of the rivers flowing into the Caspian and the Sea of Aral, although only the lower course of the Volga and that portion of the Urals situated south of Uralsk lie within its limits. The southern portion, that is the tract between the Caspian and the Hindu Koh and the districts around the upper course of the two large rivers discharging into the Sea of Aral, may on the whole be characterised as a semi-desert. The rest of the area has for centuries been known as the steppe. This steppe is mainly situated between the lower course of the Volga, and the Caspian on the west, and the Tian-Shan Mountains on the east, and forms with its central Asiatic continuation the north-eastern branch of the northern African and Arabian desert, and, unlike the desert beyond the Tian-Shan, is neither hilly nor mountainous.

The Caspian plain, like the central Asiatic highlands, lies within the temperate zone, and is subject to sudden changes of temperature and great dryness of the air, the cold winter giving the sparse vegetation an appearance differing greatly from that of the desert-region to the south-west. The influence of the winter is distinctly shown in the oases and on the banks of the rivers, where the most

noticeable vegetation consists of deciduous trees and bushes such as poplars, elms, willows and ash trees, amongst which appear wild roses, raspberry-bushes, hawthorns, and a kind of honeysuckle. In the less watered parts tamarisk, wormwood, and liliaceous plants such as garlic and tulips, are everywhere found. The characteristic plant, however, is the saxaul (*Anatis ammodendron*), a thick-stemmed tree of about 20 feet in height, with a hard, heavy wood, and a sappy bark apparently serving as a water-reservoir. In May this tree, which occasionally forms small forests, has little yellow blossoms, and in September pear-shaped, fleshy fruits. Also prominent and widely distributed is a hardy woolly reed (*Lasiogrostis splendens*), nearly 7 feet in height, which grows principally on saline soils, and forms large thickets in favourable places. Common, although less characteristic, is a juicy and thorny shrub (*Nitraria schoberi*) with small leaves, which grows best on saline and clay soils, attaining a height of about 12 inches, and affording in its berries a favourite food to many animals.

Most of the plants have small or no leaves, and are protected from drought in much the same way as the desert plants of northern Africa and south-western Asia. Their growth depends partly on the spring rains; but while the plants nourished by underground moisture bear leaves during the whole or the greater part of the summer, those dependent on these rains appear for a few weeks only.

The western districts, traversed by the lower Volga, differ in the character of the landscape from those farther east, the vegetation consisting of dwarf plants widely scattered over large spaces of bare ground, and remarkable for the predominance of greyish green, hairy herbs rich in aromatic oils. In spring there appear tender and juicy plants, such as lilies and their allies, and early grasses, especially *Poa bulbosa*. These are replaced by a yarrow (*Achillea gerberi*) and a number of grasses with hard, curly leaves. As heat and dryness increase, there follow a number of spiny plants, the spines of which replace the tender leaves of spring. At the end of summer aromatic plants and saline herbs predominate, the roots of these going deep enough to derive sufficient moisture, while their neighbours perish through drought.

Between the Caspian and the Sea of Aral is the Trans-Caspian region. Bare mountains, rivers without estuaries and in summer without water, barren salt-plains, unlimited sand, and innumerable sand-hills, partly bare and partly covered with low bushes, form the Trans-Caspian landscape. To complete the picture it should be added that the air is laden with dust and the sky cloudless. In the north-eastern part of the Caspian area lies the monotonous Kirghiz steppe, where thorny desert plants struggle with inclement nature. Wherever the ground is damp the woolly reeds grow in tall, impenetrable thickets, and everywhere the sand is clothed with the ragged saxaul, whose long, hard roots form the fuel of the Kirghiz nomads, by whom it is piled in pyramids near their tent-villages or carried away in the caravans. Here and there the steppe is traversed by water-courses, dry during the greater part of the year, which feed small salt lakes, on the shores of which innumerable flocks of birds of passage stop to rest in spring and autumn.

To the south-eastward of the Kirghiz steppe lies the Turkestan desert, where the growth of plants becomes poorer on the barren soil of the ancient bed of the

Aralo-Caspian Sea. Along the shore of the Sea of Aral the yellow sand is of such compactness that the feet of the numerous camels leave scarcely an impression. The depth of this sea is inconsiderable, and its water contains so much salt as to be drinkable only at the mouths of the rivers, and in a few patches of fresh water far out from the shore. A south-west storm drives the water into the bays and floods the sandy banks, but in the warm season the sand is driven into the water, thus continually changing the outline of the coast, filling the bays, forming isthmuses, islands, and sand-bars, and cutting off strips of water into salt-lagoons which dry up in summer. On following the course of the Syr-Darya upwards, it will be found that the ground is as flat as a table, and the country forms a typical desert for vast distances, only interrupted here and there by saxaul bushes. On approaching the Russian Fort Perovsk, a district showing traces of recent floods, and closely covered with tall reeds, is entered. Between Perovsk and Chumenarik the traveller will be surprised by coming on a rich vegetation, which in its masses of reeds, saxaul, and thorny plants, affords good covert for the tiger, and forms the favourite haunts of wild boars and gazelles, besides containing innumerable flocks of geese, wild ducks, and, above all, pheasants. Farther east the country becomes mountainous, till at length the tall poplars in the gardens of the city of Turkestan stand out clear against the sky.

The Caspian area is bordered by the Siberian province of the Holarctic region on the north, by the Pontic or Black Sea province in the north-west, and by the Mediterranean region on the south-west and south. Being a comparatively small tract, surrounded by land, it shares many animal forms with the adjoining countries. Wherever climate, soil, and vegetation are suitable, the northern Asiatic, European, and south-western Asiatic fauna is to be met with; while, on the other hand, there are many Caspian animal types either absent from the adjoining provinces or merely intruding on their confines, save in the case of the Chinese province, which in climate and soil closely resembles the Caspian area.

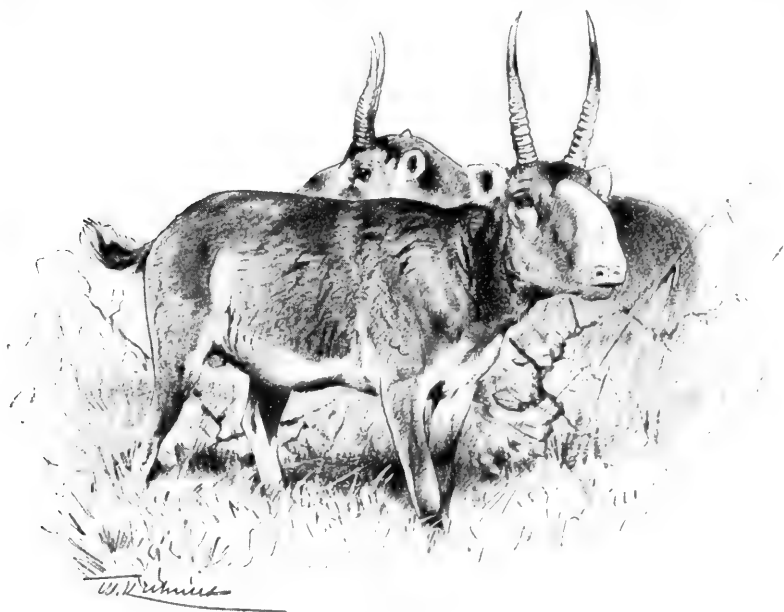
Where the climate of the Caspian area is like that of the wooded zone of the northern temperate latitudes, the animals are of similar or closely allied forms. This is the case with the eastern red deer or maral (*Cervus elaphus maral*), which inhabits north-eastern Persia, the Caucasus, and Circassia, and is a large local variety of the red deer of eastern Europe, with which it probably intergrades in the Carpathians.

Tur. A portion of the Caucasus must be regarded as belonging to the

Caspian area. In addition to the bison and the chamois, the goats are the most remarkable hollow-horned ruminants of these districts. Two of these, known by the name of tur, one of which presents some approximation to the bharal of the Himalaya, are highly characteristic of this part of the area. Of the two kinds, Pallas's tur (*Capra cylindricornis*) occurs to the west of the Kasbeg Mountains whence it ranges over Daghestan. It has a shoulder-height of about 36 inches, and long, black, smooth, almost cylindrical horns, which wind in a spiral outwardly and backwards, the points turning towards each other about a foot apart. The west Caucasian tur (*C. caucasica*), which inhabits the whole of the western Caucasus, is of the same size but more stoutly built, with long black horns curving upwards and backwards in a more ibex-like manner, their tips far apart

and curving sometimes downward and sometimes outwards. Moreover the horns are three-cornered at the base, and provided with more or less distinct knots on the front surface. In the central Caucasus occur certain tur which have much the appearance of hybrids between the two preceding species, although they have been regarded as indicating a third species.

While the deer occur only on one border of the Caspian area, the saiga antelope (*Saiga tatarica*), although not strictly confined to it, is one of its characteristic mammals. This antelope, which is about the size of a sheep, is one of the ugliest of the group, on account of the peculiar shape of its head and its clumsy body. It has a large, strongly curved, inflated nose, blunt at the extremity, with large nostrils directed downwards, and yellow, lyrate horns of which the length is usually under 12 inches. In summer the



SAIGA ANTELOPES.

coat is tawny and in winter whitish grey, the under-parts and lower surface of the tail being always white. In prehistoric times the distributional area of the saiga extended as far as the south-east of England, and the animal lived on the eastern boundaries of Poland only a hundred years ago. At the present day it is restricted to southern Russia, south-western Siberia, and above all the Kirghiz steppes.

The wild boar of Hungary and the Caspian area, on account of its huge size, has been described as a distinct species under the name of *Sus attila*, but as it is better regarded as a race of the typical wild boar, it may be called *S. scrofa attila*.

A characteristic rodent of the Caspian area is the large five-toed jerboa known as the alagdaga (*Alactaga decumana*), the best-known representative of its genus, which ranges from the Caspian through southern Russia as far as the Crimea, and over the deserts and steppes of central Asia as far

south as Bushire on the Persian Gulf. The alagdaga is about 7 inches long exclusive of the tail, which is considerably longer. In colour it is greyish rufous above and white below, the tail being brown with a black and white arrow-shaped tip. These jerboas associate in small parties, two or three pairs together in a burrow, which they dig in the ground. This burrow, which is of considerable size, and somewhat elaborate in plan, consists of a central chamber and several galleries, one of which ends near the surface and is opened only as an exit in case of danger. In the deep chamber of the burrow, the young, five to eight in number, are born in summer, and remain with their parents till the following spring, the whole family hibernating from the beginning of September until the end of April. On its nocturnal excursions the alagdaga steals the eggs and young of the steppe-lark, though it chiefly feeds on vegetables and occasionally on insects. Food being scarce in the desert, the alagdaga, like other animals of this area, travels long distances in search of provender. Its speed when moving over the ground in long leaps is considerably greater than that of the three-toed jerboas, and even exceeds that of a hare.

Sminthus.

Allied to the jerboas is the mouse-like rodent known as *Sicista* or *Sminthus*. *Sminthus subtilis*, which differs from ordinary mice and voles by the presence of four, in place of three, upper cheek-teeth. The Caspian is about the centre of the distributional area of this species, which comprises northern, eastern, and south-eastern Europe, as well as western and central Asia. In length the *sminthus* measures approximately $2\frac{1}{2}$ inches, and the tail is about the same. The hair on the body is very soft, but that on the tail is short and thinly spread. Along the yellowish grey upper-parts runs a black stripe bordered by a light band, the sides being light greyish yellow and the under-parts yellowish white, while the point of the nose, the lips, chin, and feet are white. In habits this rodent resembles the voles.

Mouse Tribe.

Passing on to the mouse tribe, it may be mentioned that a peculiar blind vole-like rodent occurs in the Caucasus, representing a genus by itself, for which the name *Prometheomys* has been proposed.

Gerbils are represented in the Caspian area by *Gerbillus tamaricinus*, which is about 13 inches long inclusive of the tail, the length of the latter being about 6 inches. In colour it is yellowish grey above, paler at the sides, and brownish on the hind part of back, with a white spot on each side. Above the eyes and behind the ears it is white, as are the lower parts; but the tail is brown. Another murine rodent, the rice-hamster (*Cricetus* [*Cricetulus*] *phæus*), which owes its name to the damage it does to rice-plantations, and has been already mentioned in the preceding chapter, ranges from southern Russia through the Caspian area into Persia and Afghanistan. Only about a third the size of the common species, it is light grey in colour with white under-parts and feet.

Manul or Pallas's

Cat.

On the steppes the place of the European wild cat is taken by Pallas's cat (*Felis manul*), which has a large range in central Asia extending from the Kirghiz steppe in the west to Mongolia in the east, and from southern Siberia in the north to the highlands of Tibet in the south. About the size of an ordinary domestic cat, it is distinguished by its very long soft fur and bushy tail. The general colour is a silvery, yellowish grey, darker on the back

and lighter on the lower-parts, the chest being dark brown. It is often marked on the sides with a few dark stripes, and the tail has six or seven dark rings, while there are also spots on the forehead, and occasionally indistinct bars on the legs. The manul, which formerly occurred in the Orenburg steppe, feeds principally on small rodents, such as picas, and has been regarded as the ancestor of the Angora cat, although this is improbable.

Corsac Fox.

The characteristic fox of the Caspian area is the corsac (*Canis corsac*), a species whose nearest relative seems to be the Asiatic desert-fox. It is of the colour of the desert sand above, and white below, with a black tip to the tail. Its haunts are more or less desert-like districts, such as are found from the shores of the Volga and the Caspian to south-eastern Siberia, China, and the Amur countries. This fox does not apparently dig its own burrow, but generally inhabits one abandoned by marmots, where it will die rather than attempt to bolt when driven in by dogs. It lives principally on small rodents, such as picas and voles, which it hunts during the night.

Sarmatian

Polecat.

The habitat of the Sarmatian polecat (*Mustela sarmatica*) extends from eastern Europe, where it has been taken in the forest of Bielowitzka, right through the Caspian area to southern Afghanistan where it is particularly common. This species, which has a bushy tail half the length of the body, is generally about 13 inches in length without its tail. In colour it is of a brown and yellow piebald above, and brilliant black below, with a brown or black face, and a white band across the forehead extending down the sides of the neck. This polecat lives in the environs of Quetta in holes in the ground, which are probably made by rats, and it seems to be as common on cultivated as on uncultivated ground. Although its habits are not well known, it is probably a nocturnal animal, as it is rarely seen during the day. Its food consists of birds, rats, mice, lizards, beetles, and snails. One of these animals in captivity killed in succession four wagtails and four rats. The rats were always seized at the same spot, namely, close behind the ears, and held firmly between the teeth of their conqueror until they ceased to struggle, when they were finished off with one or two bites in the back of the head. As soon as blood flowed from the wounds, the polecat licked it up, but it never tried to suck the blood; nor, although it had fasted for some time, did it eat its victims at once, but took them to a compartment of its cage, where it was accustomed to sleep, and there devoured them at nightfall. The Sarmatian polecat, which emits the same disagreeable smell as its European relative, brings forth three or four young at the end of March or beginning of April.

Long-Eared

Hedgehog.

In concluding this brief survey of the Caspian mammals, mention may be made of the long-eared hedgehog (*Erinaceus auritus*), which belongs to the same genus as the European hedgehog, but is somewhat smaller, with ears more than half the length of the head.

Steppe-Lark.

Many of the birds in the Caspian area are closely related to those of Europe. The steppe-lark (*Melanocorypha sibirica*) is an abundant and characteristic bird on the lower Volga and the Ural Rivers, where it occurs with the skylark; and thence it ranges into central Asia as far east as the Altai Mountains and the Irtysh River. It is a little larger than the skylark with a stouter beak.

The crown and wing-coverts are light rusty yellow, the secondaries white at the tip and black at the base, the two outer tail-feathers white, and the others blackish brown with white edges; the flanks are streaked with dark brown, the back is light brown with dark spots, and the under-parts are white. This bird occasionally strays as far west as Belgium, and has been taken in England among a flock of snow-buntings.

Black Lark. More remarkable than the steppe-lark is the black lark (*M. yeltoniensis*), which is found between the Volga and the Irtish, and between the Caspian and the mountains of central Asia. It is so numerous near Lake Yelton, north-east of Sarepta, as to be named after that sheet of water. In size it is almost as large as a starling. The females are grey with dark brown spots like other larks, but the males are quite black, especially in summer when the sand-coloured edges of the feathers are worn off. In other respects the species is distinguished by its stout, finch-like beak, and strong, short-toed feet. The black plumage of the cocks forms a striking contrast to the light ground of the steppe; and its peculiar fluttering flight as it descends makes the bird easily recognisable. When singing, it soars to a considerable height, glides on a little distance with half-drooping wings, then soars higher, and hovers almost out of sight until at last it comes to the ground at a considerable slope. Although this lark has straggled into western Europe on a few occasions, it rarely wanders westward of southern Russia.

Richard's Pipit. The spurred pipit, or Richard's pipit (*Anthus richardi*), is remarkable in more than one way, for not only is it the largest of its genus, measuring 8 inches in length, but it has the claw on the hind-toe over an inch in length, or longer than the toe itself. The feathers of the upper-parts are dark brown edged with pale brown or sandy buff, while below the colour of the plumage is rusty yellowish white shading into rufous on the sides. This species, instead of striding over the ground like other pipits, moves more like a thrush. In flight it resembles a wagtail, and when rising always utters its call, a short "zirp" or "ziep," similar to the chirp of a sparrow. On migration it appears not only in India, but also in southern Europe and northern Africa, though not known to breed there. Stray individuals have been taken in England, Belgium and Holland, on the German coast, and on the islands of the North Sea.

Rosy Starling. The starlings are represented in the Caspian area by the rosy starling (*Pastor roseus*), conspicuous for its pink body and black crested head, wings, and tail. Young birds, which lack the crest, are brownish grey with a whitish throat, and indistinctly spotted on the breast. In length the adult is about 8 inches. The breeding-area of this bird extends from the Caspian eastwards to Mongolia, and westwards to the plains of the Danube. In habits this species resembles the common starling, although the flocks in which it collects are not so large. It is also much more active on the wing, probably by reason of having daily to search a vast extent of country for its food, and being compelled to catch insects in the air after the fashion of the bee-eaters. Its principal food-supply is afforded by the wandering locust, which invades its habitat in cloud-like swarms. The Turks have a saying that it kills ninety-nine of these insects and eats the hundredth. On account of its locust-killing habit it is considered almost sacred by

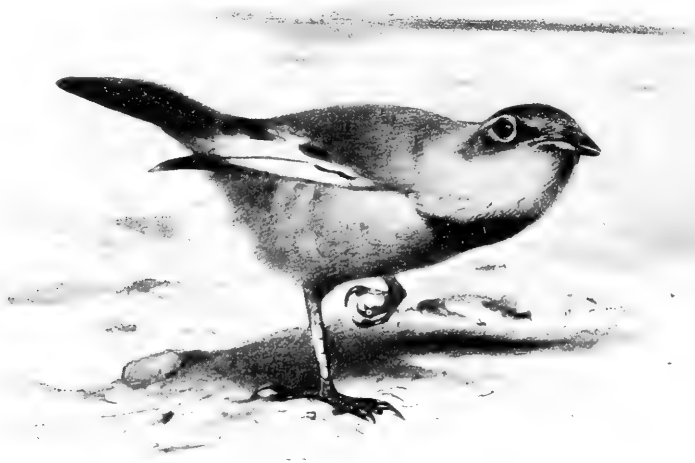
the inhabitants of most of the countries it frequents, and is nowhere persecuted or destroyed. In the paddy-fields of India it is, however, so much dreaded that it has been given the name of demon-bird, and coolies are employed to drive it away; for its food, besides insects, comprises berries, fruits, and grain, especially rice, of



ROSY STARLING.

which last it seems very fond. It seems to visit India regularly, but migration seldom takes it to northern Africa: and it appears at irregular intervals in Italy, France, England, and the countries between these and its breeding-area. In Europe the rose-coloured starling generally associates with the common starling, visiting pastures in much the same manner. In its native habitat it in most cases roosts

in willow bushes near rivers, or some such places, on account of the absence of taller trees. The nest, which is nearly always placed in the neighbourhood of water, is a plain structure composed of dry twigs and stems, generally in a hole in a tree or in crevices in rocks or ruins. Sometimes this starling, which leaves its home in August and returns in April, breeds in the countries to which it migrates in immense numbers. In 1875 Germany and Switzerland were visited by flocks of these birds; in the north German plain parties of thirty were noticed, and near Villafranca in northern Italy at least 12,000 were seen. Arriving on the 3rd of June, they settled on the walls of the fortress and the roofs of the adjacent houses, and drove away the other starlings as well as swallows, sparrows, and pigeons. On the 9th of June their nests contained eggs; by the 12th of July all the young were fledged; and on the 14th of the same month they departed with their parents, none returning the following year.



PANDER'S CHOUGH-THRUSH.

One of the most characteristic birds of the Caspian area is **Chough-Thrush.** Pander's chough-thrush (*Podoces panderi*), a species about the size of a starling, with a long, stout, pointed beak, short rounded wings, and moderately long stout legs. Flying only when in danger, it commonly runs about on the sand after the manner of a fowl. In summer it feeds principally on beetles, and in winter on seeds. In colour it is delicate grey and pale pink above, with the throat white, the lower part of the neck and tail black, a black patch on the lores, and black and white wings.

Red-Footed Falcon. Among the birds-of-prey, the red-footed falcon (*Falco vespertinus*) is an inhabitant of the Caspian area and the corresponding latitudes of eastern Europe and central Asia. In Europe it is found in Hungary, Poland, and Russia, is very common in the Dobrudscha, and also occurs in Servia and Rumania, but is less abundant in Galicia, east Prussia, and Silesia, and thence westwards becomes rarer and rarer. In September and October it migrates,

following the course of the rivers, and appears in southern France, Switzerland, Italy, Greece, the Mediterranean islands, the shores of the Bosphorus, eastern Africa, Arabia, and India. It returns in spring, to nest on cliffs and high trees, or on ledges of rock and steep slopes, but never in the plains. Its nest has on rare occasions been found in central and northern Germany. In Hungary it takes possession of magpies' and jackdaws' nests, driving away the rightful owners, if necessary, with the assistance of its fellows. This falcon is gregarious, and generally hunts in the evening till late at night, a practice from which is derived its specific name. It preys chiefly on insects, especially locusts, following the swarms of the latter on their journeys in company with rosy starlings. It also catches small beetles on the ground, clutches them with its claws, and eats them piece-meal as it flies. After appeasing its hunger, it perches on the dry branches of a tree, or on a hedge or even a clod of earth. It takes its name of red-footed falcon from the bright red hue of its feet, the same colour obtaining on the lores. In the males the back is leaden grey, in the females bluish grey barred with black. In length this falcon is about $11\frac{1}{2}$ inches. The tail is black, the thighs are chestnut, and the claws yellowish white.

Imperial Eagle. A much larger bird, the imperial eagle (*Aquila heliaca*), is an inhabitant both of the forest and of the steppe. In plains and in mountains of moderate height, it frequents the forest where it is much less particular in the choice of its breeding-places than the golden eagle. In the steppe it nests among solitary groups of trees, and even in treeless districts. The nest, which is comparatively small and built of the usual thick sticks at the base, with thinner ones towards the top, is sometimes lined with green leaves, dry grass, wool, and other material. In April or later it contains two or three white eggs with regular violet grey and rusty-coloured spots and dots, and also forms a home for numerous sparrows, which build in its sides. Most of the nests are found in districts where dormice are plentiful, these rodents being the favourite prey of the imperial eagle. By no means so bold as the golden eagle, this species will nevertheless defend its nest even against that eagle with the greatest courage. Like the golden eagle, it performs playful evolutions in the air, holding itself more like a raven than a falcon, that is to say, more nearly horizontal. The imperial eagle inhabits south-eastern Europe and north-eastern Africa, and ranges eastwards into India and China. In Europe it breeds in southern Hungary, but more frequently in Slavonia, Transylvania, Servia, Rumania, Turkey, Greece, and the lower Danube. From southern Europe it does not migrate at all, or at least not far, but in more northerly parts it is a bird of passage, and in Africa is met with far up the valley of the Nile. The female, like that of most other birds-of-prey, is much the larger of the two, although not so vivid in colouring as the male. The total length of this eagle is from 30 to 33 inches. The feet are covered with dark feathers down to the toes; on the middle toe are five large scales, and on each of the rest of the toes four. The cere and feet are pale yellow; there is a white patch on the scapulars, and the tail shows indistinct ashy grey markings with a black bar at the end.

Steppe-Eagle. The nest of the steppe-eagle (*A. nipalensis*) has been found on the shores of the Volga, in central Asia, and in the Dobrudscha, where one was situated on the bare ground beneath the shelter of a shrub. The

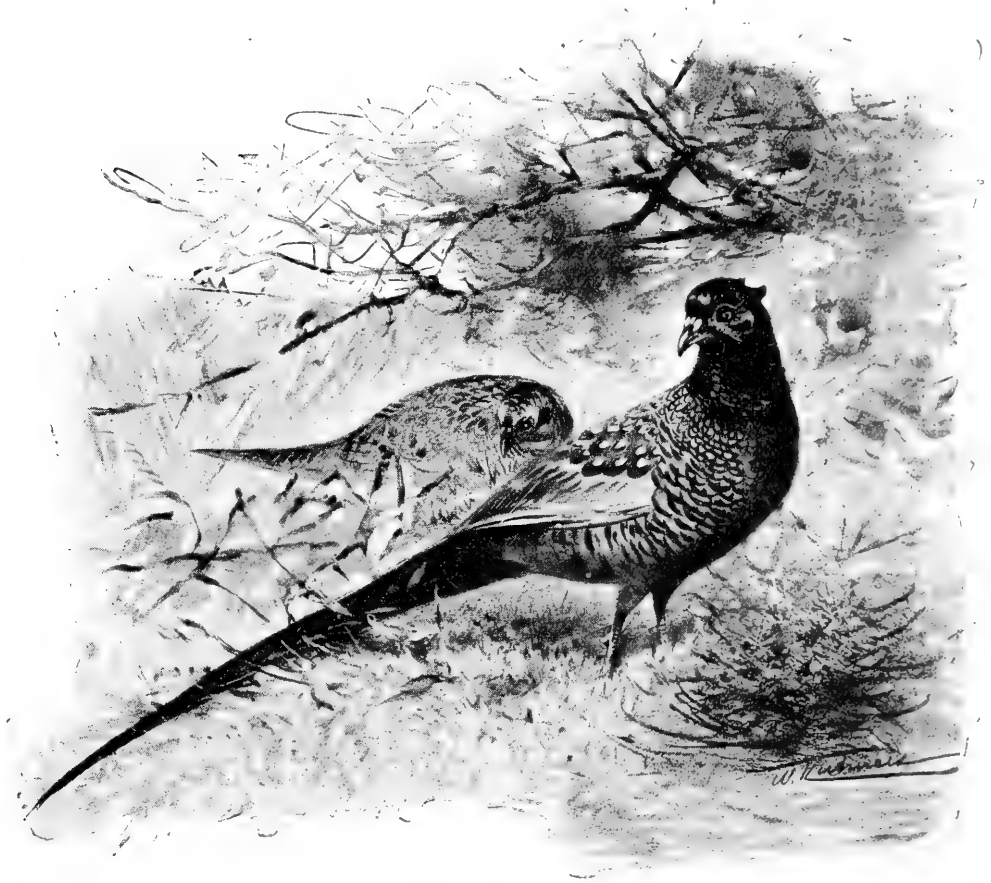
bird is not rare in India and in the neighbourhood of the Black Sea, and has been recorded from Pomerania and other parts of eastern Germany, though it apparently never strays as far as western Europe. Avoiding the forest, it keeps to wild open country. In general colour it is pale brown above and below, and in length measures about 30 inches. In size it is superior to the spotted eagle (*Aquila clanga*), which measures from 24 to 28 inches, and is slenderer in build. The home of the latter species is apparently the boundary between the Caspian and central Asia on one hand, and Siberia on the other.

Spotted Eagle. By no means a true steppe bird, the spotted eagle prefers leafy woods, especially those at some elevation. Its nest, generally placed on some tall old tree, is always covered with fresh, leafy branches. This species is distinguished from the lesser spotted eagle by its white tail-coverts, its superior size, and its call, which resembles the yelping of a hound. Its prey consists principally of ducks, geese, game-birds, young hares, marmots, mice, frogs, and beetles. This eagle, which migrates to the south in the middle of September, and returns in April, occurs frequently in southern Germany, Switzerland, Italy, and France. In northern Germany it is one of the rarest birds, but in winter is common in Egypt, although it does not apparently breed either there or in south-eastern and southern Europe. Since the two spotted eagles and the steppe-eagle have often been mistaken for one another, the boundaries of their respective breeding-areas are not yet accurately known.

Snow-Cock. On the Caucasian boundary of the Caspian and in Transcaspia there occur two kinds of game-birds unknown in Europe, namely, the Caucasian and the Caspian snow-cocks. The former (*Tetraogallus caucasicus*) which is 21 inches in length, is greyish above, and has all the feathers of the back marked with narrow black and light yellow bars. The back of the head and nape are reddish, and down the sides of the throat runs a reddish brown band. In the mountains this bird is found up to the snow-line, where it lives among rocks above the limit of trees, the vegetation consisting only of grasses and a few herbs. The Caspian snow-cock (*T. caspius*) is a larger bird, quite 24 inches long, differing in plumage by the absence of the reddish patch on the nape and head. It is similar in habits to the preceding species and like it feeds on young leaves, berries, and insects. In both species the cocks carry stout spurs, and in both sexes there is a long bare patch behind the eye.

Pheasants. The true pheasants are distributed in the wild state over southern, western, central, and eastern Asia, where they inhabit small patches of wood with low bushes or the edge of forests adjoining open country. Their best-known representative is the common pheasant (*Phasianus colchicus*), in which the cock measures about 37 inches in total length, and has spurs to the feet and short ear-tufts on the head, but no crest. The colour is glossy blackish green on the head, reddish brown on the lower part of the back and upper tail-coverts, black, buff, orange, and lake on the back and scapulars, red, green, and purple on the chest, breast, and flanks, dark green down the middle of the breast, and dark brown and rufous below, the eighteen brown tail-feathers having narrow black bars. From the shores of the Black Sea and the foot of the Caucasus, where it is particularly common near the river Phasis (from which it takes its name), and

from the adjoining districts of Asia Minor, the range of this bird extends to the Caspian. According to the old legend the pheasant was brought by the Argonauts from Colchis (the Mingrelia of to-day) to Greece, and by the Greeks carried to Italy, whence it gradually spread over Europe, where it has become thoroughly established in the warmer countries, such as Hungary, Austria, and Bohemia, but in the colder parts is maintained only by artificial preservation. In Europe the pheasant lives in woods and plantations where underwood is abundant, and is specially partial to those near water. Naturally it is a ground-bird, fond of



PHEASANTS.

dusting itself in sand or dust in sunny places, and finding its food chiefly on the ground. While feeding it slinks quietly amid the grass from one bush to another, escaping when disturbed immediately into the undergrowth. During the day pheasants seldom perch on trees, although they shelter amid their branches at night. Where trees are wanting they will, however, roost contentedly in bushes. Although not migratory, in autumn, when the leaves begin to fall, they take to wandering about the country to a considerable extent.

For nesting the hen chooses a quiet spot in some thicket but she will also lay under low bushes amid grass, clover, or even corn, the nest being always well

hidden. At ordinary times and while searching for food, the cock slinks about with stooping body, and only when on the alert raises his ear-tufts. Generally the tail is carried horizontally, but at certain seasons both this and the ear-tufts are elevated, when the bird struts about with the breast well forward and the neck thrown back, clapping his wings, and now and then gliding in a curious manner along the ground. In Europe, pairing-time lasts throughout April and May, the hens beginning to sit on their eight to fifteen eggs during the latter month. The eggs are well concealed in some hollow in the ground lined with twigs, moss, leaves, etc. In shape they are round oval, and in colour uniformly brown, olive-brown, or greenish. After twenty-five days, during which period the cocks do not take the slightest notice of their partners, the young are hatched. When a week old, their tail and wing feathers begin to appear, and when the size of quails they are almost fledged and capable of flying short distances, and soon after this are able to follow their mother to the branches of a tree to roost; the mother and her family keeping together until autumn. When surprised, young pheasants chirp, and when excited, utter a low harsh "girr," followed by a high whistling "rick"; when frightened, they lie with their bodies pressed close to the ground till the danger is past. The danger-signal of the hen is a low hissing "she," but occasionally a sonorous "kak kak." The crow of the cock is a rapid repetition of "or-ork." Old pheasants are easily frightened, and when danger threatens retain the habit of pressing the body close to the ground, and trying to hide the head. Although pheasants have a noisy and apparently heavy flight, when once well on the wing they fly fast and straight, gliding down from a height without moving the wings. On the ground they walk with long strides, and generally try to escape by running, their speed being very great, and the distances traversed on foot often very considerable.

Young birds eat small insects, especially the so-called ant-eggs, which the hen finds for them. Adult pheasants feed, according to the time of year, either on insects and snails or on leaves, berries, beechmast, acorns, corn, and other seeds. Foxes are the principal enemies of these birds, but cats, martens, hedgehogs, and rats also kill them or rifle their nests. Peregrines, kites, buzzards, sparrow-hawks, and other birds-of-prey also destroy a considerable number in some districts, while ravens, crows, magpies, and jays steal both the eggs and the helpless young. A large number of pheasants perish through storms, floods, and continued rainy or frosty weather, the young being particularly sensitive to wet. If a pheasant escapes from all these dangers, and last, but by no means least, the gun of the sportsman or the net of the poacher, it may reach the age of fifteen years. Pheasants are unsuited for domestication, as they are restless and continually trying to escape, so that the only way to breed these birds is to put the eggs of wild pheasants under domesticated hens.

The common pheasant, whose native home is the Caspian district and the countries to the west of the same, has many relatives in the Caspian and Chinese areas. The species or races west of the meridian of Calcutta form a group characterised by having the feathers of the lower part of the back chestnut-brown in colour, while in those found to the eastward of the same line the lower part of the back is always slatey grey. Moreover, all the northern species are distin-

guished by the presence of a white ring round the neck, which is absent in the more southern forms. In the British Isles the so-called "Old English pheasant," which appeared on the bills of fare long before the Norman Conquest, and is thought to have been introduced by the Romans, is now rare owing to the introduction of the Chinese ringed species (*P. torquatus*), with which it has been so freely crossed that the present birds are nearly all hybrids, and, whether with or without a white collar, combine in varying degrees the characters of both species.

Pallas's Sand-
Grouse.

Pallas's three-toed sand-grouse (*Syrrhaptes paradoxus*) inhabits the Kirghiz steppe, and extends thence into northern China. It is



PALLAS'S SAND-GROUSE.

specially characterised by the feathered feet and toes, the long and pointed wings, and the wedge-shaped tail, of which the two middle feathers terminate in long points. The general colour of the plumage is sandy, and the entire length about 15 inches. The back and shoulders are ornamented with black transverse markings, and on the throat and along each side of the neck are patches of rusty red. There are no black spots on the sides of the neck, but across the breast is a white band streaked transversely with black, and there is a black transverse patch on the abdomen. The colouring harmonises so well with that of the barren soil of the native home of this species that at a distance of only forty feet the bird is almost invisible. The hens lack the band across the breast, and the patches on the throat and the sides of the head are buff. This sand-grouse walks with the

body sloping downwards, the plumage bristled up, the head dropped between the shoulders, and the feet pointing inwards. When picking up food, it adopts a peculiar attitude, bowing the head so low and holding the tail so high that the bird looks as though it were about to turn a somersault. Awkward though it may appear on the ground, it is, however, extremely active on the wing, its flight resembling that of the golden plover. On starting, the bird flaps its wings like a pigeon, but when in full flight moves with great rapidity. When on the wing, flocks of these birds assume the form of a solid triangle, with the apex in the direction of flight, travelling at a height of about 200 feet from the ground. More generally, however, they fly in files at a height of from 15 to 30 feet, although single birds often rise higher. When rising, they utter a high shrill "tick, tickticktick, tick"; the call is "kurr kurr," and sometimes there is heard a low sonorous "geluk geluk."

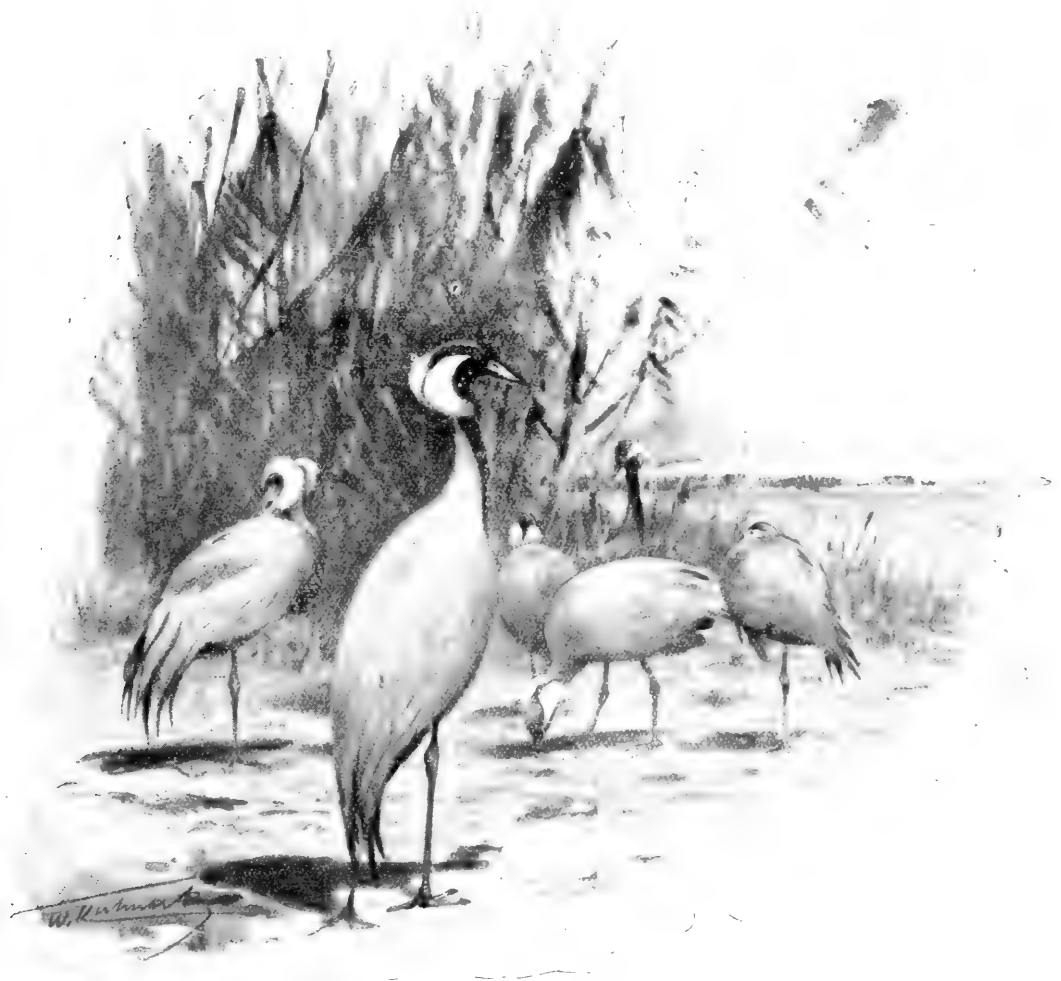
In the middle of April the hens begin to brood their three or four eggs, which are greenish or greyish yellow, spotted with brown and lilac, and are laid in a slight hollow with little or no lining. A second clutch is laid during the summer. In the late autumn these sand-grouse migrate to warmer regions, whence they return in March or the beginning of April to their breeding-grounds. In summer they wander considerable distances over their native steppes, and, like other birds inhabiting the same area, sometimes leave their home to appear in innumerable flocks in more western lands. In 1859, for instance, multitudes appeared in Europe, as they did again in 1863. In the latter year most of the countries north of the Alps, including France and England in the west, Switzerland in the south, and Jutland in the north, were visited by these birds in great numbers. In consequence, however, of the destruction inflicted on the flocks by gunners, very few appeared the following season. In 1888 occurred another incursion when the flocks visited Prussia, Pomerania, Mecklenburg, Schleswig-Holstein, Hanover, Oldenburg, Saxony, and Bavaria, and continued their journey in a westward direction to Great Britain.

These long wanderings of Pallas's sand-grouse do not, however, lead to any increase in the size of its normal distributional area; and they probably occur merely in consequence of unfavourable weather, or a temporary scarcity of food. Their nutriment apparently consists solely of green vegetable substances and seeds, no less than forty-five different kinds of seeds having been taken from the crop of a specimen killed in Scotland in 1889. In its partiality for vetch-seed this bird resembles pigeons, to which it also approximates in its bodily form and peculiar way of drinking.

**Demoiselle
Crane.**

The Caspian province forms almost the centre of the distributional area of a small species of crane, which ranges from Algiers through northern Africa, south-western Asia, the Caspian countries, and the central Asiatic steppe as far as China, and winters in southern India and central Africa, especially on the White Nile. This bird was known to the ancient Romans as the "virgin from Numidia," and is now called the demoiselle crane (*Anthropoides virgo*). Its chief habitat is the country round the mouth of the Volga, where it dwells amid the steppes and marshes. It resembles the European crane in the choice of its nesting-places, as well as in being a bird of the open country rather than of the

swamps. In size this species is considerably smaller than the common crane, measuring only about 30 inches in total length. Among its characteristic features may be noted the long and pointed quills, the tuft of long whitish feathers behind each ear, and the generally ashy tone of the plumage, relieved on the head, chin, throat, quills, and tail by black. The demoiselle crane is a slender bird, with graceful movements and a playful and gentle disposition. Occasionally it wanders as



DEMOISELLE CRANES.

far away from its proper habitat as Heligoland and south Sweden, but such stragglers as have been reported in the British Isles had probably escaped from captivity.

Macqueen's Bustard. A very characteristic bird of the Caspian province is Macqueen's bustard (*Hubara macqueeni*), which normally ranges from northern Persia and Afghanistan to southern Siberia, and visits southern Persia and north-western India in winter. It leaves the Caspian area in September, to return in March or April. In length this bustard measures about 26 inches, and it is easily

recognised by its crest of black-tipped white feathers, and conspicuous ruff. The general colour of its plumage is, however, adapted for a life in the desert, and even beyond its breeding-area this bird is only to be found on dry sandy plains. Shy and difficult to approach, this bustard when alarmed in the desert squats on the ground beneath a bush or behind a stone, but when sheltered by covert stands up to survey its pursuers. It feeds principally on plants, but also eats beetles, and even during winter keeps chiefly in pairs, although occasionally congregating in small flocks such as sometimes stray westward into Germany and send out stragglers still farther west.

Another bird of the Kirghiz steppe and the deserts of central Asia is the Asiatic dotterel (*Egialitis asiatica*), which has occasionally been caught in Heligoland and has strayed into England. In this dotterel, which is 7 inches in length, the colour of the upper-parts is light greyish brown; the quills are dark brown, the primaries having white shafts, while the forehead, cheeks, and under-parts are white. There is a broad black-edged chestnut band across the neck, which turns light rusty grey in winter, when the white feathers on various parts of its body lose their pure tint. In winter this bird visits India and Cape Colony where it has been observed to feed chiefly on beetles and other small insects.

The marsh-green-shank (*Totanus stagnatilis*), which frequents the swampy shores of slowly running rivers, where it is found more commonly during its spring migration in April and May than on its autumn migration in August, breeds in the area extending more or less round the Caspian. On migration it visits India, Australia, and South Africa. It is not rare in Hungary, where it breeds in some parts; in Germany it appears only in a few places, and it has strayed into the British Isles. In character and habits it resembles the common greenshank, although the beak is more slender, the leg longer, and the size much less, the length being only a little over 9 inches. The upper tail-coverts are white with black bars, and the tail-feathers white with brown speckles on the outer web.

The bramini duck (*Tadorna casarca*) is a common breeding-bird in Bulgaria, and on many lakes in southern Russia, especially in the Dobrudscha, but rarely visits Germany and Switzerland. Its principal breeding-area, however, is in the countries round the Caspian, the Sea of Aral, and the waters of central Asia. In autumn it migrates to southern Asia, Asia Minor, and the Mediterranean countries as far west as Morocco. This duck often nests at a long distance from the water, the nest being placed in burrows, especially those of the bobac or marmot, or in holes made by the bird itself, in hollows of trees, among stones, or in natural crevices on the shore. When the nest is far from water the young either walk there, or are carried by the duck in her beak, one after the other. When in a tree or other elevated position, the ducklings drop down without hurting themselves, either on to the water or the ground. The drake, which is 25 inches in length, has the general colour rusty brown, and the head pale buff; on the neck is a narrow black ring; the wing-coverts are white, and the primaries, as well as the tail, beak, and feet, black. The female has no ring round the neck.

White-Headed Duck. Another species whose habitat centres in the Caspian province is the white-headed duck (*Erismatura leucocephala*), which belongs to the group distinguished by having from sixteen to twenty-four stiff narrow feathers in the tail. This duck is easily recognisable by its white head, in which the centre of the crown, like the back of the neck, is black, by the small wings, long graduated tail, rusty and yellowish brown general colouring, and the large nail to its bluish beak. When swimming, this species spreads out its tail like a fan, and carries it almost vertically. It is about 17 inches long, and ranges from the Caspian to Siberia in the north, Mongolia in the east, and through southern Russia to Transylvania and Hungary in the west. It appears occasionally on the Rhine, the Lake of Constance, and the adjoining countries down to the shores of the Mediterranean. In Transylvania it arrives as a regular breeding-bird in the middle of May in small flocks which split up into pairs. Soon afterwards the females seem to disappear owing to their being occupied on their nests, while the males are left to associate by themselves. The nest is a floating one fastened on all sides to stems of reeds and other water plants, and contains at the proper season eight or nine greenish white eggs. This duck feeds on water-insects, small fishes, molluscs, and aquatic plants, and gets its food by diving, in which it excels all other species.

Little Gull. The little gull (*Larus minutus*) is found on the shores of the North Sea and the Baltic. It is found breeding on Lake Ladoga, but is more numerous in warmer countries, and is principally at home on the Caspian at the mouth of the Volga, being less frequent on the Black Sea, though in winter and spring it often visits the shores of the Mediterranean. This gull swims less than others of its kind, and is much more constantly on the wing, its food consisting of water-insects, small molluscs, and fishes. It has a shrill call. In size it is hardly equal to a tern. As regards coloration, its distinctive points are the black head, the greyish black under surface of the wings, and the red beak and legs.

Reptiles. Among the reptiles of this area, the Caspian terrapin (*Clemmys caspica*) is the most remarkable. Living in slow and stagnant waters, it ranges down to the Persian Gulf and through southern Russia and the Balkan Peninsula to Dalmatia. It is from 8 to 10 inches in length, and yellowish green or olive in general colour, marked with orange-yellow edged with black, the black under surface showing yellow spots, and the neck and legs yellow stripes.

Two lizards of the agamoid group inhabit the Caspian and south Russian steppes, one of these, the Caspian agama (*Agama sanguinolenta*), being about 16 inches in length, and brownish grey in colour above, marked with four rows of large black spots, and plain pale yellow below. Associated with this species is often found the eared lizard (*Phrynocephalus mystaceus*), which lives principally on the rivers Kuma and Terek discharging into the Caspian Sea; and like all its kindred, is distinguished by the rounded, almost toad-like head, the long slender legs, and toes serrated at the edges. The eared lizard, which has a total length of about 17 inches, shows at each corner of its mouth a patch of skin covered with thin scales, which when the animal is under the influence of excitement becomes either red or blue, and thus stands out conspicuously from the dull yellow or brownish grey with numerous black spots of the upper surface, as well as from the uniform whitish yellow under surface.



FOUR-HORNED ANTELOPE.

CHAPTER V

THE INDIAN FAUNA

INDIA, together with Burma and the Malay countries and a portion of China, forms the Oriental or Indian region of zoological geography. But in a work of the present nature it will be convenient to treat India by itself, and at the same time to ignore the zoological provinces into which it is divided by the students of geographical distribution. In this sense the Indian area extends from the Indus to the Bramaputra, and embraces the whole Indo-Gangetic plain and the entire peninsula, the northern boundary of the tract being formed by the great barrier of the Himalaya.

The vegetation, climate, and other physical conditions differ enormously in different parts, but since a large number of readers are probably more or less intimately acquainted with these variations, it will scarcely be necessary to describe them in these pages, and the consideration of the numerous remarkable types of animal life met with in this vast area is accordingly entered upon without any preliminary matter of this nature.

Chital or Spotted Deer. One of the most characteristic, and at the same time one of the handsomest, of the larger Indian mammals is the chital, or spotted deer (*Cervus axis*), which is distributed over a large extent of the mainland, and also occurs in Ceylon. In size this species may be said to be medium, the stags in northern and central India standing about 36 or 38 inches at the shoulder, and measuring nearly 6 feet in length, although in southern India they are somewhat smaller. The antlers of the stags, which are commonly about 30 inches long, although a

pair of 38 inches is known, resemble those of several kinds of Oriental deer in having normally but three tines aside, both the bez and trez tine of the red deer group being absent. They consequently end in a simple fork, of which, in this particular species, the hinder or outer branch is always considerably larger than the other. In the angle between the brow-tine and the beam there are, however, often several small irregular snags, which in most cases are the only abnormal points. The ground-colour of the coat of the chital is a reddish fawn, spotted at all seasons and ages with white all over the body. From the nape to the tip of the rather long pointed tail runs a dark stripe, bordered on each side by one or two rows of white spots along the back, these white spots often joining into a streak on the lower parts of the sides. The chin, the upper part of the throat, the underparts, the inner sides of the limbs, and lower surface of the tail are pure white, as are the insides of the otherwise brown ears. The uniformly coloured head is brownish, darker on the face than elsewhere, with a black band above the muzzle. Now and then blackish or reddish spotted varieties are met with. The chital stag has no mane, the muzzle is broad, and there are usually no upper tusks, although these have been found in a few does.

Bushes and trees near water, as well as bamboo-thickets, form the favourite haunts of this beautiful deer, which frequents river-valleys as well as hilly districts, but is never found far away from its drinking-places. Many of its haunts are situated amid the finest scenery of the plains and lower hills, in situations where tall flowering trees stand along the banks of streams, or where clearings of rich grass alternate with clumps of bamboos. In such places may be seen at all seasons herds of several hundred, for the chital is a gregarious species. It is, moreover, by no means exclusively nocturnal, and may often be seen grazing three or four hours after sunrise, while it is abroad again an hour or two before sunset. In the daytime it rests in deep shade, grazing or browsing, and it generally drinks between eight and ten in the morning, although at different hours in different seasons. Chital have no objection to going into water, and swim well. How long the does carry their young is not definitely ascertained, some say eight months, others six. The pairing-time seems to be irregular; it is commonly said to begin in September, and, in northern India, in the cold season, but young may be born apparently at any time of the year. In the retention of its white spots throughout the year the chital agrees with several other species of deer inhabiting tropical countries; and thereby differs from species like the fallow deer and the Japanese deer, which lose their spots in winter, when, owing to the absence of leaves from the trees, there is no need for a colouring of this type.

Sambar. The largest Indian deer, the sambar (*C. unicolor*), the woodland deer of south-eastern Asia, is spread widely over India, and occurs wherever undulating or mountainous country is covered with forests. In the Himalaya it is found up to the height of 10,000 feet, and in southern India and Ceylon is common even on the tops of the mountains. Unlike the chital, it is rare in the river-valleys but, like the former, is absent from the Punjab, Sind, and western Rajputana, where the deserts or semi-deserts are unsuited to the habits of deer of all kinds.

The sambar attains a shoulder-height of 4 feet, and a length of 7 feet 6 inches,

the tail measuring about a foot. This is the size of stags, but hinds are somewhat smaller. In countries beyond India proper the antlers of sambar seldom grow longer than 35 inches, and one of the largest known pairs has a length of 48 inches. Fully developed antlers have only the usual three tines of this group of deer, and they are less subject to irregularities than those of most other Oriental species. The brow-tine forms an acute angle with the beam, and the two tines of the terminal fork are generally equally developed in the typical Indian race of the species, although they are subject to considerable variation in this respect among the local races. The sambar has a large muzzle and coarse hair, the stags generally having a mane on the neck and throat. The general colour of the coat is uniform dark brown, sometimes tending to grey, and sometimes of a pale yellowish hue, becoming a little paler below, with some chestnut on the hind-quarters and under-parts. Old stags are sometimes almost black or slaty grey. In the typical Indian race the fawns are not spotted, although they are so in the Malay form. Sambar are seldom found in large herds, but generally alone, or in small family-parties of four or five or a few more. They are mainly nocturnal in their habits, and although they may sometimes be seen grazing in the open at morning and evening, they generally feed during the night, passing the day amid thick covert. In addition to grass and various wild fruits, they feed largely on young twigs and leaves. The pairing-time in the Indian plains is during October and November, but in the Himalaya is said to be in spring. It is at this season that sambar gather in herds, and the loud call of the stag resounds during the darker hours. Rarely is there more than one fawn at a birth, and the period of gestation is eight months. The antlers are generally shed about April, but may fall at any season, and in many cases apparently they are not cast every year. The call of the stag is a loud, metallic bellow; that of the hind a shriller and rather weak grunting. When a sambar scents a tiger or leopard, or beholds a human being, it utters a sharp, hissing danger-signal. A large number of these deer are killed by tigers and wild dogs, while some of the stags meet their death in combats among themselves.

The sambar has a very wide distribution, extending from Ceylon and the Malay countries to Sze-chuan in north-western China.

Hog-Deer. A smaller ally of the sambar, the para, or hog-deer (*C. porcinus*), inhabits the whole plain of the Indus and Ganges from Sind and the Punjab to Assam, and thence ranges into Tenasserim. Common in the Terai, but never ascending the mountains, it may enter the Indian peninsula within a small area along the tributaries of the Ganges, but it is doubtful if it occurs in central India, and the statement that it is indigenous to Bombay and Madras is probably due to its being mistaken for the muntjac. Hog-deer have been introduced into Ceylon, where they are confined to a small area near Mathura. A local race (*C. p. hecki*), inhabits Siam.

The hog-deer has rather a long tail, and short legs, and fairly long pedicles to the small three-tined antlers, the brow-tine of which forms an acute angle with the beam, while the outer tine of the terminal fork is longer than the inner one. In shoulder-height it is only about 24 inches, and its length from 42 to 44 inches, the tail measuring about 8 inches. The antlers, which are shed in April, do not as

a rule exceed a foot in length, but in a few very rare cases are known to attain 19 inches. In colour the hog-deer is more or less of a reddish or yellowish brown, with a whitish speckling or grizzling, owing to the white tip of each hair; below the colour is darker brown. In summer the insides of the ears and the under surface of the tail are white, and the general colour is paler and more or less distinctly spotted with pale brown or whitish. It has been doubted whether full-grown hog-deer were ever spotted, but specimens in captivity have been observed to assume these spots every summer. Young hog-deer up to the age of six months are spotted all over.

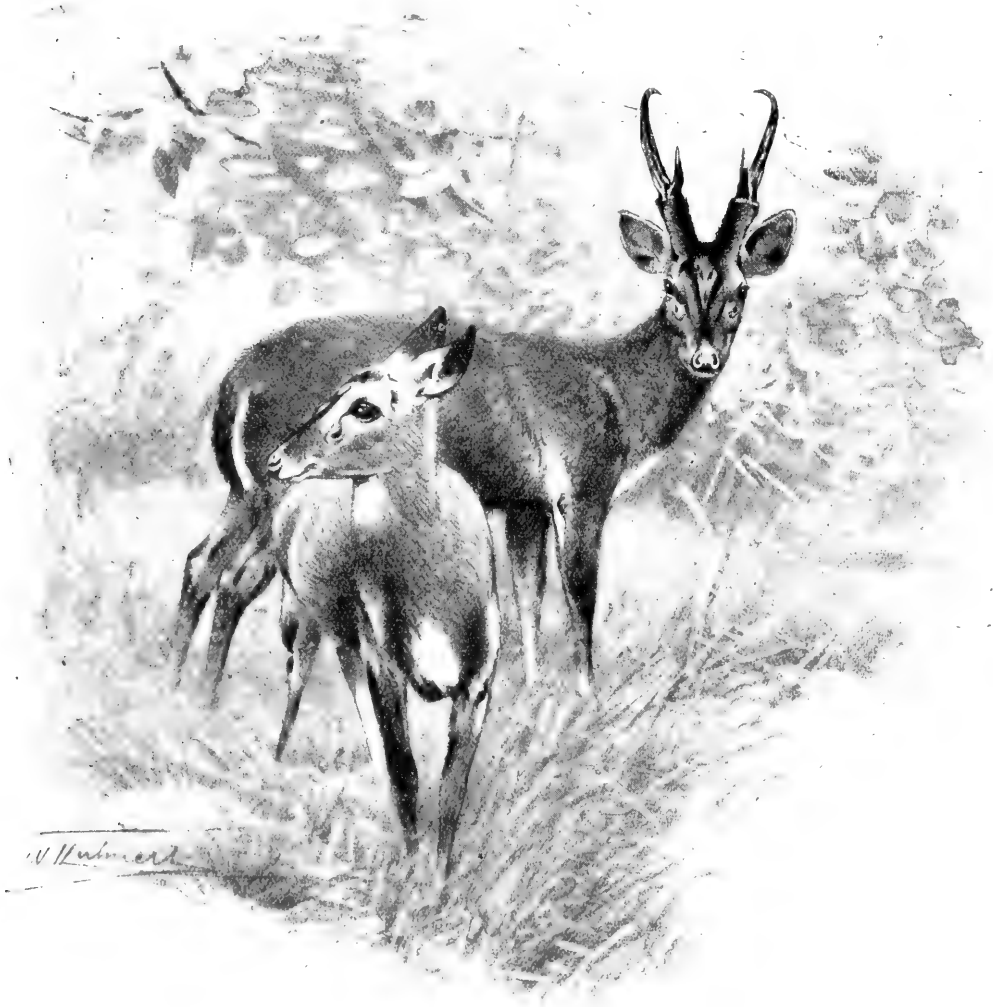
The para inhabits alluvial plains, to which it is almost entirely confined. In many grassy districts it exists in great numbers, keeping principally among the long grass mingled with tamarisk and other bushes, which form the favourite haunt of the Indian rhinoceros and buffalo. Although a small jungle often shelters a considerable number, more than two or three of these unsociable animals are seldom seen together, and they are generally found alone. By no means graceful in their movements, hog-deer run in a clumsy manner, holding the head very low; yet they require a good horse to overtake them. The pairing-season is said to be in September and October, and the period of gestation eight months.

Swamp-Deer. The barasingha or swamp-deer (*C. duvauceli*) inhabits the foot of the Himalaya from upper Assam to the Kyarda Dun west of the Jumna; and is found all over Assam, as well as in some parts of the Bengal Sandarbans, and at Bahawalpur and Rohri in upper Sind; it also occurs in the district between the Ganges and Godaviri River. These deer likewise inhabit certain parts of the valley of the Narbada as far as Bastar and its neighbourhood to the south, and are also spread over the central provinces in the same tracts as the dammar tree and the red jungle-fowl. The barasingha (which must not be confounded with the species thus miscalled in Kashmir) attains a shoulder-height of about 45 inches, and has a length of almost 5 feet, the tail measuring some 5 inches. The ordinary length of the antlers is 30 inches, but a specimen of 38 inches is known. The antlers are smooth, with the brow-tine forming almost a right angle with the beam, and often carrying small snags on the upper side; the bez-tine and trez-tine are absent, but the two branches of the main fork of the beam again subdivide, so that there are at least four points on each side, and frequently more. The somewhat woolly hair is rather thin, and forms a mane on the neck. In winter the colour is yellowish brown above, and paler below, but in summer it is a rich reddish brown, more or less distinctly marked along the back with one or two rows of whitish spots. The under-parts are white or whitish. The hinds and fawns are paler coloured, the latter being fully spotted.

The barasingha does not live in the forest, but on its outskirts, in plains or undulating country covered with grass and a few trees, and hardly deserves the name of swamp-deer commonly applied to it in certain parts of north-eastern Bengal. In winter these deer wander about in herds of from thirty to fifty or more, but in spring solitary bucks are often met with. They feed principally on grass, and are apparently much less nocturnal than the sambar, being often seen grazing late in the forenoon and again early in the afternoon. They rest in the shade at noon, and, if we may judge from their habits in captivity, are fond of the

water during the hot season. Unlike the species previously mentioned, this deer has no gland and tuft of long hair on the outer side of the hind-leg.

Muntjac. The muntjac, or kakar (*Cervulus muntjac*), is a small and peculiar kind of forest-deer which is never seen in the open plains. In the Himalaya it ranges up to 5000 feet, and even higher. Rare



MUNTJACS.

in central India and the north-west, this or closely allied muntjacs range eastwards as far as Hainan and through the Malay Peninsula and Archipelago to Borneo. Muntjacs have small (in some cases almost rudimentary) antlers carried on the top of long pedicles which are continued on two rib-like ridges down the face. There is a small brow-tine, directed upwards, to each antler, but no branch above this; and the tips of the beam incline inwards. A black line runs down the inner side of

country, though in the wilder parts of its range it occasionally grazes in cornfields. It feeds principally on grass, including sprigs of bamboo, but will not touch bamboo-leaves, although it eats the leaves and even the bark of other trees. Early morning and early evening are its chief feeding times; and it drinks and rests during the day.

Gaur are excellent climbers, descending and ascending the steepest slopes with the greatest ease. Like most large Indian animals, they are extremely suspicious of danger, although in wild parts where, as a rule, they are safe from attack, they are not quite so cautious. When wounded they will sometimes turn against man, and solitary bulls have attacked intruders, without being molested.

The calves, which all have a black stripe down the back, are generally born in August or September, but some as early as April. Gaur have never been known to live in captivity beyond their third year; and all recent attempts made to domesticate them have failed, though they were undoubtedly domesticated in the mountains between Assam and Burma in former times; the gayal of this region being a domesticated form of the species.

Asiatic Buffalo. The habitat of the Asiatic buffalo (*B. bubalis*) includes the plains of the Bramaputra and Ganges from Assam to Tirhut, from the Terai to Rohilcund in the west, as well as the plains of Midnapur and Orissa near the eastern coast, the eastern side of the United Provinces as far south as the Godaveri and the Pranhita, and perhaps a little beyond. The species is also common in northern Ceylon. As a domesticated animal its area extends into the Malay Peninsula and as far west as Italy; some of the small Malay forms of the species probably, however, represent local wild races, as is the case with one from Borneo.

The Asiatic buffalo, especially in old age, is very thinly haired; its colour is dark ashy grey, almost black, the legs, which are thick and short, being sometimes white. The animal is of heavy build, and has large hoofs, a rather short tail, a large wide muzzle, and a long head which is carried low. The forehead is comparatively flat, and the large and angulated horns are black in colour. Two distinct types of horn—the one sharply and regularly curved, and the other extending straight outwards for a considerable distance—exist, these representing either distinct local races or dimorphic phases of the species. Apart from this, a pale brown variety occurs in Assam.

The height of the typical race of this Indian buffalo is about 64 inches; the length of the head and body 9 feet 7 inches; and that of the tail 47 inches. The horns may reach a length of 79 inches measured along the curve. The wild buffalo is generally found in marshy country, where it frequents grass-jungle, although it sometimes inhabits open plains or low scrub-jungle, and very rarely forests. It associates in rather small herds and feeds principally on grass, grazing in the mornings and evenings, and resting in the high grass during the day. By no means shy, and not avoiding the neighbourhood of man, the buffalo often inflicts great damage on crops, a herd, or even a solitary bull, sometimes taking possession of a field, and keeping out the rightful owner. Although an old solitary bull will occasionally attack a human being without provocation, a herd will rarely rush at an intruder, unless he takes to flight. The



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courage of the animal, is, however, unquestionable even in captivity, and a single individual will not hesitate to charge an elephant, while a herd will attack a tiger or any other dangerous beast-of-prey as soon as it appears on the scene.

Tame as well as wild buffaloes are fond of bathing, and love to lie in shallow water during the heat of the day, with only part of their heads above the surface. The pairing-season for both the tame and the wild forms is the autumn. After ten months, or perhaps a few days more, the cow brings forth one or two calves. It is somewhat remarkable that the tame buffalo, which is kept for its milk and as a beast of burden or draught, never associates with the humped Indian domesticated cattle, although tame buffalo cows often pair with wild bulls of their own kind.

The domesticated Indian humped cattle (*B. indicus*) differ from **Humped Cattle.** European cattle, not only by the presence of the large hump on the withers, but in colour, voice, and habits, the difference being so great that they undoubtedly represent a distinct species, probably derived from the wild bantian (*Bos sondaicus*) of the Malay countries; the hump being a feature due to domestication. Humped cattle have a somewhat vaulted forehead, with uniformly curved horns, long ears, and a large dew-lap occupying the whole length of the throat. The colour varies in individuals and breeds, but, generally speaking, the legs have a white ring round the fetlock. Most are of a pale fawn, some cream-colour, others milk-white, while a few are red and brown, black, or even mottled. The difference in size is greater than that of colour, the largest of the so-called Bramini bulls standing as high as a buffalo, while the smallest are scarcely larger than a European calf about four weeks old. They are used by the natives of India mainly for draught purposes; but some of the bulls are specially protected by the Hindus and allowed to wander at will in the bazars and about the towns. In certain districts of India these cattle have reverted to a half-wild state, and on the sea-coast near Nellore there is a large-sized half-wild breed with long horns. In northern India the zebu, as this species is commonly called in Europe, seems to have formed a variety of mixed breeds by crossing with ordinary European cattle which have been introduced.

The Indian gazelle (*Gazella bennetti*) inhabits the plains from **Indian Gazelle.** the river Kistna and Palamau, northwards throughout the United Provinces, but is replaced in Baluchistan and eastern Persia by the allied *G. fuscifrons*. Both sexes are horned, the horns of the bucks being ringed and showing a very slight double curve, with the tips pointing upwards and not far apart; those of the females are much smaller, smooth, and conical in shape. The bucks have a shoulder-height of 26 inches, and a length of 41½ inches to the root of the tail, the tail itself measuring 8 inches. Their horns measure from 10 to 12 inches. The colour is chestnut-brown above, becoming darker on the sides and thighs, where the brown blends into the white of the lower-parts, the tail being blackish. A white stripe runs down each side of the face, which is of a darker reddish tint between the bases of the horns and the nostrils, and there is sometimes a dark spot over the nose, and always a dark stripe on the outer edge of the light stripes on the face.

The Indian gazelle is generally seen in parties of from two to six, although there are sometimes as many as twenty. Frequenting waste ground, especially in

places broken up by ravines, it is rare on alluvial plains, but more common among sand-hills and scattered trees. Like other gazelles, it gets over the ground very quickly, and can seldom be overtaken by dogs. When startled, it does not jump in the air like the blackbuck, but stands hissing and stamping with its fore-feet on the ground. It is closely related to the edmi gazelle of northern Africa, as well as to two south Arabian species (*G. arabica* and *G. muscatensis*).

Blackbuck. The blackbuck (*Antilope cervicapra*) inhabits the treeless plains of India from the foot of the Himalaya to the neighbourhood of Cape Comorin, and from the Punjab to Lower Assam, but is not found either in Ceylon or east of the Bay of Bengal, or down the Malabar coast from Surat southwards. It is not met with in the marshy delta of the Ganges, but is abundant on the plains near the shore at Midnapur as well as in Orissa.

The blackbuck, which is the only representative of its genus, is of moderate size, standing 32 inches at the shoulder, and measuring 48 inches to the root of the tail, the latter, which is compressed, measuring 7 inches. The hoofs are pointed, and the knees furnished with tufts of long hair. As a rule only the males are horned, the horns being close together at the base, and then diverging to form a more or less closely wound spiral. They are circular in section, ringed throughout, and at the tips from 7 to 20 inches apart. They do not generally exceed 20 inches in length, but in Rajputana and Harriana are longer, and in some cases measure over 28 inches. Full-grown bucks are blackish brown above, and in old age almost black, though the nape remains reddish brown, and the face is blackish brown. There is a white streak below the ears, and the eyes are surrounded by white circles. Does and young bucks are fawn-colour above and at the sides, and like the older bucks, white below, in sharp contrast. Old bucks show a pale streak along the line of division between the dark and the light areas. This antelope lives in herds, sometimes numbering thousands of every sex and age, but oftener consisting of from about ten to thirty, or even fifty, females and fawns, accompanied by one old buck. Sometimes two or three young bucks of the same sandy colour as the does associate with the herd, but these are generally driven away by the old bucks, and form parties by themselves.

Like most animals dwelling on open plains, blackbuck have apparently no fixed times for grazing, although they are in the habit of resting at mid-day. They seem to frequent the neighbourhood of water not so much for the sake of drinking, but for the fresh green grass growing in such situations.

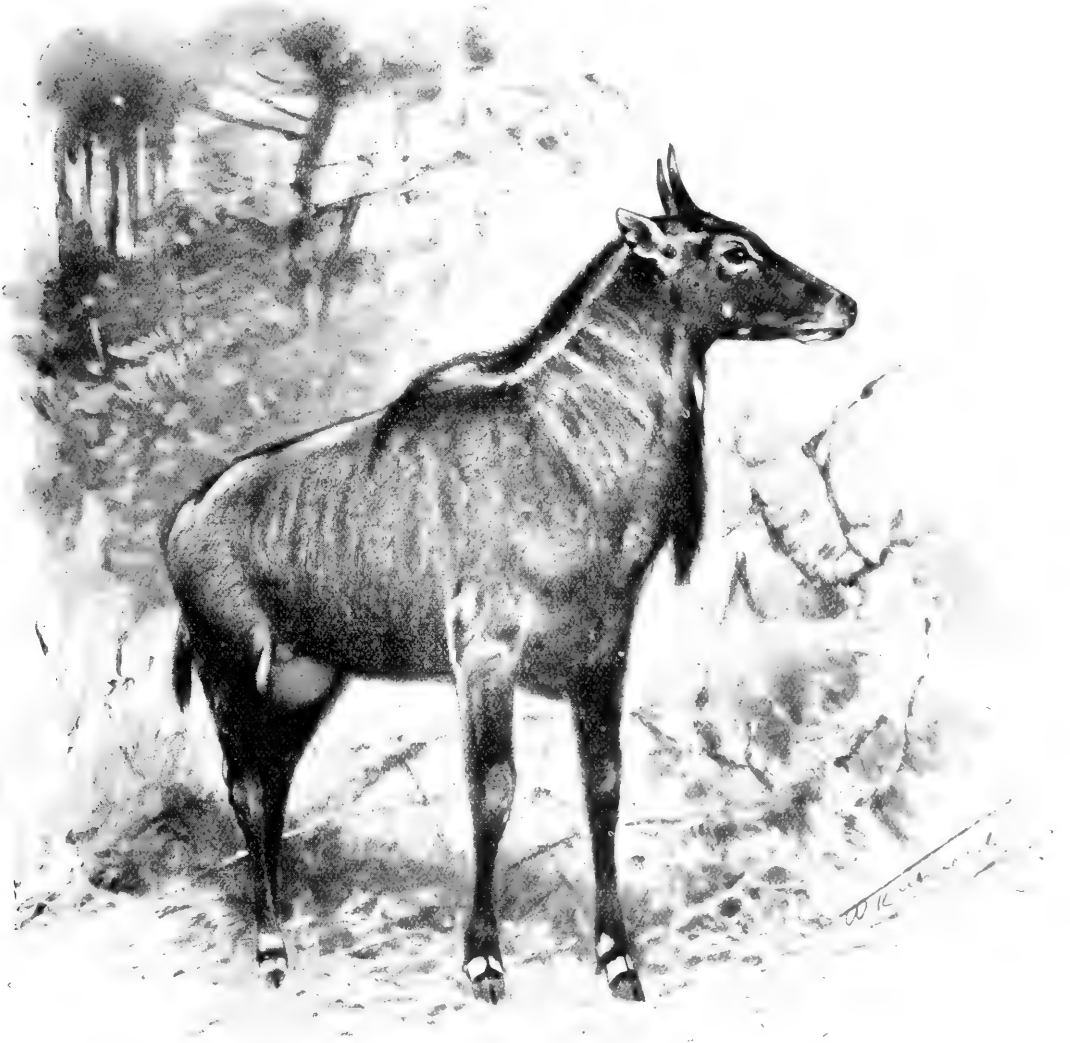
Like the African springbok, the blackbuck is in the habit of occasionally leaping into the air, and this habit is generally indulged in by all the members of a herd one after the other when they scent danger, and are about to take to flight. Many blackbuck are taken by the natives in nets and snares; and they are also caught by means of a tame buck which, with a cord attached, is induced to mingle with the herd. In the fight which is sure to ensue between this buck and the leader of the herd, the latter is captured.

Four-Horned Antelope. The four-horned antelope (*Tetraceros quadricornis*) is the only hollow-horned ruminant furnished with two pairs of horns. These appendages, which are confined to the bucks, are short, smooth, and conical in shape, one pair being situated between the eyes, and the other behind them. The hind pair



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are much longer than those in front, which are sometimes reduced to small knobs, and may be altogether wanting. The hair of this antelope is thin, coarse, and short, but rather long on the tail; the general colour is of a more or less reddish hue, the fawn of the back gradually blending into the white of the lower-parts on the sides



NILGAI.

and legs. A dark stripe, widest on the front pair, runs along the front of each leg; the colour on the muzzle and outsides of the ears is darker than elsewhere; and some of the fawns show a dark stripe along the back. The native name is chousingha.

The males are a little over 25 inches in height at the shoulder, while at the haunches they measure 28 inches, thus standing higher behind than in front.

The length is 47 inches, including the tail which measures about 5 inches. The females are considerably smaller. The hind horns never exceed $4\frac{1}{2}$ inches in length, and the front pair range from 1 to 2 or sometimes $2\frac{1}{2}$ inches. This antelope is found from the Punjab to Nepal, along the foot of the Himalaya and probably in most of the wooded and mountainous parts of India.

Nilgai. The nilgai (*Boselaphus tragocamelus*), which inhabits India from the foot of the Himalaya to Mysore, is one of the larger antelopes, and in general appearance (apart from the horns) somewhat resembles a horse with an unusually thin neck. It is absent from Ceylon, and apparently also from the Malabar coast and the neighbourhood of Bombay, although it reappears near Madras. In certain parts of the United Provinces it is very common, as it is in Gujerat, but it becomes much more rare farther south. The bulls have a shoulder-height of 52 inches, and a length of about 80 inches to the root of the tail, 18 to 25 inches being the length of the latter. The horns are generally from 8 to 9 inches long, but are absent in the much smaller females. The hind legs are shorter than the front pair; the muzzle is narrow and ox-like, and both sexes have a mane, although the males alone have a tuft of hair on the throat. The horns, which are not very far apart, rise close behind the eyes, and are short, smooth, pointed, almost straight, and directed upwards and backwards. In shape they are conical at the tips, triangular at the base, flat behind, and ridged in front. The general colour of the males is dark grey, with a shade of blue or brown; the mane, the tuft on the throat, the upper half of the ears, two spots on the inside of the ears, and the end of the tail being black. A patch on the throat, two small spots on the cheeks, the lips, chin, lower half of the ears, the under side of the tail, the under-parts, and two rings just above the hoofs are white. The females and young are rufous. The haunts of the nilgai are in dense bushes with a few low trees, or where tracts of bushes alternate with grassy plains. These antelopes are found on flat, as well as on undulating ground and among the hills, but seldom in thick jungle; and they often do great harm to cultivated ground. The bulls often live a solitary life, but sometimes collect in small herds up to a dozen, or they may accompany the larger herds of females and calves.

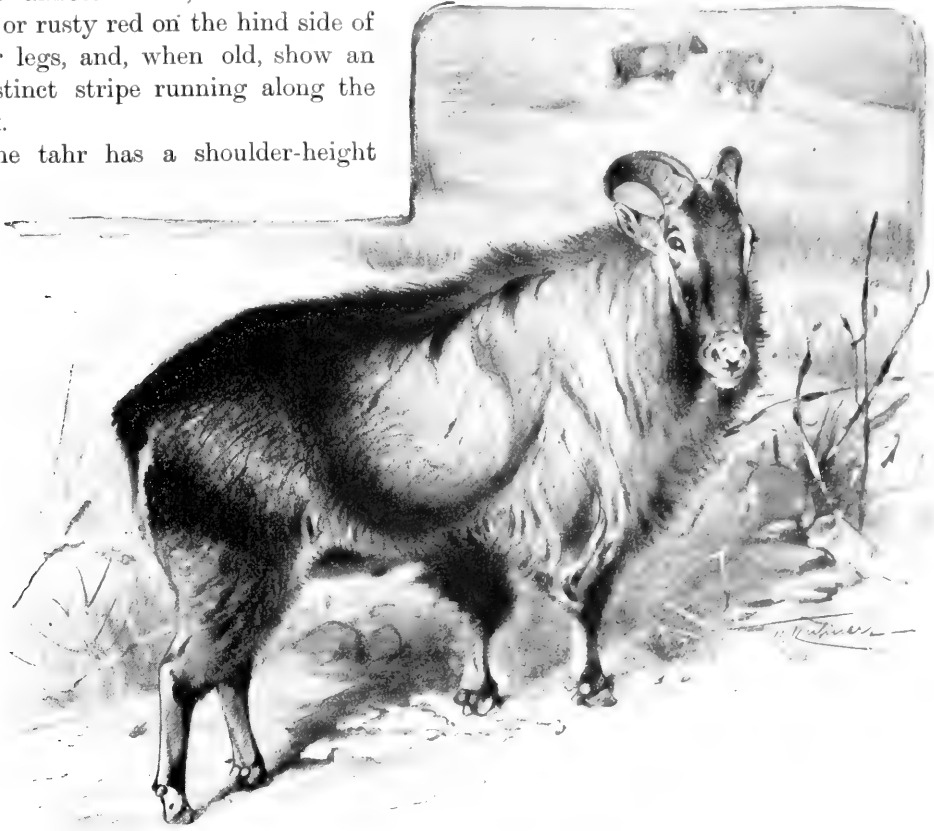
Nilgai graze a good deal all day long and also browse on leaves, especially those of the jujube tree. There are different opinions as to how often they drink, some observers saying that they do so daily, and others every two or three days, particularly in the cold season. When startled, the nilgai starts off at a heavy gallop, going so quickly that a good horse is required to overtake it. The bulls are sometimes caught and killed, but the cows are much speedier. The nilgai becomes very tame in captivity, even to the extent of drawing light vehicles, carrying loads, or as a riding animal. Both the four-horned antelope and the nilgai are related to the bushbucks and elands of Africa.

Himalayan Tahr. Besides antelopes and oxen, the Indian fauna includes two species of short-horned goats or tahr, which are nearly allied to the goats, but differ in the form and size of their horns and skull. The Himalayan, or typical tahr (*Hemitragus jemlaicus*), is a shaggy ruminant inhabiting the forests of the Himalaya from the Pir Panjal range to Sikhim, and characterised by the long head, with a narrow straight face. The black horns are slightly wrinkled,



much compressed, and flattened on the sides; towards the base, where they almost touch each other, they are rather rounder, though they are always flat at the back. In front they are keeled, and, diverging from the base, they curve backward, to approach each other at the tips. The tahr has a short tail, bare beneath, hard patches on the knees and breast, short hair on the head, and long hair on the body. Old bucks carry on their neck, shoulders, and breast a long shaggy mane, hanging down to their knees. The general colour is a deep brown or reddish brown, the face and fore part of the legs being very dark, and in some cases almost black; the bucks are pale or rusty red on the hind side of their legs, and, when old, show an indistinct stripe running along the back.

The tahr has a shoulder-height



HIMALAYAN TAHR.

of 36 to 40 inches, a length of about 56 inches to the root of the tail, and a tail 3 inches long. The horns of the bucks measure from 12 to 15 inches along the curve, those of the does being much smaller. On ground where it seems almost impossible for any other animal to place its feet, the tahr moves with the greatest ease. Like goats, these ruminants collect in herds, the sexes keeping separate during most of the year, the females being found in more open country than the males. They pair in October, and in June or July their one offspring is born.

Nilgiri Tahr. The Nilgiri tahr (*H. hylocrius*), the "ibex" of Indian sportsmen, inhabits the Nilgiri and Anaimalai Hills of southern India, and the Western Ghats down to Cape Comorin. The bucks stand from 39 to 42 inches high, and measure about 50 inches in length, with a tail of about 3 inches long; the does are about 35 inches at the shoulder. The horns of the bucks measure along the curve from 12 to 16 inches, and those of the females about 10 inches. In both sexes the horns almost touch each other at the base, rise parallel for a short distance, then bend backwards and diverge; they are wrinkled, flat inside, and convex outside, rounded at the back, and bluntly keeled on the front inner edge. The hair is close, short, and coarse, that of the males forming a mane on the neck and spine. The principal colour is dark yellowish brown, the coat of the females and young being greyish. A dark stripe runs along the back, and the lower-parts are lighter coloured than the rest. The faces and legs of the old bucks are dark sepia-brown, almost black, with a wide, pale, whitish stripe on the sides of the face. A spot behind the eye, the inner side of the legs (which are dark brown in front), and a saddle-like patch on the back are similarly coloured, the "saddle" becoming nearly white in old animals.

With the exception of the Abyssinian ibex, the Nilgiri tahr is the only wild goat living south of the northern temperate zone. Its haunts are somewhat like those of the Himalayan tahr and wild goat, but of a more tropical character. These tahr are generally found in herds of from five to fifty or more in ravines and forest country. Sometimes they collect on the tops of grassy hills, but their favourite haunts are grassy slopes and steep ridges well up the mountains. Every morning and evening they graze on the mountain-meadows, and spend the rest of the day among the rocks. The Nilgiri tahr is as active and wary as its Himalayan cousin, but, in spite of its watchfulness, often falls a victim to the leopard, although rarely to the tiger.

Himalayan Goral. The gorals, which approach the goats on the one hand and the antelopes on the other, may be recognised by their short cylindrical horns, which are of almost equal size in both sexes, taper backwards in a gentle curve, and, with the exception of the tips, are finely but irregularly ringed and furrowed throughout. The two Himalayan species (*Urotragus goral* and *U. bedfordi*) inhabit the outer ranges of the Himalaya, from Kashmir to Bhutan. The former is a goat-like, thick-legged ruminant, with almost parallel horns set close together, and somewhat coarse hair (with a woolly under-fur), which on the head and neck forms a short mane. In colour the coat is more or less reddish or greyish brown, becoming a little paler on the lower-parts. The face is rather darker near the horns; a black stripe runs down the back to the black tail, and there is a dark stripe down the front of each leg. The horns are black, and the throat white.

The goral has a shoulder-height of about 27 inches, a total length of 54 inches, and a tail-length of 4 inches, the horns of the bucks being from 6 to 8 inches long. The species is generally found in small parties of from four to eight, and lives in rugged, rocky country at heights of from 3000 to 8000 feet. It seldom leaves its feeding grounds, and never save in company, although the old bucks generally live alone. In cloudy weather goral graze at any hour of the day, at other times only

in the mornings and evenings. They appear somewhat indifferent to the neighbourhood of man, and are often found near hill-stations. The kids, of which there is only one at a birth, are dropped in May or June, six months after the pairing-season.

**Himalayan
Serow.**

The serows, which are near relatives of the gorals, are characterised by the hairy tail, naked muzzle, and short, conical horns curving gently backwards and finely but irregularly ringed and striped. There is but little difference in the size of these latter appendages in the two sexes. Serows are indigenous to south-eastern and eastern Asia, one species inhabiting Japan, another Formosa, and a third the Himalaya, Burma, and the Malay countries. The Himalayan serow (*Capricornis sumatrensis bubalinus*), and other local varieties of the Sumatran species, inhabit the Himalaya from Kashmir to the Mishmi Hills. The species, inclusive of its local races, is distinguished by its clumsy build, large head and ears, coarse sparse hair of medium length without under-fur, and the short mane on the neck. The colour is black or dark grey above, and whitish below, the head and neck being blackish, and the flank, thighs, and the lower part of the legs either rufous or dirty white. The inside of the ears, and the front and sides of the chin are white, and a stripe along the back black.

The shoulder-height is 37 inches, the total length over 5 feet, and the tail is about 3 inches long. The horns of the bucks are 9 or 10 inches long, those of the females slightly smaller. Although its gait is awkward, the serow moves very quickly over difficult ground. It lives a solitary life, mostly at heights of from 6000 to 12,000 feet, is nowhere abundant, generally keeps to dense forest and rocky ridges, shelters in caves under projecting rocks or among shady trees, and, although difficult of approach, is bold and dangerous when wounded or driven to bay.

**Indian
Chevrotain.**

The small but zoologically important group of chevrotains or mouse-deer is represented in India by *Tragulus meminna*, which inhabits the forests of the southern part of the peninsula and Ceylon, its distributional area extending to Orissa on the east coast, and to the western Ghats near Bombay.

In this interesting Indian species (which stands about 12 inches in height and measures from 18 to 22 inches in length) the chin and throat are completely clothed with hair, and the brown back is ornamented with whitish spots, while the sides are marked with similarly coloured oblong spots which often run into lines. This chevrotain never ventures out on the open plains, but lives among rocks, the clefts of which afford it shelter from the heat of the day, and a place of retreat at the approach of an enemy. It issues forth at dusk; and, like all its kindred, has a peculiar mincing walk, treading on the tips of its hoofs, and thus making its limbs look so stiff as to give the impression that the fore-legs are without the knee-joint. The male lives alone during most of the year, but accompanies the female during the pairing-time in June and July. The young, two in number, are born at the close of the rainy season, or the beginning of the cold weather.

Chevrotains form a group quite distinct from the true ruminants, and serve in some degree to connect the deer with the pigs.

Indian Wild
Boar.

Leaving the chevrotains, we come to the Indian wild boar (*Sus cristatus*), which is found in the Himalaya up to heights of 13,000 feet, and ranges southwards into Ceylon and south-eastwards into Burma. In shoulder-height the boar measures up to 40 inches or more, and the total length is about 5 feet. Some are even larger, the males being always larger than the females. Along the back runs a crest of long black bristles, the hair is coarse and bristly everywhere, has no under-fur, but is thinner at the sides, and thinnest below. The sparsely-haired tail reaches almost to the hocks, and is fringed at the sides; the ears are thinly haired on the outside and more closely inside; the general colour is black, mixed more or less with rusty brown or white. Old individuals are grey, younger ones brown, and the sucklings show dark brown stripes along their light brown bodies.

The Indian wild boar is distinguished from its European relative by its longer tusks (which are said to grow as long as 12 inches, although rarely exceeding 9 inches), the longer crest and the thinner hair on the rest of the body; it attains a large stature. Not improbably it is the ancestor of Indian domesticated swine, with which it doubtless sometimes pairs since the young of the latter are sometimes striped.

During the day the Indian wild boar remains concealed in high grass or bushes, sometimes in the forest or in tall standing crops. The sows and young generally associate in "sounders" of ten to twelve or more, but the full-grown boars live by themselves. They wander about to feed in the morning and evening, especially in marshes, their favourite food being roots, in search of which they turn up the ground in a way similar to the European wild boar, doing much harm to cultivated fields. Their food is, however, not confined to vegetable matter, for more than once they have been seen to eat carcasses, and in Assam they dig out and eat the fish which spend the dry season in the mud.

The Indian wild boar often feeds at night, but in districts where it is unmolested its life is less nocturnal. Its speed is considerable, but does not last, and on fairly even ground both boar and sow may be easily overtaken by a good horse. Wild boar-hunting, universally known as "pig-sticking," is one of the most popular of Indian sports. This sport owes much of its excitement to the boldness with which the boar defends himself to the last, the badgered animal, although surrounded by spears, attacking his adversaries again and again. Undoubtedly the boar is the most courageous of the wild animals of India. There are many anecdotes of desperate fights between wild boars and tigers, and in several instances the tiger is killed by the boar. A boar will even attack and kill a camel; and instances are on record of this animal charging elephants. The courage of the boar appears, however, to vary to a considerable extent in different parts of India, as indeed is the case with its bodily size and shape.

Pigmy Hog.

A very different animal is the pigmy hog (*S. salvanius*), of the forests at the foot of the eastern Himalaya, which stands only 11 inches at the shoulder, with a length of 26 inches. Unlike the last species, it has no distinct mane, and in general colour is brown or blackish brown. The young are white below with whitish stripes along the back and sides. In habits this diminutive representative of the pig tribe resembles the wild boar, being

mostly found in high grass, and said to associate in parties of from five to twenty which consist both of sows and full-grown boars.

Indian Onager.

The deserts of north-western India, such as the Bikanir desert, Jesalmere, the Rann of Kach, and (across the Indus) the neighbourhood of Mithankot, on the Punjab frontier, form the habitat of the onager (*Equus onager indicus*), which also occurs in Baluchistan and Afghanistan, where it probably passes into the closely allied Persian race of the species. As the Asiatic wild ass, of which the Indian animal is merely a local race, is described elsewhere in this work, the bare mention that it is represented in north-western India will suffice.

Indian Rhinoceros.

Poor as is India in members of the horse family, it is richer than any other country in the world in rhinoceroses, all the three Asiatic species occurring within its limits, although the true home of two of these is the Malay area. By far the largest of the three is the Indian rhinoceros (*Rhinoceros unicornis*), which, in common with the other two, differs from its African cousins by its heavily folded skin. It is an inhabitant of the great grass-jungles of northern India, and is now almost entirely confined to the valley of Assam, and to Nepal and other districts west of the Tista River. Formerly it was much more widely distributed. In the reign of the Emperor Baber, for instance, from 1505 to 1530, it was common in the Punjab up to Peshawar, and its remains have been found as far south as Madras.

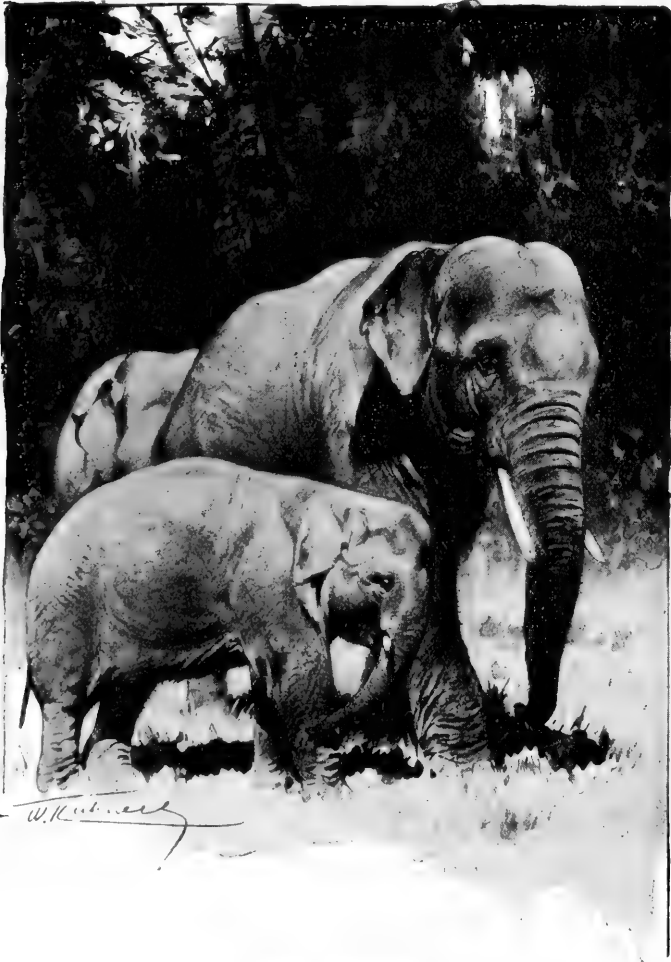
The Indian rhinoceros attains a height of 5 feet or more, and from the point of the nose to the tip of the tail measures over 10 feet, the tail being 27 inches in length. The horn, however, is seldom more than 12 inches long. The skin is bare, except the ears and the tail, and is studded with prominent tubercles ranging up to an inch in diameter, the largest of which are on the thighs and shoulders. Of the folds which divide the skin into large shields, one is situated at the back of each shoulder, and another in front of each thigh. Large folds also surround the neck, others are below the shoulders and thighs, and on the hind-quarters, so that the tail lies in a deep furrow. The colour is blackish grey, with no lighter or darker shades.

The Indian rhinoceros is an inhabitant of ground where it can bathe and wallow in the mud. It is quiet and peaceable in disposition; all that has been written about its savageness and its animosity against the elephant resting on no basis of fact. A wounded or much-molested animal may, however, sometimes defend itself, and when it does, it uses not its horn but its pointed lower incisors in the same way as the wild boar uses his tusks. It generally feeds during the morning and evening, and sleeps during the day, its food consisting principally of grass and herbage. The Sumatran and Javan rhinoceroses are noticed under the heading of the Malay fauna.

Indian Elephant.

Unlike the Indian rhinoceros the Indian elephant (*Elephas maximus*) is not restricted to India, its range extending into Siam, Cochin China, the Malay Peninsula, Sumatra, and even Borneo, where, however, it may have been introduced. In India wild elephants are still found along the foot of the Himalaya as far west as Dehra Dun, and in a few localities they are met with down to Mysore and even farther south; but their distributional area is by no means so large now as it used to be.

The Indian elephant is almost hairless, with a few faint traces of woolly fur such as that of the mammoth, and a tuft of long hairs at the end of the tail. On the fore-feet five of the toes have nails, but on the hind-feet only four are thus provided. The trunk, unlike that of the African species, is as uniformly flexible as an indiarubber tube, and has a single finger-like process on the upper margin of the tip. The tusks in the females are short and rudimentary, but in the males they are generally well developed, although in some of the latter they are reduced



INDIAN ELEPHANTS.

to small stumps like those of the females. The colour of the body is a uniform blackish grey, often varied with small flesh-coloured spots on the forehead, the base of the trunk, and the ears. The more or less white elephants considered sacred in Siam are merely partial albinos.

The shoulder-height is almost exactly double the circumference of the fore-foot. Fully grown females are, as a rule, no higher than 8 feet, while the average height of the males is about 9 feet, though a few are recorded as having exceeded 10 feet. One of the longest tusks known measured 8 feet in length, nearly 17 inches in

circumference, and weighed $74\frac{1}{2}$ lbs. Another shorter tusk is said to have had a weight of 110 lbs. In both these cases the tusk was the only one, so that it is supposed to have been unusually well developed.

Forests in undulating or mountainous districts, generally those containing many bamboos, are the favourite haunts of the Indian elephant, though at the beginning of the rainy season these animals often move for awhile into grassy plains. They live in herds of from sometimes as many as a hundred in number,



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and in each herd are elephants of different sizes and different ages in both sexes. When food is scarce these herds sometimes disperse into smaller parties, and sometimes the males live alone, though they always belong to a herd, and join it occasionally. Generally the elephants in a herd belong to the same family, and are all closely related to one another, and the leader is in all cases a female.

The cheek-teeth of the Indian elephant consist of a number of closely approximated thin vertical plates, evidently adapted for masticating grass and leaves; and the food of this species consists almost entirely of grasses and the young shoots and leaves of certain trees and plants, especially palm, bamboo, plantain, and fig, together with wild fruits. Of such food an elephant will consume quite 600 lbs. weight every day. Elephants drink only twice a day, once before sunrise and again after sunset. Water as well as solid food is conveyed to the mouth by the trunk, the tufts of grass being torn up and the leaves and shoots plucked off by coiling this instrument round them. Only small objects such as small fruits are grasped by the finger-like process at the tip. When an elephant drinks, the water is sucked up into the two tubes of the trunk for a distance of about 18 inches and then squirted into the mouth. A similar method is employed when an elephant is eating rice or other corn.

Indian elephants rest during the midday heat, and feed in the mornings and evenings and often far into the night. While grazing, the herd disperses, but immediately musters again at the slightest suspicion of danger. In many districts elephants wander for long distances, probably on account of their food, or perhaps to escape from troublesome insects, these journeys being generally performed in single file. In hot weather, when elephants reach water they take a bath or wallow in the mud, and when heated they squirt water all over their bodies by means of their trunks. They rarely bathe after sunset, and when exposed to the sun and away from water they throw earth and leaves on their backs.

An elephant can neither gallop, canter, nor trot, its only paces being a walk and a shuffle at the rate of about a mile in four minutes. It cannot jump, and as its stride does not exceed 78 inches a ditch 7 feet wide effectually bars its passage. When ascending or descending slopes, elephants bend their limbs in the manner most suitable to the occasion, and if necessary make holes in the ground to afford a footing. In kneeling an elephant first bends its hind-legs one after the other, and then its fore-legs, stretching them out at the same time; when rising it begins with the fore-legs. These animals are quite at home in water, in fact, few land mammals are their superiors in swimming. They swim very deep, and at a rate of only about a mile an hour, but they can keep this pace up for at least six hours at a stretch without resting.

Although an elephant has a very keen sense of smell, its sight and hearing are not particularly good, and its brain is small in proportion to its bulk. The latter feature is, however, characteristic of large animals in general, and must not be taken to indicate inferiority. In disposition the Indian elephant is docile and obedient, and its memory is remarkably retentive. Although in most cases gentle and affectionate, in certain circumstances these animals are highly passionate and vindictive, and often display strong emotion. Fear and anger are denoted by a shrill trumpet-like sound of varying pitch; pain is indicated by a terrific

roar; and the attention of the female to her calf is attracted by a subdued rumbling sound in the throat. A prolonged squealing through the trunk indicates pleasure, and uneasiness is denoted by a peculiar metallic sound produced by beating the ground with the trunk and at the same time blowing through it. Most elephants are timid and peaceful, although females with young as well as the solitary males known as "rogues" may sometimes be aggressive. The attack is made by the feet and tusks and not by the trunk, which is kept tightly coiled up on such occasions. An Indian elephant never charges with its trunk extended.



LARGE INDIAN SQUIRREL.

Large Indian Squirrel. India is rich in rodents, especially squirrels, one of the handsomest of these being the large Indian squirrel (*Ratufa indica*), which attains a total length of 16 to 18 inches, and is represented by several local races in different parts of its habitat. One of these, from the northern parts of the western Ghats and Mysore, is red above, with the tip of the tail whitish. A second variety found in Orissa, Bastar, Chutia Nagpur, south-western Bengal, and Manipur is mainly red above, but with black on the shoulders and tail, which latter generally has a yellow tip. In the third variety, which inhabits southern Manipur and certain parts of central India, the shoulders and hind part of the back and tail are always black, while the rest of the upper-parts is more or less black.

This squirrel dwells among high forest-trees, rarely coming down to the ground, and places its nest of twigs and leaves amid

the topmost branches. It is able to jump distances of 20 feet from tree to tree, and its cry is a rapid succession of loud screeches. It represents a group of giant squirrels all restricted to the Indian region.

Palm-Squirrel.

The tiny palm-squirrel (*Funambulus palmarum*) is found all over India with the exception of the Malabar coast and Ceylon. In the west it ranges as far as Sind and Baluchistan, though not common in either of those countries; but it is unknown eastwards of the Bay of Bengal. Its home is in the open and cultivated plains, especially in the neighbourhood of human habitations,

and it is never found in forests. It is about six inches long without including the tail; in colour the back is greyish, or reddish and blackish brown with three longitudinal whitish yellow stripes, the sides being lighter in hue, and the lower-parts whitish.

The palm-squirrel is one of the commonest animals of India, and being exclusively diurnal is, perhaps, the least wary of all. It is generally found in plantations and gardens, on large banyan and pipal trees, and especially on palms. It is frequently seen on the ground, but never far from trees, in which at any alarm it may immediately take refuge. It shelters beneath the roofs of houses, and sometimes even ventures into the rooms, and since it is also common in gardens and plantations, it would appear, like the rat and mouse, to be one of the mammals which follow man wherever possible. Indeed by some writers it has been regarded as a half-domesticated form of the three-striped jungle squirrel. Its food consists of fruits, seeds, and buds of trees; but it also eats insects, and is said to rob birds' nests, although this is doubtful. The cry of this small and easily-tamed rodent is a shrill bird-like chirping. The nest, in which the female produces a litter of two to four young at a time, is a large, rough structure of grass, wool, or any kind of fibre, placed in the branches of a tree, the gutter of a roof, or among the rafters of a house.

Striped Jungle-Squirrel. The striped jungle-squirrel (*F. tristriatus*) is mainly remarkable as the presumed original form of the palm-squirrel. Although its cry is quite different, being much more piercing, it resembles the latter in coloration, and in nesting on houses, but it is much smaller, and is met with where the palm-squirrel is absent. The back is black or blackish brown with three narrow longitudinal white or whitish stripes, and the lower-parts are whitish or grey. This species is widely distributed over the forest-districts of India and Ceylon, has been found in Sikhim, and is very common on the Malabar coast where the palm-squirrel is unknown.

Hodgson's Marmot. Several species of marmot are found in the Himalaya and Tibet, and since one of these (*Arctomys hodgsoni*) occurs in Nepal, Sikhim, and Bhutan, it probably lives on the southern slope of the mountains, and consequently belongs to the Indian fauna.

Flying-Squirrels. The lesser flying-squirrels are represented in India by *Sciuropterus fuscicapillus*, which inhabits the mountains of Travancore and Ceylon, and is also said to occur on the Nilgiris. India is also the home of several of the larger flying-squirrels, which belong to a different genus. Of these the large brown flying-squirrel (*Petaurista oral*) inhabits all the larger forests from the Ganges to Ceylon, and those of the countries east of the Bay of Bengal from Burma to Tenasserim, as well as the Mergui Islands. In length its body measures about 18 inches without the tail, and in colour it is dark chestnut or greyish brown or rusty black, mixed with grey above, and lighter, sometimes white, below. This species, which in different parts of its range is represented by local races, is nocturnal in its habits, and sleeps in holes of trees during the day. Although principally an inhabitant of the forest, it is often found in the neighbourhood of villages and mango-plantations, and its food consists of fruits, nuts, bark of trees, beetles, and larvæ, but not of corn. When asleep this squirrel rolls up its body, and sits with

its head bent downward, but in hot weather it lies on its back with its membrane extended, and, as the membrane hinders its movements, is not so active as the true squirrels, either among the trees or on the ground. Its flight from tree to tree is remarkable; at first it drops straight down from above, then takes a curved, and at last a horizontal direction, in order to ascend again towards the stem or branch where it intends to alight. It is thus enabled to influence the direction of its flight, which sometimes carries it a distance of 80 yards.

The large red flying-squirrel (*P. inornatus*) inhabits elevations of from 6000 to 10,000 feet in the western Himalaya; it is common in Kashmir, and is also found in Nepal. A third species, the grey-headed flying-squirrel (*P. caniceps*), occurs at elevations of from 5000 to 7500 feet from Nepal and Sikhim as far as Landour to the west, while a fourth species, Hodgson's flying-squirrel (*P. magnificus*), is found on the Himalaya from Nepal eastwards at a height of 5000 to 6000 feet, as well as from the Assam valley southwards.

Rats and Mice. The mouse tribe, and especially true mice and rats, are plentifully represented in India. The brown rat inhabits villages, banks of rivers, and high roads, and in Calcutta and other cities grows so large as to be often mistaken for the bandicoot. This rat is unknown in most of the interior of India, and would thus appear to have been introduced. The European black rat, which has also probably been introduced, is found in various parts of the country, especially in large ports. Besides the typical form, India possesses three other races of the black rat. One of these is the roof-rat (*Mus rattus alexandrinus*), a rather large form, whose colour is brown and somewhat reddish above, and generally white below; the tail is longer than the body, its lower part, as is the case in Simla, being sometimes white. This rat inhabits the western parts of India, whence its range extends into North Africa. The second form is the glossy black rat (*M. rattus nitidus*), distinguished from the roof-rat by its thinner fur, partly interspersed with bristles, and by the tail being but little if at all longer than the body, as well as by the white soles of the feet. The tree black rat (*M. rattus rufescens*), which inhabits India, Ceylon, and Burma, is much smaller, with a very long tail, and generally bristly hair of a red or yellowish brown colour. The tree-rat lives principally in trees, and in the Laccadives and elsewhere is found in the crowns of cocoa-nut palms. It is said never to come to the ground, and to feed on cocoa-nuts.

The universally distributed house-mouse is not absent from India, except from the Punjab, Sind, Rajputana, and some of the north-western provinces. Whether it has been introduced by ships into India, or whether it originated there, is difficult to say. The Himalayan form of this mouse (*M. musculus homurus*) generally has a shorter tail, and longer and smoother hair than the mouse of the Indian plains, and may therefore be regarded as a distinct race, as may also the Indian house-mouse (*M. musculus urbanus*), which differs in many respects from its European relative.

The common Indian field-mouse (*M. buduga*) does not, like the European field-mouse, belong to the voles, but to the typical group of the family. It is common in fields, in burrows, and holes beneath stones and roots, and also occurs in gardens, woods, and even houses. The burrows, which are

generally found near large stone-heaps, are usually inhabited by only one pair. These mice are spread over India and Ceylon, but are not found in the Indus valley except at Karachi, nor in the Himalaya. The general colour is light sandy or dark greyish brown above, and white below. The length of the head and body is from $2\frac{1}{2}$ to 3 inches, and that of the tail nearly the same.

The brown spiny mouse (*M. platythrix*), which ranges over India and Ceylon, and is found on the Malabar coast, in Sind, and in the Punjab, but not in Bengal, is especially remarkable for its habits. Living exclusively on red sandstone soil, in which it generally digs holes of moderate depth, it gathers a heap of pebbles in front of its hole, with which it stops the entrance after retiring within, and makes itself a bed of pebbles in the dwelling chamber. This mouse probably feeds on vegetable substances, and derives its name from the nature of its fur, which is covered above and below with flat spines, these being particularly stiff and coarse on the back. In colour it is dark brown, sometimes a little lighter above, and white below; to the root of the tail it measures 3 or $3\frac{1}{2}$ inches, the tail being rather less.

In various parts of India lives the metad, or soft-furred field-rat (*M. metadula*), whose colour is earthy brown above, lighter on the sides, and white below. It has a length of 5 inches to the root of the tail, the length of the tail varying between 4 and 5 inches. The metad lives in pairs, or in parties of five or six, in cultivated fields, where it digs a slight and rude hole beneath the root of a bush, or hides among stone-heaps. It makes its nest in holes abandoned by other rodents, or in the crevices formed in the ground during the dry season. At the beginning of the rainy season, when these crevices close up, large numbers of the rats perish in their holes, but if it does not rain sufficiently, they increase to such an extent that they destroy vast quantities of seed-corn.

Bandicoot-Rats. The bandicoot-rats, which differ in the structure of their teeth from the true rats and mice, have a short body and head, short and wide snout, a long scaly and almost bare tail, round ears, broad feet, and, with the exception of the first toe of the hind foot, strong and almost straight claws on the toes. The five known species are distributed over central Asia and India.

The common bandicoot-rat (*Nesocia bandicota*) inhabits India and Ceylon, but is absent from lower Bengal, as well as from Sind and the Punjab, though common in certain parts of Rajputana and probably elsewhere in the north-western provinces. It is of considerable size, namely, 12 to 15 inches without the tail, which measures from 11 to $12\frac{1}{2}$ inches. The hair of this rat is coarse, often with bristles of 2 or 3 inches long on the back. In colour it is blackish brown above, sometimes pale yellowish or greyish on the sides, and greyish brown or brownish grey below. This bandicoot-rat, which, like all its kindred, is a burrower, inhabits cultivated districts, and is particularly common in south Indian villages and towns, and probably also in forests. It is very injurious to corn, but also feeds on fruit and other vegetable substances, and is said to kill a fowl now and then. When wandering about at night or attacking its prey, it grunts like a pig. It is lazy and cowardly, apparently readily tamed, and much more easily killed by a dog than might be supposed from its size.

The kok bandicoot-rat (*N. bengalensis*) inhabits the greater part of India from

the Himalaya to Cape Comorin, and from lower Sind to Cachar, and perhaps as far as Assam, while it also occurs in the valley of Kashmir and Ceylon, and is probably spread over Burma as far as the Mergui Archipelago. It is generally found on damp, swampy ground, but also ranges to the top of the Nilgiri and other hills. The coarse hair is dark brown mixed with yellow above, and grey or yellowish below. The head and body measure from 6 to 9 inches in length, and the tail from 5 to 7 inches. The kok, which lives in cultivated ground, gardens, or pastures, betrays its presence by the heaps of earth in front of its holes. Its galleries opening into the banks of ditches and tanks near rice-fields are long and irregular, often branched, sometimes circular, and lead to a principal chamber, in which the animal stores up grain, often amounting to a pound in weight. The burrows sometimes occupy an area with a diameter of 15 to 20 yards, each being apparently inhabited by only a single rat. The food consists principally of grass and roots. The kok is a spiteful animal, which when irritated bristles up its long spines and utters a grunting sound. It takes readily to the water, in which it swims well; generally it has from eight to ten, but sometimes fourteen, young at a time; and it grows so tame in captivity that it will answer when called by name.

Bush-Rat.

The Indian bush-rat (*Golunda ellioti*), which inhabits the greater part of India and Ceylon, is a rodent with coarse hair, and a length of 4½ inches to the root of the tail, the latter measuring about 4 inches more. In colour it is yellowish brown, with black and grey speckling above, and brownish white or grey below. This rat lives only in forest, generally in a dense thorn-bush; its round or oblong nest of twisted grass and rootlets being placed on the ground among stones and twigs. This nest has a diameter of 8 to 10 inches, and its cup is about 4 inches across. A solitary animal, the bush-rat is largely diurnal, feeding in the morning and evening, and subsisting principally on the roots of the grass known as *Cynodon dactylon*. It is very injurious to coffee-plantations in Ceylon owing to its eating the buds and blossoms. The Indian bush-rat is rather slow in its movements, and cannot leap so well as other mice; at times it apparently undertakes regular migrations.

Indian Gerbil.

Although voles are practically absent from the Indian area, the pretty little gerbils have a representative in the Indian gerbil rat (*Gerbillus indicus*), which is distributed over India and Ceylon as far east as the Bay of Bengal, and as far west as Baluchistan. In colour this species is sandy or fawn above and white below. To the root of the tail its length is from 5 to 7 inches, the tail measuring from 6 to 8 inches more. Leading an exclusively nocturnal life, and never seen outside its hole by day, this gerbil frequents sandy and uncultivated ground, although it often appears on the edges of cultivated fields. Its burrows, which have numerous passages and large chambers of 6 to 12 inches in diameter, it lines with dry grass. Its food includes roots, grass, seeds, and corn, and it sometimes does great damage to cornfields. In 1878-79, for instance, it destroyed in the Dekkan an area of several thousands of square miles planted with sorghum, by biting off the stems, and eating or storing away the grain. This gerbil is very prolific, and has eight to twelve or more young at a time. It can jump 4 or 5 yards in one leap, and often escapes from dogs by jumping right over their backs.

Malabar Spiny Mouse.

The Malabar spiny mouse (*Platacanthomys lasiurus*), which is the sole representative of its genus, occurs in the Anamalai Hills and Travancore, where it lives at heights of 2000 feet above the sea. It is not unlike a dormouse, and is reddish brown above and almost white below, with a long, bushy, squirrel-like tail. The length of the head and body is about $4\frac{1}{2}$ inches, and that of the tail about 5 inches. It lives exclusively in high trees, gnawing small holes into the stems and branches, and lining the holes with moss and leaves. According to native reports, this mouse eats pepper-pods, damages jack-fruit, and drinks palm-juice.

Hares.

Three species of the hare family occur within the Indian area. Of these the red-tailed hare (*Lepus ruficaudatus*), which has a length of from 18 to 20 inches to the root of the tail, is reddish brown above, with some black on the back and face, the chest and legs being rufous, the upper side of the tail reddish brown, and the chin, throat, and lower-parts white. It inhabits the north of India, except Rajputana, Sind, and the south-western Punjab, and ranges from the foot of the Himalaya to the Godaveri, or farther south, while it occurs as far as Assam in the east, and north-western Hazara in the west. A second species, the black-naped hare (*L. nigricollis*), is found to the south of the Godaveri and in Ceylon. It is chiefly a hill-species, and is common on the Nilgiris and in Newera Ellia. Like the red-tailed hare, it seeks refuge in holes of the ground or in trees when in danger, and has apparently only one or two young which, in the Nilgiris, are born between October and February. It may be easily recognised by the large black patch on the back of neck; and has been introduced into Mauritius.

The spiny hare (*Caprolagus hispidus*) represents another genus, of which one of the species (*C. furnessi*) inhabits the Liu-Kiu Islands, while an allied type (*Nesolagus netscheri*) occurs in Sumatra. It has short ears, small eyes, and coarse bristly fur. In colour it is black and brownish white above, and paler brownish white below. This hare, which inhabits the foot of the Himalaya from Gorakhpur to Upper Assam, is remarkable for making burrows like a rabbit, although, like the true hares, it does not collect in colonies.

Porcupines.

Of the porcupines the common Indian species (*Hystrix leucura*) ranges from Kashmir to Ceylon, and from the Bay of Bengal to the Black Sea. In length it measures to the root of the tail from 28 to 30 inches, the tail being some 3 or 4 inches long. In colour it is blackish brown, with the tips of the spines on the cheeks, and on a collar on the throat, the terminal halves of those on the back, and the whole length of those on the tail, white.

During the day this porcupine remains in clefts among rocks, or in burrows which it digs on the slopes of hills, the banks of rivers, or somewhat similar places. Although it sometimes ventures out before sunset and does not return till after sunrise, it is practically nocturnal, and therefore very seldom seen. Nevertheless it is one of the most common of Indian mammals. It feeds principally on roots, but does great damage to cultivated fields by destroying root-crops of all kinds, as well as fruits. The Himalayan porcupine (*H. hodgsoni*) differs from the last by the absence of a crest and by its dark brown coloration. Inhabiting the lower slopes of the Himalaya in Nepal and Sikhim up to a height of 5000 feet, and also found in

Assam, it lives in burrows made by itself, and resembles in its habits the common Indian species. A third kind, the Bengal porcupine (*H. bengalensis*), is found in lower Bengal, Sikhim, Assam, and Arakan, and probably throughout Burma.

Tiger. Among the numerous Indian beasts-of-prey the first place is undoubtedly held by the tiger (*Felis tigris*), which inhabits the whole of India, Burma, and the rest of south-eastern Asia, including Java and Sumatra, although unknown in Ceylon and Borneo. Its habitat likewise includes a very large portion of China and an extensive area in central and western Asia. It is found, for instance, in the district around Lob Nor, in the Altai, the Amur valley, around Lake Aral on the southern shores of the Caspian, and in the Caucasus, but is quite unknown in Tibet, Afghanistan, Baluchistan, and those districts of Persia which lie south of the Elburz Mountains.

Formerly the tiger was an inhabitant of almost every Indian forest and jungle, but in the last thirty or forty years its numbers have been greatly reduced, and in some districts it is now very rare, and in others, such as many parts of Bengal and near Bombay, exterminated. It is still abundant in the forests at the foot of the Himalaya, in the western Punjab and upper Sind it is rare, and from lower Sind and Kach it has disappeared. The Javan tiger (*F. tigris sondaica*) forms a race different from the Indian, and the long-haired Manchurian tiger (*F. tigris mongolica*), as well as the Persian tiger (*F. tigris virgata*), are likewise distinct races. In size the tiger is quite equal to the lion, its length varying from 102 to 114 inches, inclusive of the tail, which measures about 36 inches. Much larger tigers are, however, occasionally met with, a few of these being over 10 feet long from nose to tail-end. The average weight of a male tiger is from 390 to 420 lbs.; that of a large tigress is about 265 lbs.

The general appearance of the tiger is well known. It is one of the cats with round pupils to the eyes; the full-grown males have a fairly well-developed ruff beginning behind the ears and extending round the sides of the neck. The fur is short and close, but varies in length, thickness, and colour according to season and country. The tail, which tapers towards the end, has no terminal tuft like that of the lion. Of all the cross-striped cats the tiger is the most distinctly marked. Its head and body are barred with broad vertical black stripes and there are black rings round the tail; the ground-colour of the back and sides varies from pale rufous to dark brownish yellow, but the lower-parts are always white. Tigers inhabiting the forests of the north are darker and redder than those of the more open jungles of central and southern India. The cubs, which are born striped, are always lighter in colour than their parents. Like leopards and other cats, tigers are sometimes black and occasionally white.

Tigers pair for life, and breed at any season of the year. About fourteen or fifteen weeks after pairing there are born from two to five or even six cubs, which the tigress is said to hide from the tiger, although in rare cases male tigers have been seen in the company of females and cubs. The latter remain with their mother until they have reached a fair size, and when several tigers are found together, it is generally a family party. The cubs are fully grown when they are three years old, and as even full-grown tigers are accompanied at times by their mother, it is thought that in the wild state tigresses have a litter every three

years; but this does not hold good in the case of those in captivity, which sometimes breed twice a year.

Tigers rest during the day and begin their search for prey in the evening, often extending their wanderings for miles, and using by preference well-trodden paths or sandy river-beds. The break of day does not always induce them to retire, and sometimes they continue their prowling till eight or nine o'clock in the morning, the course of their wanderings being indicated by the shrieks of monkeys and peafowl, the warning calls of crows and smaller birds, and the roaring of deer. These particular danger-signals do not, however, always denote the approach of a tiger, as they are uttered at the approach of a leopard or smaller cat, or bear, dog, or even man.

After the night's wanderings tigers usually repair, especially during the hot season, to some shady spot near water beneath a high bush or tree, or to a lair among high grass, or a low thicket of reeds, tamarisks, or other plants growing along a river-bed. In some districts they will lie down on a shelving shore, or in rocky countries in a cave, although they prefer the depths of a forest. With more persistency than other wild animals tigers keep to certain localities, though there may be others just as suitable close by. Some spot in the high grass on the bank of a river, some particular ravine, is chosen again and again, year after year, and when the occupant of such a spot is killed it is soon succeeded by another. In the hot season from March to June, when vegetation is dried up and water scarce everywhere, the hunting grounds of tigers are confined to small limits. Tigers are much more silent animals than lions. In districts inhabited by lions there is hardly an evening on which the air does not ring with their roars, but even in localities where tigers abound they are seldom heard. The roar resembles that of the lion, consisting of a long terrific growl, repeated several times, growing gradually louder and quicker, and ending with the last notes repeated three or four times. A startled tiger utters a peculiar "woof," and one preparing to charge emits the well-known hiss. When hit by a bullet, the male generally roars, but the tigress remains silent, and more than once tigresses when mortally wounded have died without uttering a sound. The tiger, like the lion, does not spend any part of its time in trees, seldom even ascending them, and being incapable of climbing vertical stems, whether thick or thin. It has been stated that tigers have pulled men down from trees 8 or 12 feet high, but in these cases they must have been assisted by some peculiarity in the tree, such as a much inclined stem of a forking branch. Generally tigers take little notice of a man in a tree who keeps quiet, even if he be only a few feet above the ground; and it is a mistake to suppose that they are good jumpers, as their hind legs seldom leave the ground, unless when clearing an obstacle. They can, however, spring to a moderate height, and they share with other cats the habit of scratching tree-stems to smooth the tips and edges of their claws when these have grown uneven. They generally choose some particular tree for this purpose on which the marks of their claws are seen up to the height of 10 or 12 feet.

Most tigers prey upon deer, but almost all of them kill cattle now and then. They also prey upon wild boars, antelope, and porcupines, the spines of the latter being often found in tiger-skins. Peacocks and monkeys are more frequently caught by the leopard, but the tiger occasionally pursues and eats bears.

Gaur-calves fall easy victims, but the mastering of a full-grown bull gaur is more than most tigers are able to manage. Sometimes hungry tigers will be contented with food not much to their taste, such as frogs; and during floods in Bengal they have been seen to devour fish, tortoises, crocodiles, and large lizards; and there is a case on record of a tiger being killed in whose stomach was found nothing but locusts.

The number of domesticated animals killed every year by tigers is very considerable, and many tigers seem to live exclusively on such food. By long experience the tiger has grown more and more cunning, and less afraid of man. Tigresses with their cubs often take up their quarters in the neighbourhood of a village, and prey on the herds; and, in fact, they always show a great predilection for beef. Sheep and goats are less frequently attacked, but pigs, horses, and camels are never safe from their voracity.

The manner in which tigers kill their prey has been often discussed. It has been supposed that they leap on their victims from a distance, and kill them with their paws, or tear their throats and suck the blood; but this is not the case so far as cattle are concerned. It may be that tigers kill small animals by striking them with the fore-paw, but domesticated animals killed by tigers are generally found with their necks broken, and the arteries of the neck untouched, although the neck and breast bear numerous wounds made by the claws. Consequently it would seem that tigers do not spring on their prey, and native herdsmen confirm this opinion. According to their accounts, a tiger clasps the fore-quarters of its victim, puts one of its paws on the shoulder, then clutches the throat and turns its neck backwards, leaping to one side at the same time so as to throw down its victim and twist or break its neck. Perhaps tigers do not always trouble to break the necks of small animals, and when they attack larger victims, such as buffalo, which they are unable to throw on their backs, they apparently hamstring them.

Very probably tigers take advantage of the sudden fright, to which their appearance gives rise, to rush on their victims; and they generally crawl stealthily as close up as possible before the final rush, though they have occasionally been observed to gallop up to their prey. When a tiger brings down an animal during the day, it sometimes carries the carcase a little way off, but generally leaves it untouched till the evening in order to return after sunset and carry it to a quieter place before making a meal. The manner in which a tiger will drag the carcases of cattle and buffalo across uneven ground, through dense bushes, and up steep slopes, shows its enormous muscular strength. Sometimes it will lift the carcase clear of the ground, and in one instance a tiger carried a bull weighing some 450 lbs. for a distance of about 300 paces.

When disturbed by jackals or vultures, tigers drive them away, but frequent interruption usually makes them hide their prey under bushes and leaves, and retire to a thicket near water. If a tiger is very hungry it will eat both hind-quarters of a large animal in a night, and when undisturbed, remains with the carcase for three days, eating from time to time. Although a cow may perhaps be sufficient to feed it for five days, a tiger begins to look out for other prey before the end of that time. Young tigers, which are much more destructive than old animals, may

perhaps kill from mere bloodthirstiness; and when one of these attacks a herd, it generally kills several head. Tigresses with young are perhaps the most destructive of all, possibly for the purpose of teaching their young how to kill prey.

A tiger fired at or wounded when returning to its prey, never repeats its visit, but goes in search of another victim. An animal which returns to its prey several times, and takes several days to devour it, may be expected to eat carrion as well. This is the case with the tiger, which, although it generally hunts living animals, is often satisfied with the carcasses of deer and cattle which have died of wounds or of some disease, and it is even said to eat the dead bodies of its own kind.

The ordinary tiger, which feeds on venison or cattle, is the greatest coward in the presence of man, and is often driven away by the animals it attacks. Bears are certainly more to be dreaded than tigers, and, with the exception of man-eaters and those that have been wounded, the most dangerous tigers are females with cubs, or sometimes hungry individuals when about to eat their prey.

Tigers become man-eaters when they are fat, heavy, and old, or have become crippled from a wound, or are tigresses with cubs, where deer are scarce; and it is significant that man-eaters are generally found in districts which are visited by herds of cattle only for part of the year. Once a tiger has conquered its innate fear of men it will continue to attack them, although it seldom confines itself to human prey only. Man-eaters generally become more cunning than other tigers, and it is such animals that give rise to the stories which make out the tiger to be the most formidable of all wild beasts. The most remarkable of these stories is one common all over India, namely, that the spirits of men killed by a tiger are its servants afterwards, sitting on its head and not only warning it of danger but helping it to destroy other human beings. Considering these superstitions, it is not surprising that tigers themselves, or images representing them, are objects of worship among many Indian tribes, that in former times oaths were sworn on a tiger-skin in Indian tribunals, and that various parts of the body, as, for instance, the front teeth, claws, and whiskers, are kept as amulets and charms.

A tiger may reach a considerable age; one was known to visit a certain group of villages for twenty years, and, beyond growing a little lighter in colour, showed no sign of old age when killed. The limits of a tiger's life have not, however, been ascertained, except in the case of captive specimens which afford no certainty as to what obtains in the wild state.

Tiger-cubs are sometimes born in captivity, but the species does not breed in this condition so readily as the lion, whose cubs, moreover, are much more easily reared.

Lion.

The second large cat of the Old World, the lion (*F. leo*), is now exterminated in India except in the Gir Forest of the Kathiawar district of Gujarat, where it is now exceedingly rare, and is protected by Government. As it is now almost entirely an African animal, it may be more appropriately dealt with among the fauna of the southern continent; and it is therefore only necessary to add that the Indian lion constitutes a local race (*F. leo gujratensis*), characterised by the poor development of the mane.

Leopard.

The leopard (*F. pardus*) comes third on the list of Indian cats, and next in size to the tiger. Great difference in the size of leopards is noticeable, but speaking generally, it may be said that the length, measured from

the nose to the tip of the tail, varies between 5 and 8 feet. The average height at the shoulder is about 24 inches, and the tail varies between three-quarters and half the length of the body.

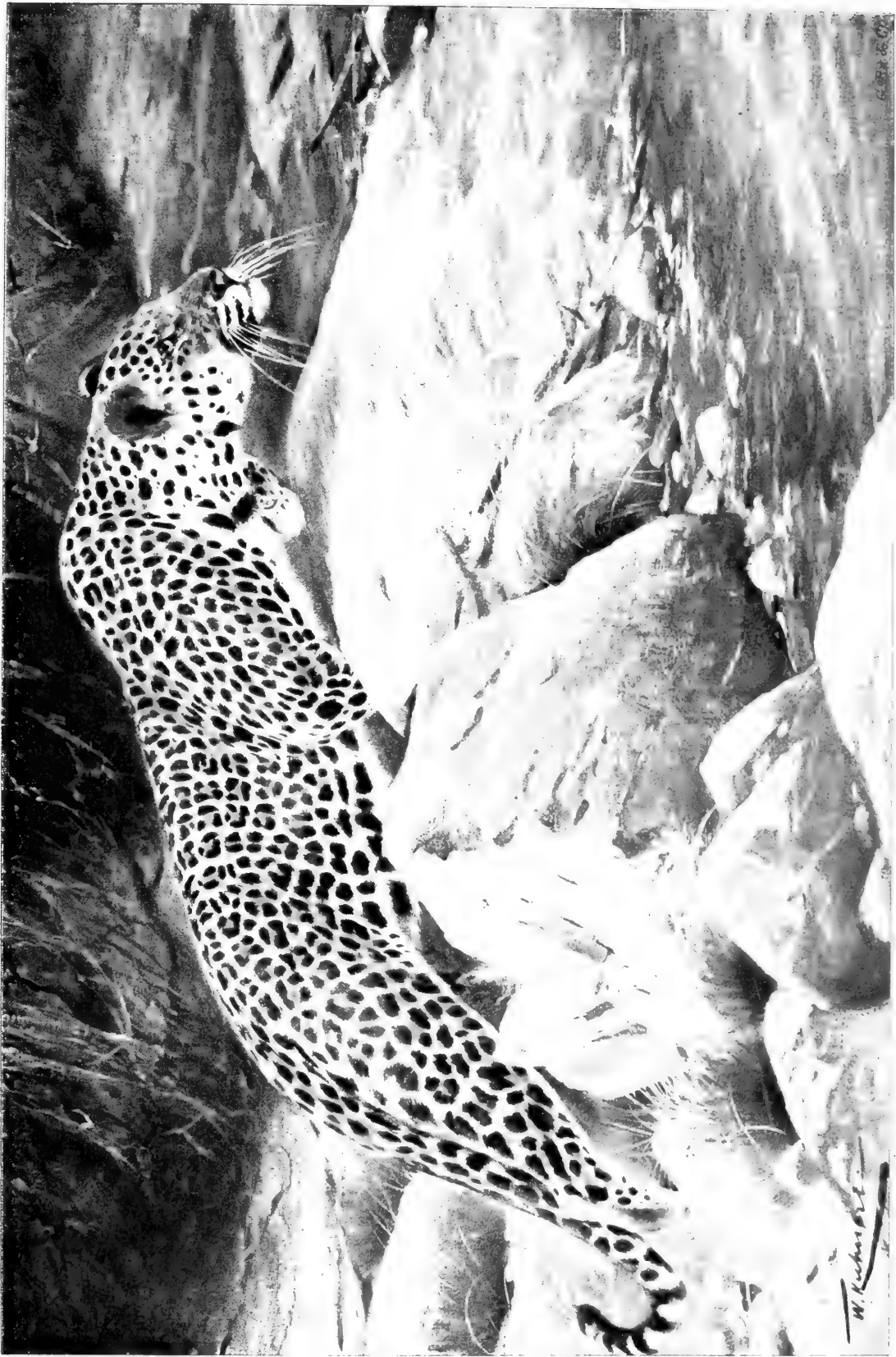
On the head and upper part of the body the fur is generally close and short, but below it is longer. The length of the fur varies with the climate; in the colder parts of the leopard's habitat, for instance, it is longer than elsewhere.

The general colouring of the upper-parts varies between reddish yellow and yellowish white, or pale brownish yellow, being sometimes darker and sometimes lighter; the lower-parts are usually white. The whole body is marked with circles or rosettes of unequal size. On the back these spots generally form black, irregular rings, which surround lighter or darker spots of the ground-colour, while the spots on the head, the lower ends of the extremities, and the sides are brownish, solid, and smaller. The greater part of the tail is also spotted, but the spots near the end are larger and fewer. Young leopards are brownish, and their marking is less distinct. The coloration varies from that of the ordinary character through all the intermediate shades up to that of the black phase, which was formerly regarded as a separate species, although it is not even a distinct race. It is just analogous to a black domesticated cat, the parents being often of the ordinary colour, while black and spotted cubs may be met with in the same litter. In black leopards the rings and spots are distinctly visible in certain lights.

There are several distinct local races of the leopard, and even in India there are two forms distinguished by their size, the larger of these being the typical representative of the species. In Persia, and perhaps Kashmir, occurs a race (*F. pardus panthera*) somewhat approaching the snow-leopard in the bushiness of its tail and longer hair. The Manchurian leopard (*F. pardus fontanieri*) is perhaps the most distinct of all. But African leopards are also distinguishable in colour from the Indian animal, and form several distinct races. Even in India leopards vary considerably in colour, according as to whether they inhabit dark and damp forests or deserts, so that sub-races may perhaps be recognised. This, however, is not a subject which need be further discussed here; the main point to bear in mind is that all these varieties form but a single species. The leopard is thus an inhabitant of the whole of Asia, from the Caucasus to Amurland, and it is likewise found almost throughout Africa, so that it is one of the most widely distributed of all large animals.

In habits this cat differs very markedly from both the tiger and the lion, being much more agile, and capable of climbing vertical and smooth stems with the quickness of a monkey. It can also jump a considerable distance from the ground; and although it likes wetting its feet as little as the domesticated cat, and often inhabits mountainous country without water, it swims when necessary without hesitation and just as well as the tiger.

The favourite haunts of the Indian leopard are rocky mountains covered with dense forests, where it hides in caves, or among projecting ledges, in order to survey the surrounding country at sunset. Its usual tactics are to cut off, with surprising quickness and stealthiness, any animal grazing apart from the herd of its companions. Wherever it may live, it knows how to hide in an almost miraculous way, owing to its spotted fur blending so well with the background.



LEOPARD.

Large leopards will often kill cattle, ponies, asses, and the larger deer, but smaller individuals are contented with smaller prey. Leopards are not particular in the choice of their food; mammals, birds, and reptiles, which are not too large to be killed, or too small to be caught, are welcome prey, and they will leap on a cow or pounce on a sparrow. If they have any preference, it would seem to be for jackals and dogs, especially the latter. The Indian leopard is also a terrible foe to monkeys, killing many in the rocky hills among which it lives. Leopards seem to kill their prey in a manner different from that of tigers, for they tear open the throat or keep the necks of their victims between their jaws until broken, or the animals are strangled. They never begin, like tigers, on the hind-quarters of their prey, but always attack the under-parts first, and eat the intestines. After a meal they retire to a hiding-place near by, to return to the carcass next day. Like tigers, they carry away their prey and hide what they cannot eat, often among the branches of trees.

At night leopards often venture over the roofs of huts to the penned goats and calves of the natives, carrying them away with great boldness and quickness. They slink round human habitations for the purpose of stealing cattle, ponies, asses, sheep, and goats, and thus often come in contact with the villagers. They fear man much less than do tigers, at least when not hunting for prey, and although less powerful, are in many respects much more dangerous than the latter, as they attack their adversaries with more courage and persistency, and when driven to bay defend themselves with the greatest fury. Some leopards become man-eaters, and one is said to have killed two hundred persons within the two years before it was shot.

Leopards are even more silent than tigers, and if undisturbed seldom utter a sound. When surprised, or compelled to defend themselves, they hiss and growl exactly like tigers. The cry, however, is different, consisting of a peculiar half-grunt and half-cough, three or four times repeated, which resembles in its regularity the noise of a saw.

Leopards are generally found alone, except during the pairing-season. About the same time after this, as in the case of the tigress, the female gives birth to from two to four cubs, which in India are born in February or March, and seem, like young tigers, to take three years to grow up. As leopards have an extremely bad character, they are much hunted, especially by the natives of India. But in spite of their greater abundance they are shot much less frequently than tigers; the cleverness with which they hide, the quickness of their movements, and the colouring of their fur, rendering them very difficult of detection. Moreover, they often look up into trees, and thus detect the waiting sportsman, who is perchance thinking that his quarry will never appear, while it is all the time watching him from a short distance, and eventually slinks off without his being aware of its presence.

In leopard-shooting, a young goat, calf, or dog is generally tied up near a tree, on which the sportsman is sitting. From time to time a string tied to the live bait is pulled, to keep the animal awake and make it move or cry out. As the leopard is more likely to appear at night, a light is sometimes placed in an earthen pot, so that it may shine on the animal tied to the tree, and the ground strewn with

flour or chopped straw to make the colour of the leopard show up better. These methods are, however, a little unsportsman-like. Leopards are much oftener caught in traps than tigers, and many are killed by means of cage-traps, in each of which a live animal is placed in a separate compartment so arranged as to open and leave it free to escape as another door closes behind on the leopard.

Fishing-Cat. One of the most remarkable of the Indian cats, on account of its haunts and habits, is the fishing-cat (*F. viverrina*), which is of civet-like slenderness of shape, and has a length of from 30 to 32 inches, exclusive of the tail, which measures from 9 to 12 inches. In colour it is earthy brownish grey, rather lighter below, marked all over with black or dark brown, oblong spots, arranged in more or less distinct rows. It inhabits swampy jungle near the banks of rivers, creeks, and bays, and is distinguished from most other cats by eating fish, fresh-water molluscs, and snakes. It probably, however, also consumes the flesh of birds and mammals, as cases have been known in which it has killed calves, sheep, and dogs, and even carried off infants from the huts of their parents.

The fishing-cat is found in Bengal, in the valley of the Indus, on the Malabar coast, and in Ceylon. At the foot of the Himalaya it ranges as far as Nepal to the west; eastwards it inhabits Burma, Tenasserim, and southern China. It does not apparently exist in the Malay Isles but is said to occur in Formosa.

Leopard-Cat. The prettily marked leopard-cat (*F. bengalensis*), which has its home in the forest, where it lives on birds and small mammals, is of a reddish, or light grey colour, with white lower-parts. It is marked all over with more or less oblong black or brownish spots, arranged in rows along the body; the head being striped, and the tail ringed. Its length is from 24 to 26 inches, exclusive of the tail, which makes it half as long again. It lives in the holes of trees, stealing domesticated fowls, and preying on birds generally. The leopard-cat, in many varieties, is found all over India from the Himalaya to Cape Comorin; but is absent from Ceylon, Burma, and the Malay Peninsula, although present in the Malay Archipelago, the Philippines, Formosa, and China up to Amurland.

Rusty-Spotted Cat. The small rusty-spotted cat (*F. rubiginosa*) inhabits grass-grown, dried-up tanks in southern India and Ceylon, but is rare in the northern parts of central India. It sometimes chooses drains in fields adjoining villages for its residence, and apparently never lives in the jungles. It is some 27 inches long, including the tail. In colour it is reddish grey or rusty red, with the lower-parts white, and the head and neck marked with rusty coloured or dark brown stripes, and the body with oblong spots of the same colour arranged in rows.

Desert-Cat. The desert-cat (*F. ornata*) is an inhabitant of sandy plains and hills in the dry north-western districts of India, where it probably lives principally on gerbils. In size it is about the same as a domesticated cat, and is of a light sandy colour, marked with numerous small spots, arranged in more or less distinct longitudinal rows. This cat, which is remarkable for not leading an exclusively nocturnal life, is said to interbreed with domesticated cats to such an extent that most of the latter in the districts it inhabits are similarly coloured.

Waved Cat. The waved cat (*F. torquata*) is widely spread over northern India, although nowhere common. It has been found in Kashmir, Nepal, Rajputana, and elsewhere, and is noteworthy as being possibly the ancestor

of the Indian domesticated cats, although, on the other hand, it may quite likely itself be the descendant of domesticated cats which ran wild. The tail is a little more than half the length of the head and body, and like that of domesticated cats tapers towards the end. In colour it is brownish, or ashy grey, marked on the sides with dark cross-stripes or rows of spots, the head and back showing indistinct stripes.

Jungle-Cat and Caracal. The jungle-cat (*F. chaus*) is a species connecting the more typical cats with the lynxes, and has a very wide geographical distribution, ranging from northern Africa and the Caucasus through western Asia to India, Ceylon, and Burma. As it is not a distinctive Indian animal, it need not be fully described in this place. The same remark applies to the caracal (*F. caracal*), which is essentially a lynx of a uniform red colour, but retains the long tail of the more typical cats. It is common to India and Africa; and was at one time very generally kept by the native princes in most parts of India for hunting purposes.

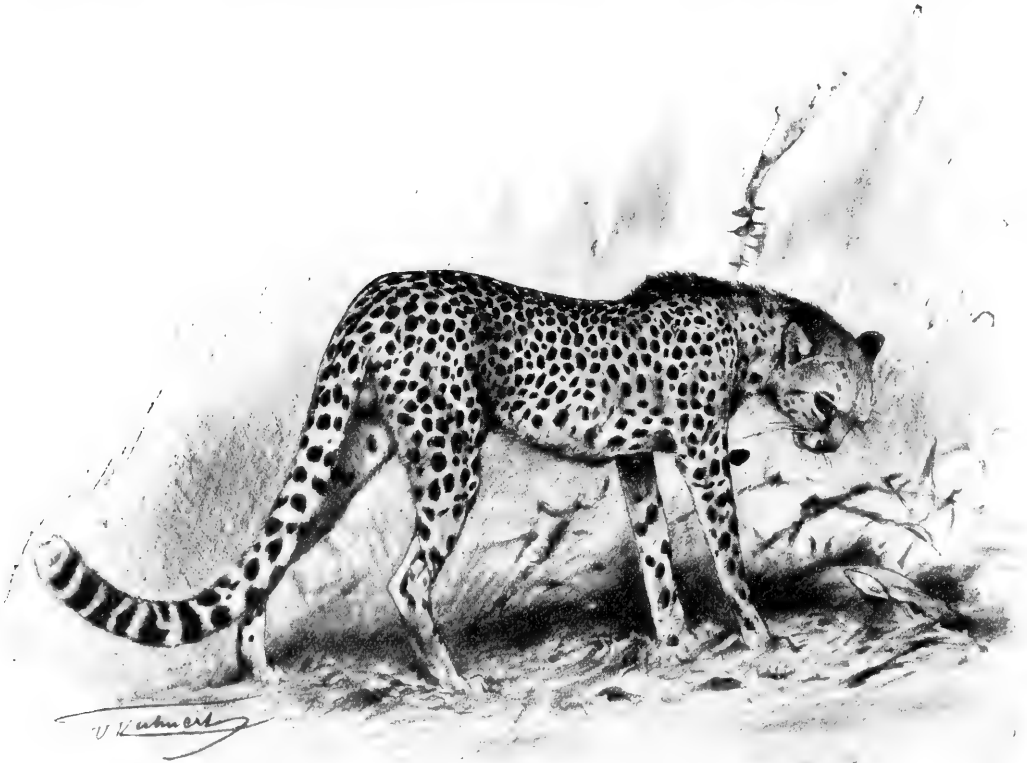
Hunting-Leopard. The range of the hunting-leopard (*Cynælurus jubatus*) extends over Africa, and thence through south-western Asia to Persia, the countries round the Caspian, and India. It is as yet unknown how far south the hunting-leopard (which is absent from the Malabar coast and Ceylon as well as from the north of the Ganges) is found in India, but its range there is probably much the same as that of the blackbuck. Although, as above mentioned, common to India and Africa, the chita, as this species is called by the natives, is fully noticed here on account of its extensive employment in hunting in the former country.

The hunting-leopard is about the size of a leopard, but stands higher on its legs, and is more slender in build. The pupils of the eyes are round, the ears short and round, the fur coarse, rather longer on the neck than elsewhere, and moderately long and somewhat shaggy on the under-parts. The ground-colour, which varies between pale brownish yellow and vivid reddish yellow, is lighter below than on the sides and the back, and is marked nearly all over with small solid round spots, not arranged in rosettes. The chin and throat are whitish, and without spots, and a black line runs from the eye to the upper lip, while a less distinct one, which in many cases separates into spots, extends from the outer corner of the eye to the ear, the latter being black outside and yellowish brown round the edge. Like the body, the tail, which is more than half the length of the body, is spotted down to the indistinctly ringed end. Young hunting-leopards look grey, and appear to be unspotted, on account of their long hair, but show their markings when shorn. The full-grown animal has a length of 42 inches, a tail-length of 30 inches, and a shoulder-height of about 32 inches.

Hunting-leopards are employed for the chase, and regarded as essential to the state of many Indian princes. They are usually caught when full-grown, and their habits are consequently well known to the men who catch and train them. The usual haunts of these animals are low, solitary hills overlooking plains inhabited by blackbuck, which form their principal prey, although they also kill gazelles, and no doubt deer and other mammals as well. Now and then they carry away goats and sheep, but they rarely molest domesticated animals, and never, so far as

known, attack man. When stalking their prey they slink along, taking advantage of uneven ground, and every sort of cover to within 100 or 200 feet, when they make a sudden rush. In this they display an absolutely marvellous speed for a short distance, surpassing that of any other mammal, even a greyhound, for no dog is able to overtake a running blackbuck or gazelle. The hunting-leopard has, however, no difficulty in outrunning these animals, and one has been seen to overtake in 400 strides a blackbuck 200 paces ahead.

After eating its fill the hunting-leopard generally spends two days resting in its lair. The third day it repairs to a special tree, which forms a kind of



HUNTING-LEOPARD.

assembling place for these animals, where it sharpens its claws, the marks being soon recognised by the trappers, who fix snares of dried antelope-sinews to poles driven into the ground round the tree.

On one of these expeditions, which has been somewhat fully described, the shikaris drove in a bullock-cart up to the tree, and fastened all round it, to a distance of from 8 to 10 yards, the snares to the poles. Sending the cart away, one of the shikaris and a European hid behind bushes and branches which had been heaped up at a distance of 50 to 60 paces, in order to watch. At sunset four hunting-leopards appeared, two large ones and two smaller ones. After stopping at a distance of about 400 paces they came gradually closer, playing with each other all

the while. About 100 paces from the tree they stopped again, as if suspecting danger. After awhile, however, they grew reassured and ran quickly to the tree. The two larger were the first to be caught in the snares by their fore-legs. The shikaris rushing up threw a blanket over their heads, and tied their legs together. Meanwhile the ox-cart had come back, and the blankets were taken off and replaced by a hood, one of the natives being seriously bitten while this was being done. After the leopards had been tied to the carriage, and the snares all collected, the party returned to camp.

Women and children remain all day with the newly captured animals, talking all the time in order to accustom them to the human voice. Then the different stages of the training begin, and in six months the leopards are generally tamed, some of them being as obedient and docile as dogs. They are fond of being caressed, are good-natured even with strangers, and like to rub themselves against their friends, purring all the time like cats. They are never kept in cages, but generally tied to a wall by a chain, and allowed to sleep on a native bedstead, or *charpoi*.

When a hunting-leopard is taken into the field a hood is placed on its head to prevent it from seeing, a line is tied to a leather belt round its neck or body, and the animal is conveyed in a bullock-cart to a place where antelopes are likely to be found. The latter allow the party to come fairly close, and when the shikaris think they are near enough, the hunting-leopard is freed from its hood, and let loose. According to the distance, the hunting-leopard either runs straight at the antelopes or sneaks up near enough to be able to attack them successfully. When a buck is with the herd, the hunting-leopard generally selects it for attack, probably because, as a rule, it is behind the others; and brings the antelope down by striking its legs. Immediately it clutches the fallen animal by the throat, and holds it until the shikaris come up. The latter then cut the antelope's throat and catch some of its blood in a basin for the hunting-leopard, who licks it up greedily. While drinking the blood, the hood is again drawn over its head, and it is taken on to other game, as a good chita will sometimes catch as many as four bucks in a morning.

Civets.

Passing on to the civet tribe, we find the true civets represented by the Indian civet (*Viverra zibetha*), which ranges from Bengal eastwards into China and Hainan and southwards into Siam. This animal may be recognised by its small round ears, long thick tail, which is thin at the end and measures more than half the length of the body, and the crest of long bristly hair running down the middle line of the back. In colour it is yellowish or brownish grey, profusely striped and spotted with black, the crest being black and the tail ringed with black. The lower part of the legs and the feet are dark brown or black; the head is grey, the chin brown, and the forehead as well as the sides of the neck and upper part of the chest are white; on the throat is a broad black band generally edged with white, and the neck has another dark band beginning behind the ear.

This civet, which has a length of about 40 inches including the tail, usually lives alone, hiding during the day in woods or high grass, and appearing in the open only after sunset. It feeds on small mammals, birds, snakes, frogs, insects, eggs, fruits, and roots. The civet used in perfumery is taken from this and other

species of civet-cat, and is collected when they are closely confined in cages, either by being scooped out of the scent-gland with a spoon or scraped from the walls of the cage. The scent is always recognisable, but most so when the animal is irritated, on which occasion it drops the odoriferous matter in lumps from the gland, although as a rule this takes place only every two or three weeks.

On the Malabar coast, somewhat widely separated from the habitat of the Indian civet, lives another species, the Malabar civet (*V. civettina*). A smaller species is the rasse (*V. malaccensis*), distinguished by the absence of a crest, the stronger and more curved claws, the short first toe of the fore-foot, the slender body, and the more pointed nose. Its average size is 22 inches exclusive of the tapering tail which measures 16 inches. In colour it varies from brownish grey to yellowish



INDIAN CIVET.

brown, and it is striped and spotted with black or dark brown on the back and sides.

In many cases these stripes and spots are indistinct or absent. There is a grey spot in front of the eye and another behind the ear; the head is grey or brownish grey and the chin usually brown. The feet are brown or black and the tail, which is 16 inches long, is marked with alternate black and white rings. Including the tail, the rasse averages 38 inches in length. It is often referred to a distinct genus, *Viverricula*.

The range of this civet includes all India with the exception of the north-west, south-western Asia, Ceylon, Java, Socotra, the Comoro Islands, and Madagascar. As it is the only civet common to Asia and Madagascar, it may have been introduced into the island by man, as it is frequently tamed and kept in cages by the Malays. It lives in holes in the ground or among rocks and dense bushes, but

although, unlike other civets, it is a good climber and quite at home amongst trees, it does not apparently choose the forest for a residence. Sometimes it settles close to human habitations, occasionally seeking shelter in drain-pipes and out-houses. When wild, the rasse, which is kept in captivity for the sake of its civet, feeds on small vertebrates as well as molluscs and, to some extent, on fruits and roots. It generally seeks its prey by night, although occasionally by day, and always alone; it often robs fowl-houses, and is therefore cordially hated by the Chinese, who are great poultry-keepers. They take their revenge, however, not only by eating its flesh, but by wearing its fur, which is much appreciated in China, where it is worn by people who cannot afford more expensive kinds.

Palm-Civets. The palm-civets differ from the true civets by the absence of a crest, the small sharp retractile claws, the vertical pupil of the eye, the long tail, and especially by the feet having the soles bare.

The Indian palm-civet (*Paradoxurus niger*) lives wherever there are trees from the foot of the Himalaya to Ceylon, in the remotest forest as well as in the neighbourhood of human habitations. It is unknown in the Punjab and Sind, and is rare in the treeless districts of the north-west as well as in the Deccan, but is common in upper Bengal and on the western and southern coasts. The head and body measure about $22\frac{1}{2}$ inches and the tail $19\frac{1}{2}$ inches; but females are somewhat smaller. The slender tail tapers but slightly, and is closely covered with hair, while the body is clothed with a coat of coarse blackish or brownish grey hair, which is long and shaggy on the back, and has little or no under-fur. Although the back is not striped, in young animals there may sometimes be indistinct stripes or rows of spots in this region. The feet, the greater part of the legs, and the terminal half of the tail are black, although the tip of the latter is sometimes white, and there may be a few spots on the body. The face is generally more or less black, with a distinct white or grey spot below each eye, frequently a second on each side of the nose, and often a third above the eyes. The coloration varies, however, according to locality, the race inhabiting southern India and Ceylon being, as a rule, blacker than those from other districts. The common palm-civet is well known in most parts of India, although on account of its nocturnal habits it is seldom seen in the daytime. It generally spends the day on trees, coiled up either in the branches or in a hole in the trunk. It takes its name of palm-civet from being so often found on cocoa-nut palms, but it also frequents mango-plantations, and often takes up its abode under thatched roofs, or in sheds and water-pipes.

Its food consists partly of small mammals and reptiles, and partly of birds, eggs, insects, fruit, and other vegetable substances. Occasionally these animals destroy domesticated fowls, while they also rob vegetable gardens, and display a predilection for palm-juice, or toddy, from which they derive their title of toddy-cats.

The palm-civet of Ceylon (*P. aureus*), which is restricted to the island from which it takes its name, is pale rusty-red, or chestnut-brown in colour; another species (*P. jerdoni*) inhabits the Palnai Mountains in Madura, the Nilgiris, and probably all the higher ranges of Cochin and Travancore.

Mongoose.

India abounds in species of mongoose, the most abundant being the Indian mongoose (*Herpestes mungo*), a shaggy greyish animal some 18 inches long, speckled with white or pale grey, and occasionally rufous on the head and legs. It is represented by several varieties in different parts of its range, which extends from Baluchistan, the Himalaya, and Assam down to Ceylon. This mongoose lives among thickets, in plantations and cultivated fields, along the banks of rivers, or on rugged ground covered with bushes, but not as a rule in dense forest. Often found near human habitations, it digs its own burrows in the ground, lives in pairs, and has three or four young in the spring. It feeds principally on small rodents, snakes, lizards, birds and their eggs, and insects, but at times also on fruit. It is often domesticated and is well known for its success in catching rats and killing snakes.

The stripe-necked mongoose (*H. viticollis*), which inhabits the western coast from Bombay to Cape Comorin, and also Ceylon, is the largest Indian species, being about 21 inches long without the tail.

The ruddy mongoose (*H. smithi*) is found all over India with the exception of north-western Bengal. It is about 20 inches long, its tail measuring 19 inches; like the preceding species it has a black tip to the tail, but there is no black stripe down the neck.

The Nilgiri mongoose (*H. fuscus*) has no black tip to the tail, is blackish brown in colour, and 18 inches long. It inhabits the Nilgiris and the hills of Travancore, but not Ceylon, where it is represented by the Sinhalese mongoose (*H. fulvescens*), which is yellowish in colour, with a yellow tip to the tail, and measures just over 16 inches in length.

Striped Hyæna.

The hyænas are represented in India by the striped species (*Hycæna striata*), but since that animal receives notice in another chapter the bare mention of its name will suffice in this place.

Wolves.

Among the members of the dog tribe, the European wolf (*Canis lupus*) just enters the area forming the proper subject of the present chapter, but is elsewhere replaced by the Indian wolf (*C. pallipes*). India from the Himalaya to the south, especially the open plain country, forms the principal habitat of this animal, which is rare in hilly and wooded parts, and is apparently not present on the Malabar coast. It occurs on the right bank of the Indus, but on the left is replaced by the European wolf, which is widely distributed over Asia, though not found east of the Bay of Bengal.

The Indian species is unknown in Ceylon, but reappears in the south of Arabia. In some respects it approaches a jackal, being smaller than the European wolf, without woolly under-fur, and with the hair generally shorter. The prevailing colour is pale fulvous, usually mixed with brown, and, especially on the back, with a good deal of black. Some individuals are reddish, and others rusty red all over. In length it measures about 36 inches exclusive of the tail, which is about 17 inches long. In habits this species much resembles the European wolf, but, although social, does not form large packs; it is also a silent animal, which only now and then barks like a pariah dog, and seldom or hardly ever howls. It feeds on such warm-blooded animals as it is able to overpower, but especially on goats, sheep, and antelopes, and when in twos and threes

occasionally attacks man, while it yearly carries off a number of children from the native villages.

Like its relatives, the Indian wolf is decidedly clever, and many of the stories told about its cunning are based on fact. Sometimes part of a pack will drive blackbucks or gazelles over some selected place, where the other members of the pack lie in wait hidden in ravines or in their own holes. An eye-witness describes a wolf lying on its back, and stretching its legs into the air in order to excite the curiosity of a herd of antelope. By accident the antelope were disturbed, and then two other wolves suddenly jumped out from where they had been hiding. When attacking a flock of sheep, wolves are said to divide in a similar way, one half keeping the dogs at bay, while the rest carry off the sheep. In this instance it may however be that one half of the wolves are occupied by the dogs defending the flock, while the others raid the sheep without the need of a mutual understanding between the two parties as to their respective duties. The following story is said to be well authenticated. Near a village in central India lived an old she-wolf and a full-grown young male, which used to frequent a certain spot situated on the slope of a hill from where the main road, always crowded with children, descended the hill. The young wolf would hide in bushes between the village and the foot of the hill, while the older animal ascended the hill, waited for a favourable opportunity, and then rushed down and seized a child in the road. This happened many times. At first the inhabitants of the village pursued the wolf, and sometimes succeeded in making it drop its prey, but in such cases the other wolf managed, during the general confusion, to carry off another child, while the one first taken was so much hurt that it did not recover. In this case, as in many others, superstition prevented the inhabitants of the village from killing the two wolves, and an Englishman who succeeded in ridding them of the pests had the greatest difficulty in finding people to assist him in the task. The chief reason which prevents the natives from killing a wolf in many parts of India is that its blood shed on a field is supposed to make it barren. It is therefore not astonishing that, in spite of pursuit by the natives, wolves are often seen carrying off young goats from villages in broad daylight.

The Indian wolf brings forth three to eight young in one of the last three months of the year, generally in December, in holes in the ground, or in caves among rocks. The young are born blind, with pendent ears. They are easily tamed, when they behave like domesticated dogs; and it is possible that the pariah dogs of India are partly descended from the present species, which appears to sometimes breed with village-dogs. It is probable that the Indian wolf is the ancestor of some of the European breeds of domesticated dogs.

The Indian jackal is the widely spread *Canis aureus*, of which mention is made in another chapter.

Wild Dog.

The Indian wild dog (*C. sumatrensis deccanensis*), which is a local form of a Malay species, occurs in all the larger forests of India but not in Ceylon. It also inhabits Gilgit, Ladak, and parts of the valley of the upper Indus, as well as eastern Tibet and the forest zone of the Himalaya from Kashmir to Assam. In form it more resembles a jackal than a wolf, owing to its short legs. The hair, which in Tibet and the Himalaya has a close, woolly

under-fur, is long; and the tail, which is black, and in some cases whitish at the tip, ends in a long-haired brush. The colour, which varies much, is generally rusty red, but sometimes rusty grey, or even light greyish brown above, and lighter below. In the Indian peninsula, this wild dog is a forest-animal, but in the valley of the lower Indus and Tibet, where there are no forests, it lives in open country. The total length is 45 inches including the tail of 8 inches, but excluding the long brush at the end, which measures another $6\frac{1}{2}$ inches. Although it may sometimes hunt at night, the Indian wild dog is mainly diurnal in its habits; and like other dogs feeds on carcasses and sometimes on vegetable substances, one of these animals in captivity having been in the habit of eating grass and leaves of different kinds, not, as in the case with domesticated dogs, on account of being ill, but apparently with full enjoyment.

The Indian wild dog hunts in packs, generally from six to twelve in number, but sometimes as many as twenty. In India it preys on deer, antelopes, and wild boars, but in Tibet seems to prefer wild sheep and ibex. As it avoids the neighbourhood of man it seldom attacks domesticated animals, although it now and then kills sheep, goats, and cattle, and in three instances these animals have been known to bring down a tame buffalo. The wild dogs, or dholes, represent the sub-genus, or genus, *Cyon*.

Indian Fox. The Indian fox (*Canis bengalensis*), ranging from the foot of the Himalaya to Cape Comorin, is common everywhere, except in the forests. It is not known in Ceylon or Burma, nor is it found east of Assam or west of Sind and the Punjab. In size it is small, measuring only about 20 inches long, with a tail of about 14 inches. In colour it is reddish grey above (changing to silvery grey or rusty red according to the season), speckled with white. The sides are much greyer than the back; the chin and throat are white; and the lower-parts pale reddish yellow or buff, becoming rufous towards the hind-legs. The ears are grey outside, and white inside, and the tail is more or less reddish above, with (unlike that of other Indian foxes) a black tip.

The Indian fox, which feeds chiefly on rats, land-crabs, grasshoppers, and beetles, has been observed to catch quails, and often kills young birds and steals eggs. It is apparently fond of lizards, and habitually eats fruits as well as the buds and sprigs of certain plants. Usually it digs its burrow in treeless plains, sometimes under a thorn bush. In parts exposed to floods during the rainy season it chooses sloping banks near water or other elevated ground. Each burrow has several apertures, some ending in the ground, others leading to a chamber two or three feet down.

Himalayan Black Bear. Of the bears, the Kashmir race of the brown bear (*Ursus arctus isabellinus*) inhabits parts of the Himalaya but not the true Indian area. On the other hand, the Himalayan black bear (*U. torquatus*) must be regarded as an Indian animal. This bear is spread over the whole wooded zone of the Himalaya, ranging from Afghanistan and Baluchistan, the Khirthar Mountains, and the border of Sind, as far west as the Persian boundary, and eastward to the mountains of Assam, and south (although rarely) as far as the Mergui Islands. It also occurs in Sze-chuan, southern China, Hainan, and Formosa. This bear is specially characterised by the white gorget or collar on the chest. The

chin is white, the upper lip whitish, and the nose and occasionally the paws are reddish brown. The average length is about 5 feet, exclusive of the tail, which measures 4 inches. Full-grown males, which are usually larger than the females, have an average weight of 300 lbs. Unlike the sloth-bear, this species has a smooth coat with hair of moderate length. There is no under-fur, but in winter the greater length of the hair on the shoulders makes the animal look humpbacked. The claws are short and strong, and the ears rather large and long-haired.

In the Himalaya, but not in Baluchistan, this bear is a forest-animal, and is found in the mountains in summer up to a height of 12,000 feet, but in winter rarely above 5000 feet. It is often seen near villages, devouring fruit in the orchards and corn in the fields. Its food in winter consists principally of acorns and chestnuts, but at other times of fruit and roots. This species is, however, not so fond of roots as is the brown bear of the Himalaya, although it often climbs trees in search of fruit, generally during the night or early morning. Like other bears it is fond of honey, and yet in spite of all this it is the most carnivorous of all Indian bears, killing sheep, goats, ponies, and cattle, and at times feeding on carcases.

All reports agree in considering the black bear a more dangerous animal than the brown species, and since it lives in the neighbourhood of villages it oftener comes in contact with man. It is said to see and hear better than the brown bear, while its sense of smell is reported to be singularly keen by some observers and mediocre by others. In walking and running it is a thorough bear, having the fast shambling trot of its kindred; and, like its brown cousin, is a good swimmer.

Its usual abode is in the depths of the forest, to which it retires for rest in caves, hollows of trees, or dense bushes. Except during pairing-time these bears are generally solitary. The cubs, often those of two successive years, remain with the mother until full-grown. Generally two in number, they are born in spring and are very small at birth and do not open their eyes for some time.

A characteristic mammal is the sloth-bear (*Melursus ursinus*),

Sloth-Bear.

which inhabits India from the foot of the Himalaya to Cape Comorin, and occurs in Ceylon. Living principally in bushy, hilly districts, this bear ranges as far as the outskirts of the Indian desert to the north, and to Kathiawar in the west. It seems to occur in the north and east of Bengal, but its identity with the bear inhabiting the plains of Assam has not yet been satisfactorily made out. The sloth-bear has one pair of incisors less than other bears in its upper jaw; its teeth comprising two incisors, one canine, and six cheek-teeth on each side of the upper jaw, and three incisors, one canine, and seven cheek-teeth on each side of the lower jaw. The claws of the sloth-bear are large and strong, and the snout and lower lip very extensile and flexible. The hair is coarse and long, longest between the shoulders, and the colour is black, except for the dull grey tip of the nose, a narrow white semicircular spot on the chest, and the white claws. In length this bear measures about 5 feet, the tail being about another 5 inches; the average shoulder-height is some 30 inches, and the weight of a male (considerably more than that of the female) may be 330 lbs. or more.

The sloth-bear is still one of the most common animals of India. In some

parts, however, as for instance in eastern Bengal and the Dekkan, where some forty or fifty years ago it was common, it is now exterminated. Wherever it exists it betrays itself by the holes it digs in the ground when searching for ants, by the marks of its claws on the trees it ascends for honey, and by its peculiar trail. This bear goes about singly or in twos and threes; the trios being generally a female with two cubs. Now and then parties of four or five are met with. Bushes, forests, and mountains form the favourite haunts of this species; and in the hot season, while the monsoon is on and when the females have young, they retire into caves, especially those formed by the weathering of the granitic gneiss, of which many of the mountains of India consist. This gneiss, disintegrated into



SLOTH-BEAR.

large, loose, and broken blocks, forms large caves which are favourite resorts of these bears, as they afford shelter from the sun, and a refuge from flies, gnats, and other insects, which are particularly troublesome during the monsoon.

At other times when they cannot find caves, or during the cool season, sloth-bears spend the day amid long grass, bushes, or in holes in the sides of ravines. They wander in search of food at night, and in the neighbourhood of human habitations are rarely seen in the daytime, although in wild, uninhabited parts they often remain out till eight or nine o'clock in the morning and are again on the move an hour or so before sunset. In wet and cloudy weather they may be abroad all day. Although like other Indian animals they avoid the noonday sun, they are not so sensitive to heat as their black coat might lead us to expect, and they have less hesitation than the tiger in exposing themselves to the sun's rays.

Its long shaggy hair, the peculiar shape of its long movable snout, and its short hind-legs make this bear one of the most remarkable of its kind, and as peculiar in its appearance as it is in habits. It generally moves at a quick walk, but when frightened or in a hurry trots away so awkwardly that it appears to roll along the ground. If startled by a shot or other sound, it rolls downhill head-over-heels like other bears; ascending rocks comes easy to it, and it climbs trees slowly and heavily, as is shown by the deep impressions of its claws in the bark. Its food consists almost exclusively of fruit and insects. Sloth-bears generally visit fruit-trees on their nightly excursions, sometimes climbing about in the branches and shaking off the fruit, sometimes standing up on their hind-legs and drawing the branches down with their fore-paws. The animal food of these bears consists chiefly of beetles and their larvæ, and white ants. They will turn over stones for beetles, climb the trees for bees, and dig holes of a yard or more in depth for ants. When they reach an ants' nest they blow away the dust and then draw the hapless inhabitants into their mouths with such a powerful suction that it may be heard at a distance of two hundred paces. They are exceedingly fond of the fermented sap of the wild date-palm, climbing the trees to get at the pots which are hung up to catch the juice, and are said occasionally to get intoxicated on this beverage. They are also fond of sugar-cane and do great damage to sugar-plantations. Sometimes they eat maize and other grain, or steal birds' eggs. Although they may occasionally kill the larger animals, they do not eat them. Dry bones of cattle are sometimes gnawed by them, and once a wounded muntjac, and on another occasion a cow killed by a tiger, were found partly eaten by a sloth-bear.

The habit of sucking their paws, grunting all the while, is especially characteristic of sloth-bears, and young specimens in captivity are fond of sucking the hands of their keepers. The sense of smell is apparently well developed, but the sight of this bear is indifferent, and the peculiar way in which it looks at intruders gives the impression of its being short-sighted. Neither is its sense of hearing very acute, and it seems to discover honeycombs in trees and ants' nests or larvæ of beetles underground mainly by smell.

When sniffing about for food on their nocturnal excursions sloth-bears utter a peculiar sound audible at a considerable distance. Occasionally during pairing-time, or at the beginning of the cold season, they utter a shrill scream; and when surprised or startled, and especially when wounded, they break into long loud guttural tones, while when mortally wounded they give vent to plaintive cries.

When wounded by a bullet, a sloth-bear generally attacks its unwounded companion. On the whole these bears are cowardly, although in some cases they will furiously attack men, using both teeth and claws. When surprised and trying to escape, they content themselves with knocking down their adversaries by a blow of the paw. Often, however, they inflict serious wounds, and in some cases clutch their victims and bite fiercely till all struggles cease. The most furious attacks are made by females with young; wounded bears are generally dangerous, but sometimes this species attacks without provocation.

Native hunters generally send beaters through the jungle or over a hill and shoot the bear as soon as it is within range. Elephants are seldom used, for the

bears run away from them at once, and moreover, the ground is too uneven and rocky for elephants to advance quickly enough. A peculiar method of hunting this bear with hounds is used by the Polygars who inhabit the extreme south of the Indian peninsula. When the hounds have driven the bear to bay each hunter sticks a long bamboo cane smeared with bird-lime on to its shaggy fur, and thereby holds it fast. This bear—which is also caught in nets—often tries to escape when pursued, and runs until it falls down from exhaustion, continuing its course for many miles, heedless of cold or heat. It has been stated that when attacking it rises on its hind-legs, so that it may be shot through the breast; but this is erroneous, as it seldom stands on its hind-legs, except when enraged or perhaps when surprised.

Seven months after pairing-time the young, of which there are generally two, are born, mostly in December or January, but sometimes as early as October, or as late as February. At birth they are about the size of Newfoundland pups. They remain blind for three weeks, and have soft long hair which becomes rougher and coarser in a few months. When two or three months old, the mother takes the cubs out, carrying them on her back, to the long hair of which they cling. In this way they ride about occasionally until they are a good size. Sometimes the mother will carry one cub while the other runs at her side. Generally the cubs remain with their mother for two or three years, by which time they are fully grown.

Yellow-Breasted Marten. Of the weasel tribe there are many Indian species. Among the typical representatives of the group the yellow-breasted Indian marten (*Mustela flavigula*) is found throughout the Himalaya, from Kashmir to Assam, as well as in Burma, the Malay Peninsula and Sumatra, southern China and the Amur countries, and also in the Nilgiris, the mountains of Travancore, and probably in the higher portions of the Western Ghats. This marten has a length of from 20 to 22 inches exclusive of the tail, which measures 16 inches and more. In the southern portion of its range it has rather short hair, but in the Himalaya the hair is longer, with a woolly under-fur in winter. The head as far as the ears, the face, the hind part of the neck, the lower portion of the back, and the tail and legs are glossy brown or black, while the back is pale brown, or, sometimes, brownish white. The chin and lower part of the throat are white, and the rest of the throat as well as the breast orange or brownish yellow; the under-parts being paler than the back. The coloration, however, varies in different districts; and on this and other differences several local races have been named.

The yellow-breasted marten inhabits the forest and is often seen in the day-time, sometimes in pairs and sometimes in parties of five or six, among bushes or trees, wandering in search of prey, and uttering all the time a low chuckle, which in anger becomes a hoarse cry. It feeds on birds and their eggs, small mammals, reptiles, fruits, and insects.

Yellow-Bellied Weasel. The yellow-bellied weasel (*M. cathia*) is dark reddish brown on the back, face, head, ears, extremities, and tail, and of a deep yellow on the lower-parts. It is employed in Nepal for catching rats, a task in which it is most successful; and is also trained for catching fowls, geese, and even sheep and goats, which it kills by biting through the arteries of the neck. It inhabits heights up to 8000 feet in the Himalaya, as far west as Masuri, and in other mountains

from Assam southwards. In length it averages 10 inches, the tail measuring 5 or 6 inches more; the males are considerably larger than the females.

Otters.

The common European otter is well known in India under a somewhat greyer form. Another kind, the smooth otter (*Lutra ellioti*), is found south of the foot of the Himalaya, and is common on the Indus, as well as in lower Bengal, Burma, and the Malay Peninsula. It is much smaller than the common otter, and of a uniform brown colour with a light greyish gloss; and is probably the otter kept by the Malays for fishing. The golden otter (*L. aureobrunnea*), a smaller species, occurs in the Himalaya; but the clawless otter (*L. leptonyx*) belongs more to south-eastern Asia, although it is sometimes found near Calcutta.

Indian Ratel.

Another representative of the weasel tribe, the Indian ratel (*Mellivora indica*), inhabits India from the Himalaya southwards, but is unknown in Ceylon and east of the Bay of Bengal, and seems to be absent from the Malabar coast. Like its African relatives, this ratel has very long front-claws, double the length of the hind-claws. In length it is about 32 inches, the tail measuring another 5 or 6. In colour it is grey, or whitish grey above, and black below, the hair being very thin on the under-parts. It is exclusively nocturnal, and common in hilly districts, as well as in the river-valleys of northern India, where the high banks are convenient for its burrows. Ratels are said to live in pairs, and to feed on rats, birds, frogs, and insects, but especially on honey and bees. The long front claws are specially adapted for digging out honey-comb. The reason for the peculiar coloration of the ratel and certain other members of the weasel tribe—light above and dark below—appears to be for the purpose of rendering them conspicuous, as they are all strong-smelling creatures, unfit for food.

Indian Hedgehog.

Among the insect-eating mammals, the hedgehogs are represented by *Erinaceus micropus*, a species inhabiting Madras, of whose habits and range nothing definite is known. It is pale in colour and only about 6½ inches in length.

Moles and Shrews.

Two kinds of mole (*Talpa micrura* and *T. leucura*) inhabit the south-western Himalaya and Assam, but none is known from the plains of India. Musk-shrews are, however, very numerous in the Indian area. Among these, the grey musk-shrew (*Crocidura caerulea*) lives in the neighbourhood of human habitations all over India and Ceylon, and in many islands of the Indian Ocean, to which it has probably been brought in ships. The length of the head and body is 6 inches, and that of the tail about 3½ inches. This shrew may be only a domesticated form of the brown musk-shrew (*C. murina*), which lives principally in forests, but is also found in houses. It smells particularly strong of musk, and feeds mainly on insects and their larvæ and worms.

The grey musk-shrew, generally called the musk-rat, may be regarded as the common shrew of India, and is nocturnal, like other shrews. During the night it hunts for cockroaches and other insects in houses, squeaking occasionally as it does so, while during the day it shelters in holes and drains. Its hiding-places often have a very strong smell of musk, emitted by the secretion of the glands on the sides of the animal, but when not irritated or frightened this shrew leaves no scent

on objects over which it runs. In colour it is generally a bluish grey, paler below than above, but there is considerable variation in the tint. Analogous variations occur in the brown musk-shrew, which probably inhabits the whole Indian area, as it does the Himalaya from Kashmir to Assam up to quite 8000 ft.

Insectivorous Bats. Among the insect-eating bats, Kuhl's bat (*Scotophilus kuhli*) is abundant throughout India, and also ranges to Borneo and the Philippines. The upper-parts of this bat are generally yellowish brown, but vary between vivid chestnut, golden brown, and greyish brown, the lower-parts being yellow or dull white. In length it is about 3 inches, the tail measuring about 2 inches. In flight it is easy and slow, and it lives singly or in pairs, or in small or large parties, in verandas, temples, and other buildings, and also in the holes of trees, its food being chiefly white ants or termites.

Six kinds of tube-nosed bats (*Harpyiocephalus*), recognisable by their tubular nostrils and the hairy membrane between the hind-legs, are indigenous to the Himalaya and Tibet. The genus is nearly allied to *Myotis*—represented in northern India only by the wall-bat (*M. muricola*). A remarkable Indian species of another genus is the painted bat (*Cerivoula picta*), which is widely spread over India, Ceylon, and Burma, although rare in the drier districts of these countries. It is small in size, the length without the tail being about $1\frac{1}{2}$ inches. In colour it is a deep orange, or bright rusty red above, but lighter and yellower below, the membranes being orange and black. In the daytime this species more resembles a large butterfly than a bat, but is remarkably like dead leaves when at rest, and is thus well protected by its colouring. As it is often found on plantain-trees, it is known in Ceylon as kehel vulha, or plantain-bat, and this is probably the origin of its generic name. One of the wrinkled-lipped bats (*Nyctinomus plicatus*) occurs in India and south-eastern Asia generally, but neither in Ceylon nor the Himalaya. This bat is furnished with long narrow wings, and has a length of $2\frac{1}{2}$ inches, with a tail-length of $1\frac{1}{2}$ inches. In colour it is brownish black, or greyish brown above, and is sometimes of the same hue below, although generally lighter. Another family is represented by the Indian false-vampire (*Megaderma lyra*), a large-eared species of about $3\frac{1}{4}$ inches in length, of a dark ashy or slate-grey colour above, and lighter below. This bat belongs to a group characterised by the long snout, large wings, and the absence of a tail, and deserves attention on account of its food. It is spread over India from Kashmir to Ceylon, and from Karachi to Calcutta, and is also found in China, but not as yet in Burma. It sleeps in caves, old buildings, and under roofs during the day, and lives partly on insects, but principally on small vertebrates, the blood of which it sucks. Strange to say, males of this species seem much more numerous than females. There are many other Indian forms of insect-eating bats—among them several kinds of tomb-bats (*Taphozous*)—but these need not be mentioned in detail on this occasion.

Fruit-Bats. The group of fruit-bats, the majority of which are of large bodily size, are, as their name implies, fruit-eaters; and the crowns of their cheek-teeth, instead of bearing sharp cusps, are, as a rule, marked only by a simple longitudinal groove. Moreover, the outer and inner margins of their ear-conchs are joined so as to form a more or less oval ring at the base, instead of, as in most insectivorous bats, rising from the head independently of each other. All the

a length of about 9 inches, varies much in coloration, but is generally reddish brown on the head, and lighter on the shoulders and the hind part of the neck; the back behind the shoulders is brown or black, the lower-parts are yellowish brown, and the chin, the front of the neck, the sides, and hind-quarters are generally darker, and the breast sometimes dark brown or black. This bat roosts on trees, suspended by its hind-legs, head-downwards during the day. It generally selects the tamarind tree, but sometimes the bamboo, and when wrapped up in its wings looks like a large dry leaf. It is generally found in large numbers on one tree, and if not driven away always chooses the same group of trees for its abode. Towards sunset it begins to grow restless, and climbs about in the branches, and by and by starts on its nocturnal excursion, singly or in pairs. With the exception of oranges, it feeds on all kinds of fruit, especially figs. At early dawn these bats return to their resting-places, where, from the arrival of the first few until the sun stands high in the sky, there are continuous quarrels about the best places, most of them trying to get higher up the tree, and to drive away their neighbours from too close a vicinity. In this endeavour they climb up the branches, biting one another fiercely as they pass, striking each other with the long claws of their thumbs, and screaming and screeching unceasingly. Each newcomer is driven back on all sides and obliged to fly several times round the tree, and when it has gained a bough on which to hang, has again to fight, and is perhaps chased away two or three times before being able to maintain its place. About 10 o'clock they begin to grow drowsy as they hang side by side on a branch, fanning themselves with their wings, or wrapping their wings round their heads, until evening wakes them again. When eating they hang by one foot, and hold the fruit with the other, not by clasping it with their toes, but by thrusting their claws into it. The Indian fox-bat, like most other bats, has only one young at a time, which is born at the end of March, or in April, and is carried about by its mother until the end of May or beginning of June, when it is almost full-grown.

The short-nosed fruit-bat (*Cynopterus sphinx*), which is endowed with an appetite uncommon even in this voracious family, ranges throughout India from the Himalaya to Ceylon, and eastwards to Burma, the Malay Peninsula and Archipelago, and the Philippines. In colour it is light or dark brown, and its length is $4\frac{1}{2}$ inches. Dwelling in forests, it rests during the day suspended either on palms and other trees or in caves and hollow trees, and feeds exclusively on fruit. This fruit-bat has a particularly light and buoyant flight, whereby it is distinguished from the fox-bats, which fly heavily and in a straight line, although in general behaviour and habits both have much in common.

Among the monkeys of India, one of the most familiar, in all senses of the word, is the langur or hanuman (*Semnopithecus entellus*), in which the hair on the head radiates in a circle from one central point and overhangs the black face like a penthouse. The hair of the body is rather woolly, and in colour mainly greyish brown, although the naked portions of the face, ears, hands, and feet are black. The males measure from 25 to 30 inches in length, exclusive of the tail, which is a quarter as long again as the body, but the females are much smaller. The range of this species extends from the Dekkan to the south bank of the Ganges and the outer ranges of the Himalaya, and on the west includes



HANUMAN MONKEY.

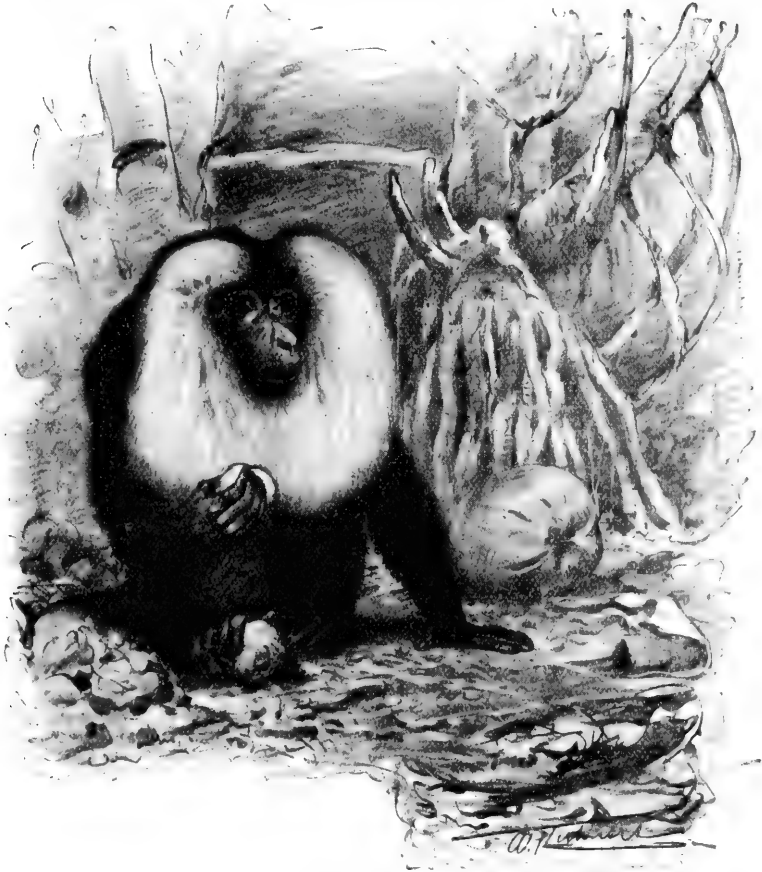
Gujarat and Kathiawar, but its extreme limits are not as yet ascertained. This is all the more remarkable since the hanuman is one of the best-known animals of India, being protected everywhere, not fearing man, and found as frequently in villages as in the depths of the primeval forest. Far away from villages the hanuman lives on trees, the banks of rivers or tanks, and on rocky hills, but never very far from water. It is very brisk in its movements, and leaps with astonishing sureness from branch to branch, often jumping from 20 to 30, or even 40, feet to the ground. Old males are sometimes seen alone, but, as a rule, hanumans associate in smaller or larger parties, composed of individuals of both sexes and of all ages. The females carry their young clinging to their bodies, and while the young are very small may temporarily keep apart from the rest of the troop, although they can hardly be said to form separate parties. It is distinguished from others of its kindred by the circumstance that the female, though generally giving birth to only one young at a time, sometimes has twins.

Himalayan Langur. The Himalayan langur (*S. schistaceus*) inhabits the area extending through Kashmir and the greater part of the Himalaya as far as Bhutan. It has long hair, which on the head radiates like that of the hanuman, but the ears are smaller and covered by the long hair of the cheeks, and the tail has a thin but distinct tuft. The colour of the back, tail, and the outsides of its limbs is greyish brown or dark slaty grey, with a slight tinge of purple, the head and lower-parts being whitish. Like the hanuman, the face, ears, palms, and soles are black. Except that it lives in a cooler climate and is larger, the Himalayan langur differs little from the hanuman in habits, although it may often be seen leaping among the snow-clad branches of the Himalayan deodar-forests.

Nilgiri Langur, etc. In the Nilgiri langur (*S. johni*), which ranges from the Nilgiris to Cape Comorin, the head and body measure 26 inches in length, and the tail 30 inches, but the females are smaller. In colour this species is glossy black or brownish black, the head being yellowish brown, and the lower part of the back and root of the tail ashy grey. This langur, which lives in small troops of from five to ten, is oftener killed than most Indian monkeys on account of the beauty of its fur and the flavour of its flesh, which is said to be eaten by some of the natives. Consequently it is shy and cautious, though very noisy. The ursine langur (*S. ursinus*), which inhabits the mountains of Ceylon, is distinguished by its very long hair (often 4 or 5 inches in length on the sides), and is greyish brown in colour. This monkey is generally found in large troops, jumping from tree to tree, and uttering a short howl when alarmed. A second species (*S. senex*) also inhabits the mountains in the south of Ceylon.

Macaque Monkeys. Of the macaque monkeys the best-known in northern India is the bandar or Bengal macaque (*Macacus rhesus*), the males of which attain a length of about 22 inches, with a 10-inch tail, while the females are much smaller. In colour it is principally light greyish brown, varied with dark brown or rufous, the under-parts being yellowish. Its range extends from the Himalaya to the Godaveri and from Kashmir to Burma. This monkey, which has been found at an elevation of 10,000 feet in Kashmir, generally lives in large troops, and has little fear of man, being occasionally found in villages. It seeks its food on the ground, eating spiders and all kinds of insects, and also fruit and seeds.

It frequents cultivated districts, especially in the neighbourhood of tanks, or near clumps of trees on the banks of rivers, but is still more common in forests; it delights in going into the water, where it swims well. Closely related to the last is the Himalayan macaque (*M. assamensis*), which inhabits the southern slope of the Himalaya from Masuri or farther west as far east as northern Burma, and is generally found at a height of from 3000 to 6000 feet. Another species, the lion-tailed macaque (*M. silenus*), is a long-haired black monkey, the males of which measure 24 inches in length, with a tail of 10 inches, the females being smaller.



LION-TAILED MACAQUE.

The face is framed by a grey fringe, which leaves only the forehead free and conceals the ears, and the tail is tufted. This species, which inhabits the forests of the Western Ghats from below Goa to Cape Comorin, is very common in Cochin and Travancore, and found at a considerable height above the sea. Another kind, the bonnet macaque (*M. sinicus*), is found all over the south of India, not only in forests but in populous cities. It is one of the most inquisitive and mischievous of the macaques, tamer than the rhesus monkey, and unsurpassed in making grimaces by any member of the tribe. It derives its name from the fact of the hair radiating in all directions from the crown of the head, although it rarely falls over the forehead, the short hair on which is parted in the middle. The full-grown

males measure 27 inches, exclusive of a tail of 24 inches or more. This monkey inhabits the western coast up to Bombay, but in the east is not found north of the Godaverī. In Ceylon the bonnet monkey of southern India is replaced by the toque macaque (*M. pileatus*), which is perhaps a little smaller and has the hair wavy and rough instead of straight and smooth. In colour it resembles the bonnet monkey, being greyish or brownish above and whitish below. The face is flesh-coloured and the upper lip black, while the naked parts of the ears, hands, and feet are smoky brown.

Lorises.

The lorises — commonly mis-called sloths by travellers and sportsmen — are the sole representatives in India and the Malay countries of the great group of lemuroids, whose headquarters are Madagascar and, in a less degree, Africa. The slender or true loris (*Loris gracilis*) is much the smaller of the two, and is restricted to the lowland forests of southern India and Ceylon. The slow loris (*Nycticebus tardigradus*), on the other hand, extends from Assam and Sylhet to the Malay countries, where it is represented by a distinct local race. In length it may measure 16 inches, the slender loris being only about half that size. The fur of the slender loris is soft, close, and woolly, greyish in colour, with a more or less reddish, and often a silvery, tinge on the upper-parts and the outer sides of the limbs. It feeds partly on fruits and leaves, and partly on insects, eggs, and small vertebrates, and is very fond of honey and syrup. The large eyes of this loris, which are set very close together, form a favourite remedy among the uneducated natives for ophthalmic diseases, and are also used as love-potions.

Indian Pangolin.

The Indian pangolin or scaly ant-eater (*Manis pentadactyla*) belongs to another group (the Edentata) of which there are no representatives among the European fauna. The range of this species extends from Peshawar, Sind, and probably Baluchistan to Bengal and Orissa, and from



BONNET MACAQUE.

the foot of the Himalaya to Ceylon. This strange animal, whose allies inhabit the Malay countries, China, and Africa, has a short plump body and stout tail, the united length of which is 42 inches. The fore-feet are furnished with very long



SLENDER LORIS.

claws, the middle one of which is double the length of the corresponding claw on the hind-foot. The large scales covering the head, body, and tail, which distinguish the pangolins from all other mammals, are arranged in this species in from eleven to thirteen rows along the body, the middle row containing from fourteen to seventeen to the root of the tail. These scales are about double the width of those of the two other Asiatic species of pangolin, and are light yellowish brown in colour, the skin being pinkish white on the scaleless parts. The Indian pangolin is a nocturnal animal, hiding among rocks or in its burrow during the day, although it is sometimes seen abroad shortly after sunrise. The crooked burrow extends to a depth of 8 to 12 feet below the ground to terminate in a large chamber of about 6 feet in diameter. The aperture is stopped with earth when its owners are inside. The food of pangolins consists of ants and termites. To obtain these, pangolins tear up the nests with their long

claws, inserting their long sticky tongues into the passages and withdrawing them when covered with the insects. The tongue also serves for drinking, by being alternately protruded and drawn back in quick succession. It is doubtful, however, whether pangolins drink at all when in the wild state, as they frequently occur in places far from any water. Like many birds, they swallow small stones to aid in the digestion of their food.

The Indian pangolin walks very slowly with an arched back, and frequently stands up on its hind-legs with its body horizontal. Although little is known of its reproduction, it apparently has seldom more than one young, or at most two, at a birth. Pangolins are easily tamed, but it is difficult to keep them long in confinement owing to the nature of their food.

Susu, or Gangetic Dolphin. The great rivers of India are the home of a peculiar kind of fresh-water dolphin, which has no very near kindred in any part of the world, the South American fresh-water dolphins representing a distinct family. The susu, as this species is called in India, is known scientifically as *Platanista gangetica*, and lives in the Ganges, Indus, Bramaputra, and all the larger tributaries of these rivers, principally in the tidal portions, although it is found up to the foot of the mountains. The head terminates in a long compressed snout, a little expanded at the tip, and much shorter in males than in females. The body has a rudimentary back-fin and triangular, fan-shaped flippers. This dolphin is quite blind. The upper jaw carries thirty pairs of cylindrical teeth, the number in the lower jaw being usually somewhat greater. The entire length varies between 7 and 8 feet, the females being larger than the males; and the colour is blackish.

Although sometimes found in pairs, the Gangetic dolphin is generally solitary; it seems to migrate towards the sources of the rivers in the hot season. Sight would be of little use in this case, since the water of the Indus, like that of the Ganges and Bramaputra, is anything but clear at all seasons, and the creature obtains its food, consisting of fish and prawns, by probing in the mud with its long snout.

Warblers, etc. Like the mammals, the birds of India present a mixture of Oriental and other types, many of them belonging to European genera and even species. Among the perching-birds, we find one of the furze-chats and many of the thrushes breeding within the area. The moustached sedge-warbler, which is spread over southern Europe, North Africa, and Asia Minor, inhabits India as far east as Lucknow. The fan-tailed warbler also occurs, and the wrens are well represented. Tits, nuthatches, and tree-creepers are likewise all present in the Indian area.

Larks and Wag-tails. The larks are represented by the Indian skylark (*Alauda gulgula*), which is spread all over the country and Ceylon; and the European crested lark breeds in the north-west of India, where the genus is also represented by two other species. The finch-larks, small short-legged and short-toed birds, with short thick beaks, extend from India into Africa, the ashy-crowned finch-lark (*Pyrrhulauda grisea*) ranging from Sind to Calcutta, and from the foot of the Himalaya to Ceylon, and being everywhere resident throughout this large area. The rufous finch-larks (*Ammomanes*), again, are represented in India by the red-tailed species (*A. phoenicurus*), distinguished from other members of the group by its black-tipped tail. More than a dozen different kinds of wagtail occur within the area, the most notable being the large pied species (*Motacilla maderaspatensis*), whose breeding-range extends from Sind to Sikhim and western Bengal, and from the foot of the Himalaya to Ceylon.

Buntings. The Indian list also includes numerous buntings, five of which are resident, the most widely distributed being the streaked bunting (*Emberiza striolata*), which ranges from Palestine and Arabia through Sind and the Punjab into the United Provinces. The crested bunting (*Melophus melanicterus*), on the other hand, is very local in distribution, its range extending from Kashmir to Bhutan, from Sind to Mahableshwar, and from Assam to Tenasserim. It is distinguished by both sexes being crested, though differently coloured, as well as by the tail being nearly square at the end. The male is black and the female dark brown, both showing a certain amount of red on the wings and tail.

Finches and Starlings. Among the finches may be mentioned the universal house-sparrow, which in India is much whiter about the cheeks and blacker on the edges of the white than the western race. The weaver-birds include eight Indian species, but the group is more abundantly represented in south-eastern Asia. Six species of starlings are found in India, two of which are resident.

Orioles and Jays. The orioles, known in India as mango-birds, are represented by nine species, eight of which are mainly yellow in coloration and have the tail black and yellow or green, while the ninth, *Oriolus trailli*, has a red tail and in plumage is black and maroon. The raven, the carrion-crow, the rook, the hooded crow, and the jackdaw are all found in India, and in addition there are the more characteristic brown-necked raven (*Corvus umbrinus*), the jungle-crow (*C. macrorhynchus*), and the house-crow (*C. splendens*). The handsome green magpie (*Cissa chinensis*) ranges from the valley of the Jumna into south-eastern Asia, but the Ceylonese magpie (*C. ornata*) is confined to Ceylon. The tree-pies are represented by four species, one of which, *Dendrocitta rufa*, the Indian magpie, ranges from the Himalaya to Travancore. The lanceolated or black-throated jay (*Garrulus lanceolatus*) ranges from Hazara to Nepal and is frequent in Kashmir, where it is found in summer up to 8000 feet. It derives its popular names from its chin and throat being black with white shaft-streaks, the black ending in a patch of iron grey. It has a blue tail barred with black, and not a black one like *G. bispecularis*, the Himalayan jay, which is also distinguished by having the forehead and crown purplish instead of black. The Indian shrikes include a dozen species; and of cuckoo-shrikes there are three, the most generally distributed being the black-headed cuckoo-shrike (*Campophaga sykesi*). Sixteen different kinds of bulbul are likewise natives of the country.

Swallows and Swifts. Of swallows and martins about twenty species are found within the area, including the European sand-martin and the Indian sand-martin (*Cotile sinensis*) which ranges from the Himalaya to the Philippines. There are two kinds of swift (*Cypselus melanocephalus* and *C. cinereiventris*) in which the head is black, as well as a third kind (*C. phæocephalus*) in which it is grey; the distribution of all three is curiously local.

Roller, Bee-Eater, Kingfishers, and Cuckoos. Among other noteworthy picarian birds of India, reference may be made to the Indian blue roller (*Coracias indica*), and also to the Indian hoopoe (*Upupa indica*), both of which are very close indeed to the European forms. The long-tailed bee-eaters are strikingly represented by the



LANCEOLATED JAY.

green species (*Merops viridis*) and the blue-tailed bee-eater (*M. philippinus*), the latter of which ranges from the south of India and Ceylon to Celebes. The European kingfisher is represented in India and the Malay Archipelago by a smaller race (*Alcedo ispida bengalensis*); but other members of the group occur in the Himalaya, India, and south-eastern Asia, the group being still more strongly represented in the Malay countries. The same is also the case with certain other groups of picarian birds. Although the European cuckoo is only a winter visitor to India, one of the crested cuckoos (*Coccyzus jacobinus*) ranges from the Malay Peninsula into south-western Asia, and also occurs in Africa from the Sahara to the south.

Owls. The Indian owls include several European species, as well as other related types. Among the former, the barn-owl is found as a breeding-species. Nearly allied are the masked owls, distinguished by the circumstance that the feathers forming the eye-discs run in separate rows down their foreheads, leaving a space in the middle. The Ceylon masked owl (*Phodilus assimilis*), which has a wide range in India, is exclusively nocturnal, and lives in the larger forests. The screech-owls and forest-owls likewise have Indian representatives. A relative (*Bubo bengalensis*) of the European eagle-owl is more or less restricted to India, but the larger *B. coromandus*, equalling *B. ignavus* in size, ranges from India to China. The fish-owls (*Cetupa*) are distributed over south-western and southern Asia. They live chiefly on fish and crustaceans, and only partly on small mammals, birds, and reptiles.

Birds-of-Prey. The common kestrel may be regarded as an Indian falcon, since it breeds not only in the Himalaya, but in the Western Ghats, and probably in Burma. Bonelli's eagle ranges from the west into India, although not farther east; and the pigmy eagle is resident in India and Ceylon, but rare in Burma. The spotted eagle breeds in northern India, but its near relative the small spotted eagle remains within the area throughout the year. The most abundant species is, however, the tawny eagle (*Aquila vindhiana*), which varies greatly in colouring, but is in most cases almost uniformly brown. This eagle, which is from 26 to 27 inches in length, is often seen either perching on a tree or flying about over fields and woods, in pursuit of small mammals, birds, lizards, snakes, and frogs, and sometimes helping vultures to devour the carcasses of cattle, or robbing smaller falcons of their prey. Although absent from Ceylon and the Malabar coast, and apparently also from lower Bengal and Assam, it is distributed over the greater part of India and upper Burma, but nowhere beyond these limits. The Indian serpent-eagle (*Spilornis chila*) is also confined to India. The sea-eagles are represented in the Indian area by the banded *Haliaeetus leucoryphus*, distinguished by a bright bar across its dark brown tail. This sea-eagle lives on the banks of rivers and other waters, and is probably spread over all southern and central Asia, though absent from southern India and Ceylon. The osprey ranges round the world, and is of course present in India as elsewhere. The kites are well represented throughout the area, but their relatives the buzzards, and honey-buzzards, are more numerous beyond its limits. The place of the common sparrow-hawk is taken in the Himalaya and the large forests of India and Ceylon by the besra sparrow-hawk (*Accipiter virgatus*), which is also occasionally found in the Malay countries, China, and Japan.

Vultures range from south-western Asia into India, but no farther east. Of these, the Egyptian vulture, which occurs in north-western India, is replaced elsewhere in the country by the somewhat smaller Indian bird (*Neophron ginginianus*). The range of the European griffon vulture extends to Nepal and Sikhim and southwards to the Dekkan; and the Indian griffon (*Gyps indicus*) inhabits the peninsula from the plains of the Indus and Ganges to the south, and is also found on the other side of the Bay of Bengal. A third kind, the slender-beaked griffon (*G. tenuirostris*), is a native of the southern slopes of the Himalaya; while a fourth, the Bengal vulture (*G. bengalensis*), although absent from Ceylon and not occurring above a moderate height in the Himalaya, is the most common Indian vulture. These birds assemble in large flocks around the carcasses of all kinds of animals, and in 1878 and 1879 accompanied the British army into southern Afghanistan to feed on the fallen camels.

Game-Birds.

India is particularly rich in game-birds. Among these, the black-breasted or rain quail (*Coturnix coromandelica*), distinguished by the large black patch on the chest and breast, is indigenous to India and the Malay Peninsula. Chiefly Indian are the two bush-quails, small birds distinguished from the true quails by the longer and straighter beak, as well as by the presence of a short and blunt spur on the legs of the cocks. Of the two kinds the jungle bush-quail (*Pedicularia asiatica*) is irregularly distributed over India and Ceylon, usually frequenting forests, grass-jungles, and broken ground, and generally found in coveys. The other kind (*P. argoonda*) prefers more rocky situations. The francolins are represented in northern and central India by the common species, usually known as the black partridge (*Francolinus vulgaris*), which ranges from Cyprus to Manipur. The painted francolin (*F. pictus*), on the other hand, is confined to India, where it occurs to the south of the range of the common species. Three other francolins (*F. chinensis*, *F. pondicerianus*, and *F. gularis*) are also found in the country. Pheasants are abundant in certain parts of the Himalaya. Among these is the chir (*Catreus wallichi*), characterised by a pendent crest, the feathers of which are brown tipped with white. Of jungle-fowl, distinguished by the comb extending along the middle of the head, by the wattles, the long curved spurs and the length of the middle pair of tail feathers, two kinds occur in India, and a third is restricted to Ceylon. Of these, the most widely distributed is *Gallus ferrugineus*, the red jungle-fowl, whose range extends to Cochin China and Sumatra. This bird is generally considered to be the ancestral form of domesticated fowls, as typified by game-fowls (see Chap. VI.). From India domesticated fowls appear to have spread north, east, and west over the Old World. The Chinese kept them 1000 years B.C., and about the same time they were bred by the Persians, Babylonians, and the inhabitants of Asia Minor. The ancient Greeks kept them in the year 600 B.C., and in Italy they were known almost as early. Domesticated fowls were likewise familiar to the ancient Britons as well as to the inhabitants of central and southern Germany long before the Roman invasions. They have been developed into numerous breeds, differing from each other in many ways—bantams and dwarf Japanese, cochins, brahmas, crested houdans, five-toed dorkings, langshans, orpingtons, and many others bearing but little resemblance to each other except in the general character, which marks them as

originating from a common ancestor which the ordinary farmyard or game breeds most nearly approximate.

Pea-Fowl and Monal. The typical pea-fowl (*Pavo cristatus*) inhabits India and Ceylon in the wild state, but is rather local. In the Himalaya it ranges to a height of 2000 feet, and in southern India as high as 5000 feet, but in Ceylon it is never found above 3000 feet, being mainly an inhabitant of the low, dry country in the north of the island. In its wild state it is not found farther east than Assam, and it has probably been introduced into Gujarat, Katch, and Rajputana, and certainly into Sind, since in these districts, where it is considered a sacred bird and protected very strictly, it occurs as semi-domesticated in the neighbourhood of the villages. Where it lives in its original wildness, it is generally found in small parties in forests or in bushy, rugged ground not far from water. It feeds on grain, insects, small lizards, and snakes, and makes its presence known by its characteristic scream. The hens lay six or seven eggs in a hole in the ground scantily covered with twigs, leaves, or grass, and the breeding-time lasts from June to September. Magnificent birds are the monals, of the high mountains of southern-central and southern Asia, whose general habits are very similar to those of the true pheasants. Of these, the Himalayan monal, or impeyan pheasant (*Lophophorus impeyanus*), ranges in the Himalaya from Kashmir to Bhutan up to heights of 10,000 feet or more in summer, living just below the upper forest-zone, and sometimes rather higher. Its food consists of insects, berries, seeds, leaves, etc., and its cry is a loud plaintive whistle.

Pigeons and Sand-Grouse. A very large number of species of the pigeon tribe occur in India and Ceylon, among which the genera *Osmotreron* and *Turtur* are the most largely represented. Many of the species have, however, a range extending beyond India and Ceylon, on which account, as well as from limitations of space, the group cannot be noticed in detail on this occasion. Of the sand-grouse, the painted species (*Pterocles fasciatus*) is peculiar to India, where it is resident; while the black-bellied sand-grouse (*P. arenarius*) is a cold-weather migrant to India, arriving at the end of September and leaving in March.

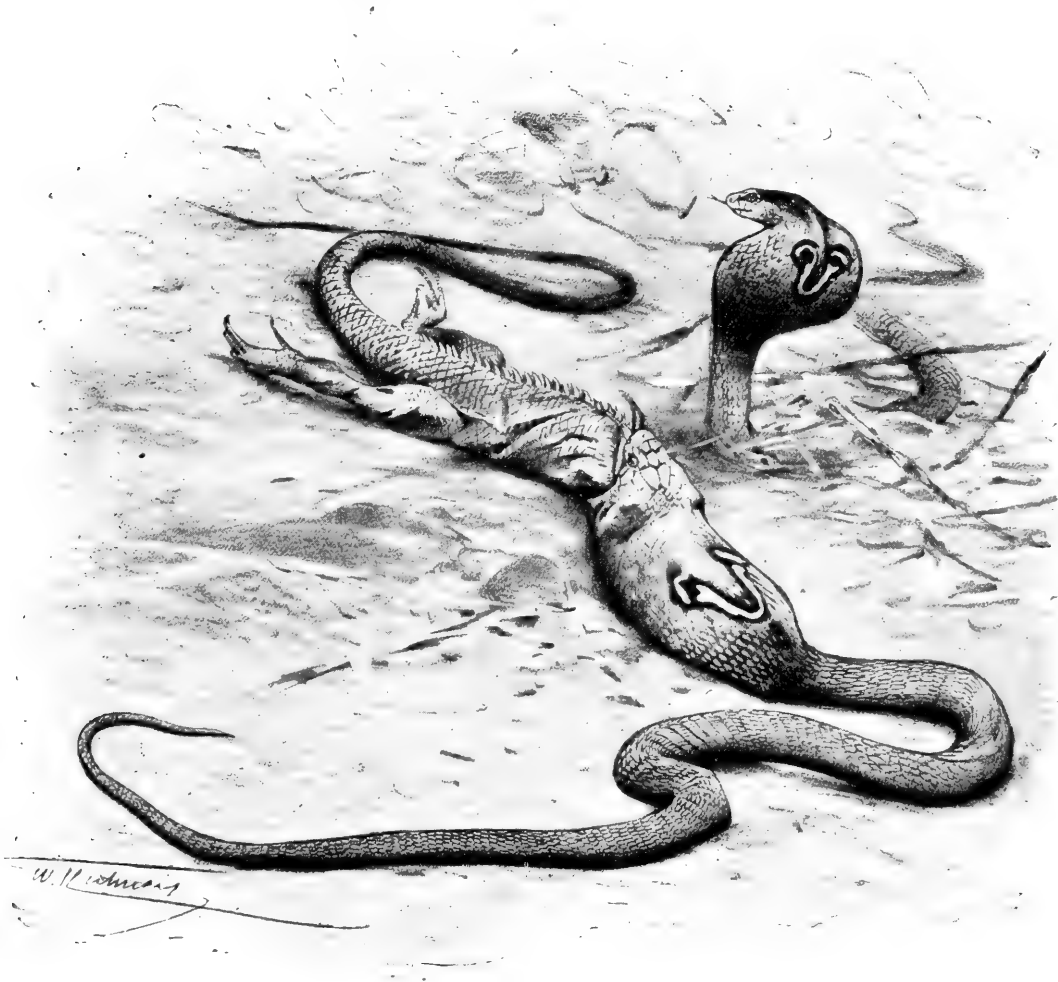
Waders. Among the heron tribe, several species chiefly characteristic of Europe and south-western Asia visit India. The common heron, for example, breeds in both India and Ceylon; while the purple heron is represented by a form which may be regarded as a local race of the European bird. Both the white heron and the little egret likewise breed throughout the Indian area, as well as much farther east. The European little bittern, again, which breeds in the Himalaya as far as Nepal to the east, is spread over the Indian area, China, Japan, New Guinea, and northern Australia. The European representative of the night-herons is a breeding bird in India, Ceylon, and Burma. On the other hand, except in Sind, the flamingo is rare in India and Ceylon, and unknown farther east. The European white stork has been found breeding in Ceylon; but the rest of the Asiatic storks are principally represented outside the Indian area. The spoonbill and the glossy ibis breed in India, and the true ibises are represented by several species.

Rail Tribe. Among the rail tribe, the grey-headed gallinule (*Porphyrio poliocephalus*) ranges from India and Ceylon to the Caspian, and also

occurs in Burma; but to the east, in the Malay Archipelago, it is replaced by other species. The Indian moorhen (*Gallinula phoenicurus*) is found as far east as Formosa and Celebes; and the coot breeds in many parts of India, and likewise ranges to Java and Japan.

Cranes, Flori-
can, etc.

The cranes are represented in the north of India by the stately Sarus crane (*Grus antigone*), which is a larger bird than the European



INDIAN COBRAS.

species. It has a light grey plumage, reddish brown eyes, and crimson warts on its head and neck.

Characteristically Indian are the two floricans, *Sypheotides aurita* and *S. bengalensis*, the latter being confined to Assam, and the district between the Ganges and the Himalaya. Snipe and woodcock winter within the area, as do the thicknee and several of the plovers. The Indian courser (*Cursorius coromandelicus*) is exclusively an Indian species, as is also the small pratincole (*Glareola*



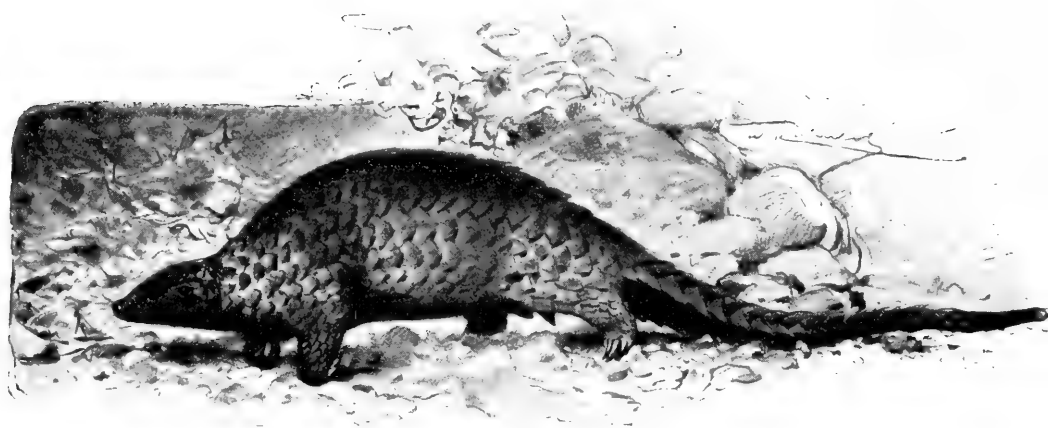
MONAL.

lactea), the so-called Indian pratincole (*G. orientalis*) ranging beyond the area into eastern Siberia and northern Australia.

Duck Tribe. As regards the ducks, the most interesting species are perhaps the Indian tree-duck (*Dendrocycna javanica*) and the Indian comb-duck (*Sarcidiornis melanonotus*), closely allied species to both of which are found in Africa and South America. A whole host of ducks, and a few geese, visit India during the cold season, but the majority of these must be regarded as purely migratory.

Cormorants. The common cormorant is a breeding-bird in India and Ceylon, and in several localities is found the somewhat rare Indian cormorant (*Phalacrocorax fuscicollis*), though the commonest species is the small *P. javanicus* which, in addition to India, inhabits Ceylon, Sumatra, Java, and Borneo.

Reptiles. As many of the reptiles of India are more or less closely related to those of south-western and south-eastern Asia, a brief notice must suffice. One of the most characteristic is the gharial (*Garialis gangeticus*) of all the great rivers, and there are two crocodiles (*Crocodylus porosus* and *C. palustris*). Chelonians are represented by land-tortoises of the widely-spread genus *Testudo*, as well as by sub-aquatic species of the Oriental genera (*Damonina*, *Nicoria*, and *Morenia*). The rivers abound in the large batagurs (*Batagur*, *Hardella*, *Cachuga*, etc.), as well as in soft-tortoises (*Trionychidæ*). Among snakes, there are the Indian python (*Python molurus*), the cobra (*Naia tripudians*), Russell's viper (*Vipera russelli*), and the krait (*Bungarus cæruleus*), of which the three last are all deadly. India is the home of sixteen species of viper, of which twelve have a conspicuous depression, or pit, between the nostril and the eye, and are hence called pit-vipers, while the remaining four are devoid of these. As examples of the latter the saw-scaled viper (*Echis carinata*) and the aforesaid Russell's viper may be mentioned. The first-named is a snake of the plains; the other, though more abundant in the plains, is occasionally found even at an altitude of 7000 feet. Among those of the Himalaya, the mountain-viper (*Lachesis monticola*) is noteworthy on account of being oviparous, instead of ovoviviparous. It is found on the lower ridges of the eastern Himalaya from Nepal to Assam, from the foot of the hills to an altitude of 8000 feet or more. To the lizards, amphibians, fishes, and invertebrates of India it is impossible to refer, although remarks relating to some of them will be found in the next two chapters.



MALAY PANGOLIN.

CHAPTER VI

THE MALAY PROVINCE

BURMA and the Malay countries form a part of the great Oriental region, but may be conveniently considered as a province by themselves. This province includes the Assam and Sylhet districts of north-eastern India, Burma, a considerable portion of China, and all of the Asiatic continent lying to the south and south-east of this, as well as the islands as far as, and inclusive of, the Philippines, the Moluccas, and Celebes. The fauna of Celebes and the Moluccas presents, it is true, a certain similarity with that of Australia and New Guinea, and for a long time all four areas were included in the same zoogeographical realm. Of late years, however, naturalists have realised that the animals of Celebes and the Moluccas have greater affinities with those of the Malay countries than with those of Australasia. It should be added that the Andamans, as well as the islands of Hainan and Formosa, are included in the Malay province.

As might be expected from the luxuriant forests which clothe the greater part of this vast tract, and the slight difference between the wet winter and the still rainier summer, the fauna of the Malay province is decidedly of a more Oriental type than is the case with that of India itself, where a large admixture of forms characteristic of south-western Asia is met with.

Among the mammals of the Malay tract the number of kinds of monkeys, especially langurs, forms a predominant feature in the fauna. In Aracan, Pegu, and northern Tenasserim this group is represented by Phayre's langur (*Semnopithecus phayrei*). In this species the females measure about $18\frac{1}{2}$ inches to the root of the tail, while the tail itself is some 21 inches more. The males somewhat exceed their partners in size. The most characteristic feature of this langur is the presence of a peaked longitudinal crest on the crown of the head. The general colour is dark ashy brown, darker on the head and limbs than elsewhere, the root of the tail being whitish and the tip dark. A silvery gloss is

noticeable on the upper-parts, and the under-parts are white or whitish. This langur inhabits forests, or bamboo-plantations on the slopes of mountains or the banks of rivers, and goes about in troops of from twenty to thirty head. It is oftener heard than seen, as it is very shy and cautious; and when a troop is disturbed its members hurry through the forest, leaping from tree to tree, and violently shaking the branches as they go. Sometimes an old male will remain in a secure situation on the top of some high tree, where he is recognisable by his warning call, which resembles that of the hanuman. The young mew like cats or utter a plaintive sound expressive of want. Another member of this group, inhabiting the forests of Cochin China and Hainan, deserves mention on account of its peculiar form. The

body is remarkably short, the arms and legs are of almost equal length, and the coloration and marking are of a very striking type. The douc langur (*S. nemæus*), as this species is called, has a brilliant yellow face, with pale grey whiskers, while a bright chestnut band below the ear adds to the varied coloration of its brown head. The general colour is dark grey above and lighter grey below, with a large white spot on the lower part of the back. The tail is also white, but

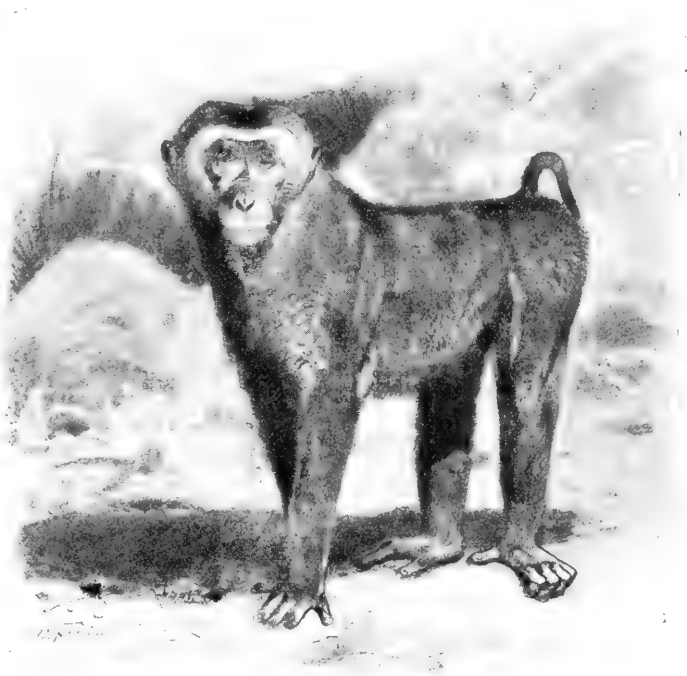


FIG-TAILED MONKEY.

the upper parts of the arms and legs, as well as the hands and feet, are black, the fore-arms are white, and the lower portions of the legs a bright reddish brown. All these colours are in strong contrast to one another, thus making the douc one of the most brilliantly coloured of all mammals.

Macaques.

Of the macaques two species deserve special notice. The first, the crab-eating macaque (*Macacus cynomolgus*), inhabits river-deltas and the shores of tidal rivers. Its range extends over a great part of Burma, including Arakan, as well as Tenasserim, Siam, and the Malay Archipelago, but in the latter area, as in the Nicobars, it seems to have been introduced by the Malays, who are very fond of animals. This monkey is distinguished by its stout body, large head, and very short neck. The legs are stout and rather short, and the tail is long and somewhat thick at the root. The general colour is greyish brown,

reddish, or golden brown above, and light grey or nearly white below, with the bare parts, namely, the face, ears, and buttocks, flesh-coloured or dark brown, while the eyelids are in many cases white or bluish white. These macaques are generally found in troops of from fifteen to twenty in number, and are most abundant in mangrove-thickets, where they subsist mainly on insects and crabs. Old males attain a length of 22 inches, with a tail-length of 19 inches. The mouths of the rivers of Tenasserim and Arakan, as well as the delta of the Irawadi, being the only ways into the interior of the country, these macaques are so accustomed to the presence of man that they will allow themselves to be approached quite close, and will often follow vessels for some distance. Being good swimmers and divers, they are almost as much at home in the water as on the banks and beaches where they seek their food. The newly born young may be seen clinging to their mothers at all times of the year. If its offspring attempts to let go its hold the mother tries to soothe it by patting it on the head, and pressing it with a serious air to her breast, the screaming and chattering youngster behaving all the time like an obstinate baby. The young of this docile and amusing monkey soon become tame, and the females always remain gentle, although the males grow morose and malicious in old age.

The second species, the pig-tailed monkey (*M. nemestrinus*), is characterised by its short and stout body, its long and muscular limbs, and prolonged muzzle. The hair is generally short, but somewhat longer on the shoulders than elsewhere. The tail, which is slender and pig-like, is about a third the length of the body, and is carried erect. In general colour this species is yellowish brown above, and lighter below, with the head dark brown or black. A broad black stripe runs down the back, and the tail is in all cases black at the base and pale yellowish brown at the tip. The length of the head and body averages about $18\frac{1}{2}$ inches, and that of the tail 8 inches. The pig-tailed macaque inhabits the greater part of Tenasserim, especially the south, as well as southern Burma, the Malay Peninsula, and Sumatra, Java, and Borneo. In Sumatra it is trained by the natives to pluck and carry down cocoa-nuts from the trees. A peculiarity of this monkey is its habit of bending its tail in a double curve when excited.

Gibbons.

Of the family of man-like apes (which are unknown in India proper) there are several Malay representatives. Of these the gibbons, which are peculiar to this tract, are characterised by their slender bodies, and their inordinately long arms, which touch the ground when the animals walk or stand erect. One of the best-known species, the hulok (*Hylobates huloc*), is almost confined to mountainous forests, and inhabits the lower ranges of Bhutan, Assam, Sylhet, Cachar, Manipur, Chittagong, Arakan, and the Irawadi Valley near Bhamo. Like most other gibbons, the hulok is generally found in troops of fifty to a hundred or more, only the old males leading a solitary life. The males are black, and the females brownish black or whitish brown in colour. The length is about 20 inches; the arms measure about 24 inches, and the legs 19 inches; and the height, when standing erect, is about 31 inches. This gibbon is exclusively arboreal, and, assisted by its long arms, is able to leap enormous distances from branch to branch and from tree to tree; it descends mountains with surprising agility, grasping bamboo stems or branches, bending them down by its weight, and letting them go as soon as it is able to reach the



WHITE-HANDED GIBBON.

next branch on its descent. It ascends mountains quite as quickly, but when walking on level ground may, in spite of its rapid strides, be easily overtaken. It walks with the sole flat on the ground and the great toe extended apart from the others. It is at once distinguishable from the other gibbons by the white bar across the eyebrows, and its black hands and feet. Its food consists of fruits, leaves, and young twigs, but also includes spiders, insects, birds' eggs, and small birds. Huloks in captivity display so much skill and activity in catching and eating birds that it is possible these may form the principal item of their food in a wild state. These gibbons drink like baboons, bending down their heads to the water, and drinking with the lips. Their name is derived from their call, the two syllables of which several times repeated are imitated by the word hu-lok. At some distance the voice sounds very human, and has a kind of plaintive ring. Huloks are easily tamed when caught young, and as a rule are gentle, good-natured, and intelligent.

Another species, the white-handed gibbon (*H. lar*), inhabits Tenasserim, Arakan, and the Malay Peninsula, where it is found at a height of 3500 feet or more in the mountains. This gibbon also has a whitish bar across the eyebrows, but, unlike the hulok, its hands and feet are white. The legs are 20 inches long, the arms measure 25 inches, and the height when erect reaches 30 inches, the females being smaller than the males. This gibbon is so exclusively an arboreal animal, and depends so much on its hands when in movement that it carries its burdens with its feet. Unlike the hulok, it is said to drink from the hollow of the hand. Neither in the wild state nor in captivity is it so active or cheerful as the hulok, nor does it walk so easily. Its voice is also different, but in other respects it is much like its relative.

Loris.

The lemurs are represented only by the slow loris (*Nycticebus tardigradus*), which inhabits the mainland east of the Bay of Bengal, as well as Sumatra, Java, and Borneo. This loris has close, woolly hair, which covers the face, except the nose and lips, and almost hides the ears and tail. The larger individuals are ashy grey, much lighter below than above, with a more or less silvery gloss on the back, and a chestnut stripe along the back, expanding on the head, where it forks, one branch running down to the eye, around which it forms a brown ring. From this larger form a smaller phase is distinguished by the reddish grey back, and lighter coloured under-parts, the stripe along the back being wider and in many cases of a bright brown. The broad reddish patch in which this stripe ends on the head encloses the ears, but does not reach the rings encircling the eyes. The slow loris is exclusively nocturnal, and feeds partly on leaves, young shoots, and fruits, and partly on insects, birds' eggs, and young birds. When about to catch an insect, it rises on its hind-legs, and then throws itself on its prey. It is generally silent, or utters only a feeble, crackling sound, but when angry or about to bite, it gives vent to a grunt.

Bats.

The bats of the Malay province are mainly of the same types as those of India. The Indian fox-bat, however, is represented by the kalong or Malay fox-bat (*Pteropus edulis*), which is the largest bat known. It is very like its relative, but darker in colour. In length it measures about a foot, but its wingspread is as much as 5 feet. It inhabits the Malay Peninsula, Sumatra, Java, Borneo, and the Philippines, and is said to be found on the Nicobars

and Andamans. The small long-tongued fruit-bat (*Carponycteris* or *Macroglossus minimus*), which ranges from northern India to Australia and the Bismarck Archipelago, is remarkable on account of its diminutive size, its length being only $2\frac{1}{2}$ inches. Perhaps the most remarkable of the numerous forms of insect-eating bats inhabiting the tract under consideration is the naked bat (*Chiromeles torquatus*), which has almost completely bare skin. As the young would be unable to obtain any hold on a surface of this nature, this bat is provided with large pouches on the under surface of the body, in which its offspring



SLOW LORIS.

are carried about in safety. This bat inhabits the Malay Peninsula and Islands.

Moles.

Among the Insectivora, in which the tract is fairly rich, the short-tailed mole (*Talpa micrura*) is particularly common in Nepal and Sikkim, as well as on the mountains of Assam. To some extent it differs in habits from the European mole, as it does not throw up hillocks of earth. Its eyes are covered with skin, and it derives its name from the shortness of its tail, which is almost bare and completely hidden in the fur. It is of a velvet-black colour, with a more or less distinct silvery gloss, and in length measures about $4\frac{1}{2}$ inches.

Swimming-Shrew. The Himalayan swimming-shrew (*Chimarrogale himalayica*) resembles in its habits the European water-shrew, inhabiting the banks of mountain-streams, where it runs over the stones on their beds. It swims well, and is said to live on water-insects and small fishes. In length it is about $4\frac{1}{2}$ inches, its tail measuring 3 inches. It is slaty grey above with bright blackish brown to the tips of the hairs, and pale brownish grey below.

Gymnuras. The gymnuras, which are allies of the hedgehogs, but without spines, are mainly peculiar to Malaya. One of the two largest is the long-tailed gymnura (*Gymnura rafflesi*), which inhabits the Malay Peninsula, the south of Tenasserim, and the island of Sumatra. This species has a long head, with a pointed muzzle, rounded ears, well-developed claws, and a naked rat-like tail. It attains a length of 14 inches, with a tail about three-quarters as long as the body. In colour it is white and black, the head and neck being white, with the exception of a black spot on the crown and over each eye, and the rest of the body is black. The arrangement of colour varies greatly, however, and in Burma these animals have in many cases a white tip to the tail, while the Bornean *G. alba* is white all over. Gymnuras are exclusively nocturnal, feeding principally on cockroaches, ants, and larvæ; they exhale a peculiarly disagreeable, garlic-like smell. The short-tailed gymnura (*Hylomys suilla*) is a much smaller animal, of less than 5 inches in length, with a very abbreviated tail. It ranges from Burma, Tenasserim, and the Malay Peninsula to Sumatra, Borneo, and Java. A third genus is represented by the Philippine *Podogymnura truei*. It is allied to *Gymnura* and *Hylomys*, and has a long hind-foot and a stout tail rather more than a third the length of head and body.

Tree-Shrews. Very characteristic of the Malay countries are the tree-shrews, which are somewhat squirrel-like animals, although with the elongated muzzle and sharp-cusped cheek-teeth characteristic of the Insectivora generally. They are practically unique in the group in their diurnal and arboreal habits. A well-known example is the Malay tree-shrew (*Tupaia ferruginea*), which measures nearly 8 inches to the root of the tail, the tail itself being about 9 inches long. Its colour on the upper-parts varies from yellowish and brownish to deep rusty red, the under-parts being white. The range of this species includes Burma, the Himalaya as far westward as Nepal, the Malay Peninsula, Sumatra, Java, and Borneo. Tree-shrews live both in forests and bamboo-plantations, as well as in bushes or trees near villages. They feed on insects and fruit, and, according to native reports, small birds and mice. When feeding, they sit up on their hind-legs and hold their food with the fore-feet, licking their palms at the end of the meal, and also smoothing down their coats with their claws. They drink often, and not unfrequently bathe. In disposition they are pugnacious, fighting among themselves when in captivity. When agitated they utter shrill cries, their usual call being a short jerky whistle. A very remarkable member of the group is the pen-tailed tree-shrew (*Ptilocercus lowi*), of Borneo and the Malay Peninsula, a mouse-like creature, with an inordinately long tail, of which the greater portion is nearly naked, but the extremity ornamented with two ridges of long hair arranged like the vanes of a feather.

Still more remarkable are the flying-lemurs, or cobegos, of which one species (*Galeopithecus volans*) inhabits the Malay Peninsula, Java, Sumatra, and Borneo, and a second the Philippines. These strange animals, which fly by means of a parachute, are evidently related to the more typical Insectivora, and perhaps serve to show how the ancestors of the latter have been gradually modified into bats. The Malay cobego, which has a length of about

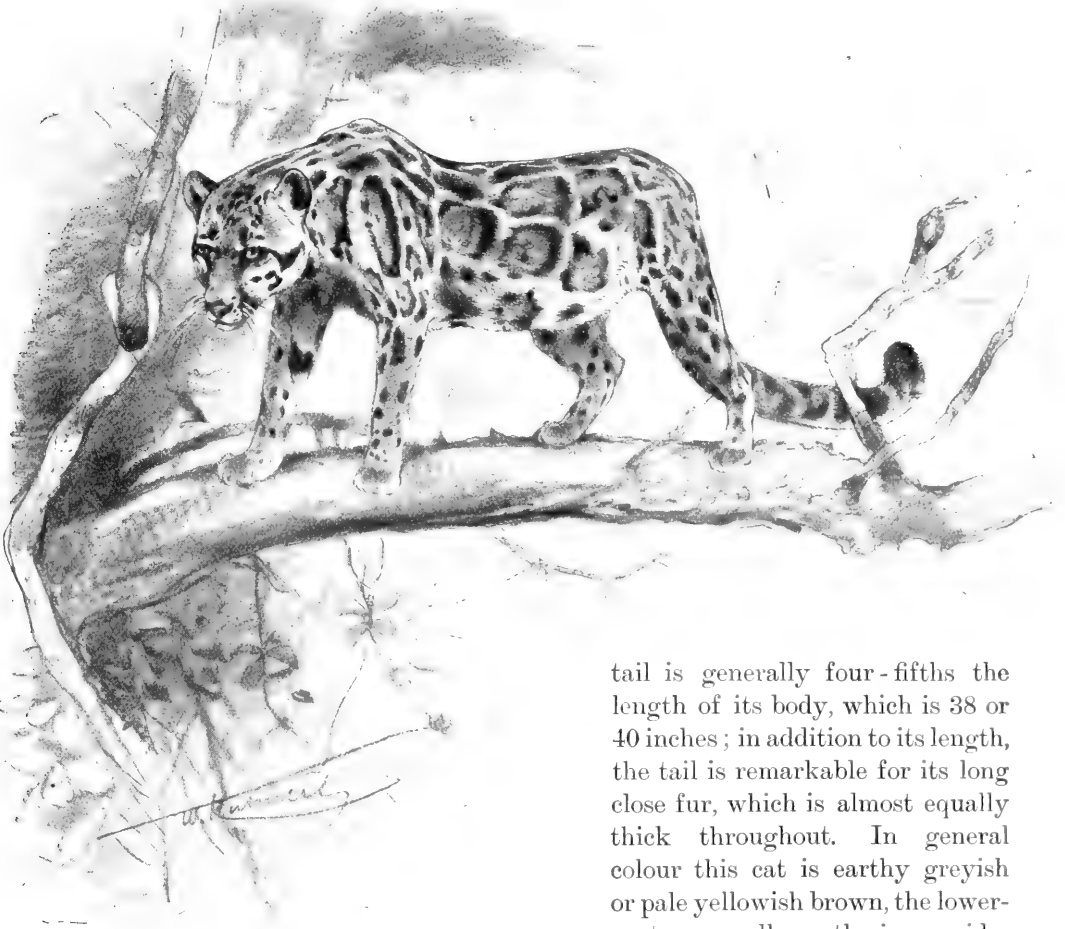


COBEGO.

16 inches, and a tail measuring some 9 inches, is protected from attack by its peculiar coloration. Leading an exclusively nocturnal life, and often hanging on the trunks and branches of trees during the day with its head downward, the cobego when at rest looks exactly like a piece of bark. The short, thin, soft fur completely covers even the parachute, and varies in colour between darkish grey and light chestnut-brown, while the lower-parts are light brown with a more or less reddish hue. The back is so thickly speckled with silvery white as to form an almost exact imitation of the lichen-clad trunk on which the creature rests.

Cats.

Several carnivorous mammals are highly characteristic of the Malay countries. Among them is the clouded leopard (*Felis nebulosa*), which inhabits heights up to 6500 feet in the south-eastern Himalaya and the mountains of Assam, Burma, Siam, the Malay Peninsula, Sumatra, Java, and Borneo, being replaced in Formosa by a race with a shorter tail. In the typical race the



CLOUDED LEOPARD.

tail is generally four-fifths the length of its body, which is 38 or 40 inches; in addition to its length, the tail is remarkable for its long close fur, which is almost equally thick throughout. In general colour this cat is earthy greyish or pale yellowish brown, the lower-parts as well as the inner sides of the legs being white or yellowish. On the head it is more or less distinctly marked with vertical stripes, and on the sides

with large irregular dark blotches of which in old individuals only the black edges remain. The legs and lower-parts are marked with black spots, and the tail is irregularly ringed. Although its habits are very imperfectly known, this cat apparently leads a nocturnal life, feeding on mammals and birds. Still less is known about its smaller relative the marbled cat (*F. marmorata*), which is of similar marking and colouring, and has a length of about 21½ inches, with a tail of

15 inches. It inhabits the same countries as the preceding, and seems to live principally on trees. Quite unknown are the habits of the golden cat (*F. temmincki*), which is 40 inches long including the tail, and inhabits the south-eastern Himalaya, Tenasserim, Sumatra, and Borneo, and probably also Burma and Malacca. It has occasionally been brought alive to Europe. The flat-headed cat (*F. planiceps*), so called on account of its flat, marten-like head, is a species confined to the Malay Peninsula, Sumatra, and Borneo. It is one of the few uniformly coloured cats, and is the size of the domestic species, but with shorter legs and long soft fur. Its colour above is deep dark reddish brown with silvery speckles, and whitish with more or less brown speckles beneath.

Burmese Civet and Linsangs. To the east of the Bay of Bengal the Indian civet is replaced by the Burmese *Viverra megaspila*, which ranges through Burma, the Malay Peninsula, Cochin China, and Sumatra. Much more interesting are the linsangs, which form a group of civets confined to the Malay countries and the eastern Himalaya, although, like many Malay types, they have a relative in the forest-district of Africa. The Nepalese linsang (*Linsanga pardicolor*), which has a tail almost as long as its body, is marked with large black spots on the very pale brown of the back and sides, but is unspotted below. The head is brown with, in many cases, a black spot behind each ear; there are four vertical bands on each side of the neck, and two wider bands start behind the ears; these latter do not break up into spots so much as is the case with those behind the shoulders. These bands are continued in rows of large round spots, interrupted by smaller ones in the middle, all along the back, while the sides are marked by three rows of square-shaped or round spots, becoming smaller towards the lower-parts. The spots which compose these rows form cross-lines; and a more or less regular spotting is also noticeable on the outer sides of the limbs, except the feet, which are pale brown and unspotted. The tail is marked with from eight to ten alternately dark and light rings of almost equal width, and thereby contributes much to the beauty of this graceful little civet. The length of the head and body is from 14 to 15 inches, and that of the tail from 12 to 13. The linsang is at home both on the ground and on trees; it sleeps and rears its young in holes in branches or the trunks, and is generally solitary. It catches small birds by jumping on them from a hiding-place in the grass. In February and August the female produces a pair of kittens. No disagreeable civet-like smell emanates from this beautiful little animal. In Tenasserim the Nepalese linsang is replaced by the Burmese species (*L. maculosa*), of whose habits nothing is known.

Palm-Civets. The palm-civets are represented by the Malay *Paradoxurus hermaphroditus*, which ranges from the Bay of Bengal to Siam, the Malay Peninsula, Sumatra, Java, and Borneo. Another kind, the Himalayan palm-civet (*P. grayi*), ranges from Simla into Assam, Arakan, and the Andamans. It is more of a vegetable-feeder than the Indian palm-civet, but, like the latter, is partly carnivorous, devouring birds and small mammals. It lives in mountainous forests, sleeping in hollows in trees, where it probably gives birth to four young at a time. It is said to do great damage to the banana-plantations in the Andaman Islands. A third kind, the small-toothed palm-civet (*Arctogalidia leucotis*), is distinguished by the smallness of its teeth, with the exception of the canines, as well as by

the large bare soles of its feet and a peculiar divergence between its first digits and the others. It ranges from Sikhim to Borneo, its habits being probably very similar to those of the other members of the group. Hardwicke's palm-civet (*Hemigale hardwickei*) is a transversely banded member of the group, which forms a genus by itself; it is a native of the Malay Peninsula, Sumatra, and Borneo. The last named-island is the home of an allied striped species, *Diplogale hosei*, which likewise represents a genus by itself.



MALAY PALM-CIVET.

Binturong. A distant relative of the palm-civets is the weird binturong (*Arctictis binturong*), which is probably an extremely ancient type of animal, and is peculiar among the Carnivora on account of its prehensile tail, being the only known placental mammal with a truly prehensile tail in the Old World. It is the only representative of its genus, and has rather a wide distribution in the Malay Province. It differs from the palm-civets by walking on the whole soles of its feet, as is indicated by the large tract devoid of hair on the hind-pair. The claws are short and partially retractile, and the short ears are surmounted with long tufts of hair. With the exception of a whitish edge to the ears, the whole of the long and

coarse hair clothing the head, body, limbs, and tail is black with a more or less marked greyish grizzle. To the root of the tail the length is from 28 to 33 inches, and that of the tail 26 or 27. The tail, which is very thick at the root, is covered with bristly hairs longer than those on the body. The binturong ranges from Simla through the Malay Peninsula to Java; it feeds on small mammals, birds, fishes, worms, insects, and fruits, leading a nocturnal life among the trees, and climbing in a somewhat slow manner, partially supported by its tail. The binturong is said to have a loud howling voice, and to be fierce by nature, although easily tamed when caught young.

**Web-Footed
Civet.**

Another very remarkable Malay representative of the group is the web-footed civet (*Cynogale bennetti*), which is a distinctly aquatic animal, although a good climber. It feeds partly on land animals and fruits, but



BINTURONG.

chiefly on crabs and fishes. In external appearance it presents some resemblance to an otter. The anterior cheek-teeth are unusually long, probably for seizing and rending fish. Like the otter, it has a broad depressed muzzle, thickly fringed with whiskers, which are unusually long on the cheeks and over the eyes. The toes are webbed at the base. The short tail measures only $9\frac{1}{2}$ inches, the length of the head and body being about 32 inches. In colour this civet is brownish, the back and outside of the legs being more grizzly than the rest. It is a native of the Malay Peninsula, Sumatra, and Borneo.

**Crab-Eating
Mongoose.**

The mongooses are represented by the crab-eating species (*Herpestes urva*), which ranges from Nepal to southern China. One of its distinctive features is the white behind the eye; the general colour on the legs and under-parts is reddish brown, and on the back grey; the tail has no black tip. This mongoose, which is partly aquatic in its habits, and feeds chiefly on crabs and frogs, is stoutly built and about 20 inches in length to the root of the tail, the tail itself measuring about a foot.

Malay Wild Dogs. Eastward of the Bay of Bengal hyænas are unknown, and the only members of the dog family met with are the jackal and the Malay wild dog (*Canis sumatrensis*). The latter differs from the Indian race of the same species by its inferior stature, slighter build, and colour, the upper-parts



MALAY BEAR.

being rufous and the lower surface white. In habits the two races appear, however, to be practically identical.

Malay Bear. The Himalayan black bear is met with as far south as Mergui, and also in western and southern China, Hainan, and Formosa. The typical bear of south-eastern Asia is, however, the Malay bear (*Ursus malayanus*),

which ranges from Chittagong to Borneo, and likewise extends into the Sze-chuan province of western China. This is a very small species, apparently never attaining a greater length than $4\frac{1}{2}$ feet, the tail measuring about 2 inches. It is specially characterised by its short and rounded skull. The fur is short and coarse, the claws are curved, the ears are small, and the tongue is very long. The general colour of the fur is black shading to brown, becoming whitish on the muzzle and chin, and round the eyes. On the throat is a pale-coloured gorget, the broad extremities of this often coalescing to form a large patch, the end of which tapers and is continued down the body. Very little is known of the habits of this bear in the wild state, although it is comparatively common in menageries. It seems to be a thoroughly forest-animal, and an excellent climber, living chiefly on fruits, but preying upon mammals and birds when opportunity offers, and



HIMALAYAN PANDA.

probably also feeding on insects and their larvæ, while it evidently has a liking for honey.

**Himalayan
Panda.**

That very remarkable mammal, the Himalayan panda (*Ailuropus fulgens*), which, together with the short-tailed panda of Sze-chuan forms a special subfamily of the raccoons, inhabits the south-eastern Himalaya at an altitude of 6500 to 11,000 feet. It does not occur west of Nepal, but is distributed through the mountains north of Assam and into Yunnan. It has a broad rounded head, circular pupils to the eyes, which are set well forward, large ears, stout limbs, with the feet thickly covered with hair on the under side, long, sharp, curved, partially retractile claws, and a long ringed tail. The length of the body is about 24 inches, and the tail measures about 19 inches. The coat is long and thick, with woolly under-fur; the colour on the back, head, and tail is bright rufous, but the under-parts and inner sides of the limbs are blackish. The face and lower lip are white, except for a reddish stripe extending over the eyes down to the

corners of the mouth; the ears are white on the edges and inner surface. The panda, as a rule, is found in pairs or small families in the forest, living in the hollows of trees, and probably also among rocks, but spending much of its time on the ground, where it feeds. Its food seems to consist of grass, roots, fruits, and bamboo-shoots, and also eggs, and insects and their larvæ. On the ground its movements are very slow and awkward, but it can hold fruit and other objects between the fore-paws. Its senses of hearing, sight, and smell do not appear to be very well developed, and as its movements are slow and it is not shy, the panda is easily caught. It sleeps curled up like a dog, with the head covered by the tail, or hidden between the chest and fore-paws. It is also known to sleep on its legs, in the manner often seen among the American raccoons, in accordance with its habit of reposing on the branches of trees. It does not seem to be exclusively nocturnal in its habits, although sleeping a great deal during the day; captive specimens being most lively in the mornings and evenings. Its usual cry is a short feeble chirping like that of a bird, but when angry it rears itself in bear-fashion on its hind-legs, as if to seize the intruder, and snorts or hisses. The male when excited emits a strong smell of musk. A local race of the species inhabits Sze-chuan.

Ferret-Badgers. Very characteristic of the Malay province are the so-called ferret-badgers, of which four species are known, two of these being Chinese and the others more distinctly Malayan. The Burmese species (*Helictis personata*) is a small mammal with a long body, head, and nose, living in trees and feeding on fruits, small mammals, and birds. It is mainly confined to Manipur and lower Burma. The limbs are short, strong, and somewhat compressed, the pads of the soles being naked, and the claws of the fore-feet double as long as those of the hind-feet. The upper-parts are grey. The brown ferret-badger (*H. orientalis*), in which the upper-parts are brown, ranges from Nepal to Java. Like the Burmese species, it is about 16 inches long, with a tail of 9 inches. In habits these animals appear to be nocturnal, and they live chiefly in woods.

Sand-Badger. The sand-badgers, of which there are two species, are more exclusively Malayan. They have stout bodies and limbs, rather short tails, long mobile muzzles, naked towards the tip and terminating in a flat disc like the snout of a pig, very short rounded ears, small eyes, slightly-curved blunt claws, and long coarse hair, with a woolly under-fur. The common sand-badger (*Arctonyx collaris*), which occurs in Nepal, Sikhim, Assam, Sylhet, Cachar, Arakan, Pegu, and Tenasserim, is more or less dirty grey in colour above, with a peculiar mark on the white head, the under-parts and legs being darker. In length it measures about 30 inches, the tail being about 11 inches. Nocturnal in its habits, it lives in rocky undulating country, and in thickets among hills, hiding in the clefts of the rock, or in holes excavated by its powerful claws. The second species, *A. taxoides*, occurs in Assam, Arakan, and probably southern China.

Otters. The otters of the Malay countries are to a great extent closely allied to those of India. The common Indian species, for instance, is met with on the eastern side of the Bay of Bengal, although it is not definitely known how far east and south its range extends. The same is the case with the smooth Indian otter (*Lutra ellioti*), which also inhabits Burma and the Malay Peninsula. A third

species, the clawless-otter (*L. cinerea*), distinguished by the extraordinary small, stunted claws, which are sometimes entirely absent, ranges from India into China. It is common near Calcutta, in Assam, Burma, southern China, and the Malay Peninsula and Islands, and is said to be the species which frequents the neighbourhood of Newera ELLIYA, in Ceylon. The head and body of this species measure about 2 feet, and the tail 13 inches. A fourth species is the large Malay otter



THE GAYAL, A DOMESTICATED BREED OF THE GAUR.

(*L. sumatrana*), distinguished by the hairy nose; it inhabits the Malay Peninsula and Islands, and may extend into Tenasserim.

Gayal.

Passing on to the hoofed animals, we find the gaur (*Bos gaurus*), which has been already alluded to in the preceding chapter, extending through the hilly tracts of Burma and the Malay Peninsula. Another member of the group, the gayal or mithan, is found in a domesticated condition from Tippera, Manipur, Cachar, and the Lushai Hills to Chittagong. It is a somewhat

smaller animal than the gaur, with a flat forehead, regularly conical black horns, and no forwardly-curving ridge between the latter. The general colour is blackish, with the lower part of the legs white. As mentioned above, the saladang, or Malay race of the gaur, comes, however, very close in the characters of the skull and horns to the gayal, and there is little doubt that the latter is merely a domesticated race of the former, in which case it is not entitled to a distinct scientific name. Gayal are kept by the Kukis and Manipuris for the sake of their flesh, and, according to some accounts, also for their milk, although the latter is doubtful, because, as a rule, Buddhists never drink milk. These animals apparently are not used either for tilling the ground or for carrying loads, and are allowed to wander about in the woods during the day, returning in the evening to their owner's village.

Bantin.

Throughout Burma and the Malay Peninsula as well as in Borneo and Java occurs a very distinct species of wild ox, the bantin (*B. sondaicus*), which also inhabits Siam and perhaps Sumatra, and is distributed northward as far as Pegu, Arakan, and the mountain-ranges east of Chittagong. In many respects the bantin resembles the gaur, but is of lighter build, with longer limbs, and the ridge on the back much less strongly developed. The dewlap is of moderate size, and the tail longer than that of the gaur, reaching to the hocks; the head is also somewhat longer. In young animals the horns are cylindrical in shape, but in fully grown animals are flattened at the base. In the Javan and Bornean races the cows and calves are bright rufous in colour, shading to chestnut about the head and upper part of the limbs, but the old bulls are black. In both sexes the lower part of the legs are white, from the hocks and knees downwards, as is also a large patch on the buttocks; and the lips and insides of the ears are also white. The bulls of the Burmese race of the species—the tsaine of the natives—are, however, tawny or pale chestnut-coloured at all ages. The bantin stands about 66 inches high at the withers; and, judging from the length of its legs, is not such a good climber as the gaur, being more restricted to the plains covered with grass and jungle, and less of a mountain-animal.

The humped cattle, or zebu, of India and Africa, are probably derived from the bantin.

Serow and Goral.

Brief mention may be made of the serow (*Capricornis sumatrensis*), which ranges from the eastern end of the Himalaya, through Manipur and Yunnan, as far as Sumatra, and is met with in Assam, Burma, Siam, and the Malay Peninsula. In the typical Sumatran race the lower part of the legs is reddish, but in the Malay race (*C. s. swettenhami*) the colour is almost uniformly black. Another race (*C. s. milne-edwardsi*) inhabits Sze-chuan. A goral, which appears to be a local race of the ashy goral of Sze-chuan, inhabits the mountains of Burma, and has been named *Urotragus cinereus evansi*.

Thamin.

In the countries east of the Bay of Bengal the sambar of India is represented by a distinct race (*Cervus unicolor equinus*); while in Java and the Moluccas there exists an allied species, the rusa (*C. hippelaphus*), with much more slender antlers. One of the most characteristic deer of Burma and the Malay Peninsula is, however, the thamin (*C. eldi*), which belongs to the same group as the barasingha of India, from which it is distinguished, among other features,

by the peculiar form of the antlers. The thamin inhabits Manipur and suitable districts throughout Burma, the Malay Peninsula, Cambodia, and Hainan, where it always frequents alluvial plains near rivers. It is of fairly large size, the stags

standing 45 inches at the shoulder, and the hinds about 42 inches. The antlers, which measure on an average 40 inches or more, have exceptionally long and curved brow-tines, which form a continuation of the curve of the beam, the junction being generally marked by a number of small snags. The beam, which for a considerable distance—generally half its length—is unbranched, and curves backwards and outwards and finally forwards, carries towards the tip a number of small snags, from two or three up to nine or ten. In Mergui and Malacca the antlers are shorter, the brow-tines bearing generally from two to three points: in Siam, where the upper part of the antler is flattened, it carries numerous small points. The Siamese race is known as *C. eldi platyceros*. The thamin is short-tailed, coarse-haired, and in winter shaggy-coated, the throat of the stags being thickly haired. The colour



A THAMIN STAG.

of the coat in winter is dark brown, in summer fawn, the hinds being paler and redder. The fawns are spotted. Thamin are generally seen in herds of from ten to fifteen or more. During the day they may possibly seek the shelter of the woods, but they usually keep to the open plains, and are often observed grazing on wild rice and other plants; they apparently seek marshy spots, not on account of the presence of water alone, since they are met with in plains where there is no water during the dry season. In Manipur the antlers are shed in June, in lower Burma about September. In Burma the rutting-time lasts from March to May, and the fawns—generally one to each doe—are usually born in October or November. The antlers appear in the second year, but the stags are not fully developed until about their seventh year.

Schomburgk's and other Deer. A very distinct species, Schomburgk's deer (*C. schomburgki*), nearly allied to the thamin, occurs in Siam, but very little is known of its habits. There are also numerous distinct species of small deer in the Philippines—among them Prince Alfred's deer (*C. alfredi*), in which the stags are black with white spots at all seasons.

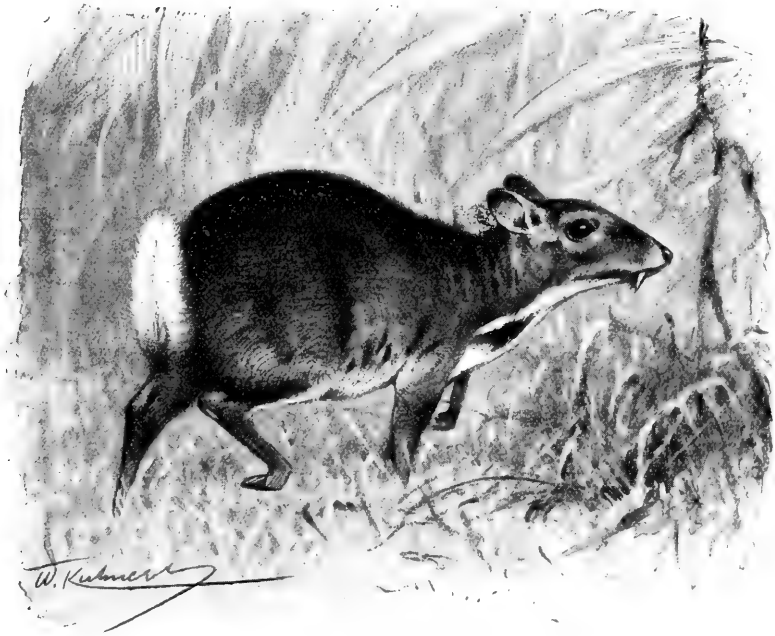
Muntjacs. The muntjacs are represented in Moulmein by *Cervulus feæ*, a species which differs from the ordinary forms by its darker colouring and the long tuft of hair between the antlers. Other species, such as Reeves's muntjac (*C. reevesi*), distinguished by its small size and bright coloration, inhabit China and Formosa. The Indian muntjac also occurs in the countries east of the Bay of Bengal, its representative in Burma having been named *Cervulus muntjac grandicornis*.

Chevrotains. Of the chevrotains or mouse-deer, the small Malay species (*Tragulus javanicus*) occurs as far north as Tenasserim, as well as in Cambodia, Cochin China, and the Malay Peninsula and islands. It is the smallest of the ungulates with the exception of the pigmy antelopes of West Africa, the head and body measuring only 18 inches long and the tail 3 inches. In colour it is reddish brown above, and whitish below, with a dark line down the nape and generally a brown stripe down the chest. This chevrotain frequents dense jungle, and is also found in mangrove-swamps on the coast. Like the rest of its kind, it is a timid, gentle little animal, walking on the tips of its hoofs, living alone except during the pairing-season, and easily tamed. The second species is the napu (*T. napu*), which inhabits much the same localities, and is distinguished mainly by its larger size, its shoulder-height being about 13 inches and its length about 27 inches. Numerous island forms of these two species have received distinct names. Of a third species (*T. stanleyanus*), the home is not definitely known.

Wild Pigs. The Indian wild boar extends into Burma; but in the Malay islands its place is taken by several more or less closely allied species, such as *Sus vittatus*, *S. verrucosus*, and *S. barbatus*, the latter distinguished by the great length of its head. A small pig (*S. andamanensis*) inhabits the Andaman Isles, and differs from the Indian animal not only by its inferior size, but by the absence of a crest of long hair on the back.

Javan Rhinoceros. Of the two Malay rhinoceroses, the Javan, or lesser one-horned rhinoceros (*Rhinoceros sondaicus*), is distributed from Assam through Burma and the Malay Peninsula to Sumatra, Java, and Borneo; and is also found

in the Bengal Sandarbans and parts of eastern Bengal. It is considerably smaller than the large one-horned Indian species, from which it differs widely in the characters of the skin. In place of the large tubercles of the Indian species, the skin of the body and limbs is covered with small, angular, scaly discs of uniform size which form a network of cracks. As in the Indian rhinoceros, the skin is divided into shields by folds, those before and behind the shoulders being continued right across the body like the other two main folds. The horn, which is frequently absent in the female, is never very large. This rhinoceros is more an inhabitant of forests than of grassy plains, and although found in the low swamps of the Sandarbans, is usually met with in mountainous regions. In Burma and Java it is found at a considerable altitude, its footprints having been noticed south-east of Sadiya at an altitude of 6500 feet.



MALAY CHEVROTAIN.

**Sumatran
Rhinoceros.**

The two-horned Sumatran rhinoceros (*R. sumatrensis*) ranges from Assam into Siam, and southwards into Sumatra and Borneo. It is the smallest existing member of the group, the average height being only about 4 feet. This rhinoceros is more thickly haired than any of the other species, the greater portion of the body, which is greyish brown or black, being thinly covered with longish black hair, which tends, however, to disappear with age. From both the other Asiatic rhinoceroses it is broadly distinguished by possessing two horns, which are often of considerable size and curve backwards. The skin is coarsely granular, with the folds indistinctly marked, and only the one behind the shoulder continued across the back. It also differs from the other species in having only one pair of incisor teeth in the lower jaw. The Chittagong representative of this species (*R. sumatrensis lasiotis*), which was at first thought

to differ from the Sumatran and Malay animal by its more abundant hair, now appears to be distinguishable only by its superior size.

Tapir. The Malay tapir (*Tapirus indicus*), which ranges from Tenas-

serim to Sumatra, and perhaps Borneo, is the only representative of its kind in the Old World. In height it stands about 40 inches at the withers, and has a curved back, measuring along the curve from the tip of the nose to the root of the tail about 8 feet. The head, legs, and the fore part of the body are black or dark brown, the rest of the body and the tips of the ears being white or grey. The young up to six months differ in colour from the adults, being of a soft silky dark brown, marked with brownish yellow spots, especially on the sides; the under-parts are white. According to native reports, this tapir, instead of swimming, is accustomed to walk along the bottom of rivers or lakes. It feeds on leaves and young sprigs and buds; and its colouring seems intended to break up the outline of the body, and thus render the animal inconspicuous.

Irawadi Dolphin. The Irawadi is inhabited by a fresh-water dolphin of quite a

different type from the one found in the great Indian rivers. This dolphin (*Orcella fluminalis*) is characterised by its rounded head, short beak, small scythe-shaped dorsal fin, and moderately large, almost oval flippers. It occurs locally in the Irawadi from Prome to Bhamo in the deeper parts of the river, but has never been observed in the tidal portion, so that it appears to be confined exclusively to fresh water. This dolphin, which is nearly related to another species of the genus (*O. brevirostris*) inhabiting the Malay seas, is characterised by the small number of its teeth, of which it has in the upper jaw only fifteen, and in the lower jaw fourteen pairs. The sides of the body are marked with numerous small irregular stripes, the ground-colour being pale slaty above and white beneath. The length is about $7\frac{1}{2}$ feet. This dolphin, whose food consists, so far as is known, entirely of fish, is a sociable species, seldom seen alone. It keeps to deep water, coming to the surface about every minute or so to breathe, when it emits a short blowing noise while exhaling and a weaker sound while inhaling.

Squirrels. Like India, the Malay province is rich in rodents, especially the squirrel tribe. In the eastern Himalaya, Sikhim, Bhutan, and the large mountain-forests of Assam, Manipur, Burma, Siam, the Malay Peninsula, Sumatra, Java, and Borneo, and even in Celebes, the large Indian squirrel is replaced by the nearly allied Malay form (*Ratufa bicolor*). Similar in habits to the Indian species, this squirrel is generally seen in pairs; it eats fruits and nuts of various kinds, as well as insects and birds' eggs, and has a loud harsh cry. In colour it is black or dark brown above, and paler underneath. The black-backed squirrel (*Sciurus atrodorsalis*) has a black stripe on the back; its tail is 7 inches long, the body measuring $8\frac{1}{2}$ inches. It inhabits Siam, but is represented in northern Tenasserim by *S. flavimanus*. Both are remarkable not only for their varied coloration, but for being generally found not among tall trees, but in bushes and hedges near villages or in bamboo thickets. There are many other Malay squirrels, and flying-squirrels are also common in the Malay countries, but marmots and susliks are absent.

Rats and Mice.

Among the members of the mouse tribe, the Indian house-rat is well known within the Malay area, where there also occurs the closely allied lesser rat (*Mus concolor*), which lives in the roofs of wooden buildings. It is well known in Pegu, Tenasserim, and the Mergui Islands, but probably has a wider distribution. This rat is 4 inches long, the tail being rather longer than the body, and it has a rough coat interspersed with bristles on the back, which is reddish brown above and paler below. The palm-mouse (*Vandeleuria oleracea*), which occurs for the most part in India, Ceylon, Assam, and Burma as far as Yunnan, is a remarkable species, representing a genus by itself, and is noticeable on account of its habit of living in trees and bushes, especially palms and bamboos. Here it builds a nest consisting of grass and leaves, which at the proper season contains from three to four young. Equally noteworthy is the mouse known as *Chiropodomys gliroides*, which is also the only representative of its kind. It has uniformly close hair, which becomes still thicker on the tail. In colour this mouse is brown above and white below. It is distributed all over the Malay countries, occurring in Burma, the Malay Peninsula, Java, and Borneo.

Black-Bellied**Vole.**

One vole, the black-bellied *Microtus melanogaster*, occurs in the upper Irawadi valley. It is yellowish brown above and dark brown beneath, with a ground-colour of dark ashy grey. The head and body measure $3\frac{1}{2}$ inches, and the tail a little over an inch. This vole ranges into Malaya from south Tibet and south-west China.

Very characteristic of the Malay province are the bamboo-rats, the common bay species (*Rhizomys badius*) inhabiting the foot of the Himalaya, Nepal, Sikkim, Bhutan, Manipur, Burma, and Siam. The close fur, which conceals the ears, is of a chestnut or greyish brown colour.

The bay bamboo-rat makes its home in a burrow, or sometimes beneath the root of a tree, or in thick tall grass, the teeth as well as the claws being used in digging. In the evenings this rodent issues forth from its hiding-place to feed on grass, corn, and bamboo-shoots; it is also said to be fond of roots and to take up its abode in situations where it can obtain them readily. Another kind, the larger bamboo-rat (*R. sumatrensis*), ranges from Siam to Tenasserim; it is of large size, measuring 17 inches to the root of the tail, the tail itself being about $5\frac{1}{2}$ inches long. In colour it is dark ashy grey or light brown above, somewhat darker down the middle of the back, and paler below. A third kind (*R. pruinosus*) apparently ranges from Assam to Cambodia and China.

Porcupines.

The true porcupines are represented in the Malay province by the Himalayan and Bengal species, as well as by a third kind, the long-tailed *Hystrix longicauda*, which inhabits the Malay Peninsula and Islands, and also by the small *H. yunnanensis*, of Yunnan, which lacks the crest of the other forms.

Of the brush-tailed porcupines one species is indigenous to western and central Africa, and the other to Burma and the Malay province. These rodents are much smaller and more rat-like than the true porcupines, from which they differ by their long scaly tails, terminating in a tuft of flattened and alternately wide and narrow spines. The flattened spines of the body are grooved, and taper towards the tip. The Malay species (*Atherura macrura*) is about 22 inches long, exclusive



INDIAN TAPER.

W. Kuhnert

of the tail, which measures about 10 inches. Its range extends from Chittagong, Tippera, and the Khasi Hills to Java, Sumatra, and Borneo.

Pangolins. The Malay pangolin (*Manis javanica*), one of two representatives in this area of the Edentata, ranges from Sylhet and Tippera through Burma, Cochin China, Cambodia, and the Malay Peninsula to Sumatra, Java, Borneo, and Celebes. This species, which attains a length of 24 inches, with a tail of about 20 inches, is larger than its two Asiatic relatives, from which it also differs by its more slender shape, as well as by the much greater relative length of the hind claws, which are nearly as long as those of the fore-feet.

The Chinese pangolin (*M. aurita*), which ranges from southern China, Hainan, Formosa, the Kareen Mountains, and the district north of Bhamo to Assam and the Himalaya as far west as Nepal, is distinguished from its Indian relative by its much larger scales, darker colour, and larger ears. It has, moreover, many more hairs between the scales than the other Asiatic species. Its length is from 19 to 23 inches, the tail measuring from 13 to 15 inches more.

Ground-Thrushes. Many of the more noteworthy birds of the Malay countries have an extensive geographical range, the numerous species of ground-thrushes, for instance, ranging over India, central Asia, and Australia. These birds resemble ordinary thrushes in many respects, but differ by the colours of the axillaries and the pattern formed by the white bases of the quills on the under-side of the wing. The orange-headed ground-thrush (*Geocichla citrina*), a bird about the equal in size of the song-thrush, breeds throughout the area lying between the extreme east of Assam and Tenasserim. Here it is found in large numbers all the year round, and in summer it ascends in the Himalaya up to heights of 5000 or 6000 feet, whence it ranges occasionally into Ceylon and the Malay Peninsula as far south as Tongkah. The Malay ground-thrush (*G. innotata*), which differs in being without the white tips to the medium wing-coverts, is a more southerly species, ranging from Tenasserim to Malacca.

Babbling Thrushes, Babblers, etc. Another group is represented by the babbling thrushes, many species of which are common to India and the Malay countries. Among the most striking is the Himalayan white-crested species (*Garrulax leucolophus*), which ranges to Bhamo and eastern Assam. Nearly allied is the white-crested Burmese *G. belangeri*, chiefly inhabiting Tenasserim and Pegu. A third member of the white-crested group, the Siamese *G. diardi*, ranges over Siam and Cambodia, while the black-gorgetted *G. pectoralis* and the necklaced *G. moniliger* both range from the Himalaya to Burma. Closely related are the babblers, of which there are numerous representatives in the area under consideration, while some are found in India and Africa. To another branch of the same family (*Timeliidae*) belong the hill-tits, all of which are arboreal in their habits, and have the two sexes dissimilar in plumage. Among them, the red-beaked *Liothrix lutea* is an inhabitant of upper Burma and Aracan, but its habitat extends into southern China, across the Khasi Hills, and along the Himalaya from Bhutan to Simla. In size this hill-tit is a little larger than the coal-tit; in colour it is olive-green above and yellow below, with an orange-coloured throat and chin, a yellow ring round the eye, and yellow or crimson edges to the wing-feathers.

These birds, which feed on berries and other fruits, seeds, and insects, generally collect in small parties among thickets and underwood. Another member of the group is the red-capped babbler (*Timelia pileata*), which is the only member of its genus, and inhabits Borneo, Siam, Cochin China, and Java, although absent from the Malay Peninsula. In colour it is olive-brown on the upper-parts, and whitish below, with a rufous crown and a white forehead. Its home is among the grassy plains, where it leads an almost hidden life among the grass on the ground, often betraying its presence by its agreeable song.



RED-BEAKED HILL-TIT.

Tailor-Bird.

A very characteristic species is the tailor-bird (*Orthonotus sutorius*), which ranges from India and Ceylon through Burma and the Malay Peninsula as far south as Mergui to Siam and China. Tailor-birds have long straight slender beaks, with the aid of which they construct their nests, formed of green leaves sewn together with plant-fibres. They are generally confined to well-wooded tracts and bushy districts; and, for their size, are possessed of singularly loud voices.

Magpie-Robin and Shama. Another noteworthy bird is the magpie-robin (*Copsychus saularis*), which ranges throughout India and Burma as far as Moulmein. Of equally wide distribution is the shama (*Cittocincla macrura*), a bird frequently kept in confinement by the Malays.

Crow-Tits. The crow-tits, an Oriental group of birds distinguished by a thick crest and a deep, short, and compressed beak, are largely represented in India and the Malay province. They feed solely on insects. A well-known member of the group is the yellow-billed species (*Paradoxornis flavirostris*) which inhabits Assam, the Khasi Hills, Bhutan, Sikhim, and Nepal, where it generally frequents reed-thickets.

Flower-Peckers. The flower-peckers are small birds of much the same habits as tits, wandering about in small parties, and frequenting tall trees. They resemble sun-birds in having the edges of the beak serrated for a portion of its length, but the beak is shorter. They feed on insects, honey, and soft fruits, and construct pear-shaped hanging nests with an entrance-hole at the side. One species, the Nilgiri flower-pecker (*Dicaeum concolor*), is confined to the western coast of India, a second, *D. virescens*, is peculiar to the Andamans, but nine others are common to India and the Malay countries, while others range over the Malay Peninsula and Islands to New Guinea and Australia. One of the most widely distributed is the scarlet-backed flower-pecker (*D. cruentatum*), whose habitat extends eastwards from Calcutta to China and southwards to Sumatra.

Sun-Birds. The gorgeous sun-birds (*Nectariniidae*) resemble flower-peckers in the long tubular tongue, but are distinguished by the long, cylindrical beak. Although mainly African, the group is well represented in Burma and the more eastern countries of the Malay province, while nine species are known from India. All have a richly coloured plumage, with a metallic gloss, resembling in this respect, as well as in their habits, the humming-birds of America which to a certain degree they represent in the Old World. They feed on tiny insects, which they capture with their tongues in flowers, as well as on honey. They do not, however, hover like humming-birds over flowers, but cling to them after the manner of tits. In this group the sexes differ in plumage, and the nest is pendulous.

Spider-Hunters. In the spider-hunters, on the other hand, the plumage lacks a gloss, the two sexes are alike, and the nest is attached by its rim to a broad leaf. These birds are represented by numerous species in India and the islands of the Malay Archipelago; a striking member of the group being the little spider-hunter (*Arachnothera longirostris*), the range of which extends from the Western Ghats of India to the Malay Archipelago.

White-Eyes. The allied group of white-eyes have, like the flower-peckers and the sun-birds, the tongue adapted for catching minute insects and sucking honey. This organ is extensile and forked at the tip, where it is provided with a brush of horny fibres. In general colour these birds are green, but they take their name from the white rings encircling their eyes. They are represented by about sixty species distributed over the tropical countries of Africa and Asia, the groups of islands belonging to both, and the whole of the Australian area. The Siamese white-eye (*Zosterops siamensis*) inhabits the forests and gardens of southern Pegu, Tenasserim, Siam, and Cochin China. These birds dwell in small

parties in the crowns of palms, continually twittering and searching the leaves for insects. The common Indian white-eye (*Z. palpebrosa*) does not extend farther east than Bhamo, and is not found farther south to the east of the Bay of Bengal.

Very similar in habits are the bright green leaf-birds, of which the golden-fronted *Chloropsis aurifrons* ranges from southern Bengal to Cambodia. In this species the crown of the head is brilliant golden yellow, the face black, and the throat of the same colour, crossed by an orange band, with a deep blue spot on the chin, and brilliant turquoise-blue lesser wing-coverts. Its brilliant plumage makes this species difficult to discover among the palm-leaves, especially as, like all its kindred, it mimics the calls of other birds.

Leaf-Birds. The bulbuls though largely African are more characteristically represented in tropical Asia, especially the Malay Islands. They are all birds of the forest, living principally among the upper branches of trees, and rarely in underwood, their food consisting of insects and berries. They resemble thrushes in habits, and in all cases possess a melodious song. Among these, the Bengal red-whiskered bulbul (*Otocompsa emeria*), one of the crested species, ranging from Simla to China, Siam, and the Malay Peninsula, has a black head with white ear-coverts, a crimson tuft extending from the lower eyelid over the ear-coverts, the under tail-coverts crimson, and the tail-feathers tipped with white. The long crest springs from the centre of the crown, and, like the peculiar ear-tuft, is most highly developed in the Burmese and Malay form of the bird.

Bulbuls. Among the finch tribe, the European tree-sparrow inhabits not only the Himalaya as far east as Assam (where it is found in summer at heights of 7000 feet and more), but also the Malay province as far as Java. In the eastern portion of its vast distributional area this bird does not, as in Europe, build in trees but, like the house-sparrow, nests in holes of houses and other buildings. The house-sparrow itself ranges as far east as Cochin China; while the closely allied Pegu house-sparrow (*Passer flaveolus*), which has a good deal of yellow in its plumage, likewise lives in or near buildings, as well as in jungle, ranging into Cochin China, but most abundant in the northern portions of the area under consideration.

Sparrows. The weaver-birds are near relatives of the finches, which they resemble in general bodily form, especially in the shape of the beak, although distinguished by having ten in place of only nine pairs of primary quills. The group is likewise characterised by the peculiarly constructed nests, which differ from those of all the finch tribe by being closed above. In shape the nest is like a bottle or ball, suspended from above, and attached to leaves or twigs at the side, and entered by a tube from below. This is the construction of the nests of the tree-weavers, but those of the fire and velvet weavers, as well as of the widow-birds and certain others, are oval in shape, provided with a hole at the side or the top, and a roof-like covering with stems protruding from the upper wall. This roof is fastened by grass-stems to shrubs and bushes, the twigs and stems of which are ingeniously worked in so as to serve the purpose of rafters. The gorgeous weavers, or munias, are inhabitants of the forest, but the tree-weavers frequent more open country, where meadows alternate with coppices or clumps of trees, or resort to plantations surrounding villages, or hang their nests from trees over-

shadowing native huts. The fire-weavers, widow-birds, and velvet-weavers, on the other hand, inhabit the plains, where they nest in high grass.

Although mainly African, the weaver-birds are represented by two Oriental genera, among them being the eastern baya (*Ploceus megalorhynchus*), which ranges from Bengal and the eastern Himalaya to the islands of Java and Sumatra. The bottle-like nest of this species is built of grass, with an entrance-tube from below of as much as 24 inches in length; it is often seen hanging from the eaves of the native houses in Assam, where the bird is known as the took-ra.

In their habits munias resemble finches more than others of their kindred, but are quicker in their movements. In the breeding-season the flocks of these birds break up into single pairs; each of which constructs a large spherical nest of fine grasses — not woven but untidily packed together — with an entrance-hole at the side. One of the best known representatives of the group is the Indian red munia or amandavat (*Sporæginthus amandava*), better known perhaps as the abadavat, a small crimson bird with brown wings, and numerous circular white spots on the sides of the body. The allied Burmese species (*S. flavidiventris*) is distinguished by the yellowish red, instead of black, underparts.



MALAY GRACKLE.

Another well-known member of the group is the Indian rice-bird (*S. oryzivorus*), which is about the size of a goldfinch, and inhabits the Malay Peninsula and Isles. It is of light grey colour above, and a pale red below, in contrast to which the black crown, chin, upper tail-coverts, and tail, as well as the white lower tail-coverts, the black edges of the cheeks, and the red of the beak, stand out conspicuously. Despite the fact that its song is often by no means

pleasing, the rice-bird is often kept in captivity; it is generally considered an enemy to the rice-cultivator.

Grackles. The well-known grackles are glossy black Oriental representatives of the starling tribe, characterised by their crow-like beaks, which, like their feet, are yellow or red, and bare warty wattle-like patches on the sides of the head. Grackles range from India through the Malay countries as far eastwards as New Guinea. The Malay grackle (*Eulabes javanensis*), whose habitat extends from Tenasserim to Borneo, is almost as large as a jackdaw; it easily learns to whistle and talk, a habit very characteristic of all the grackles, which are in consequence frequently called talking mynas.

Glossy Starlings. Nearly allied are the beautiful glossy starlings, which also have a sable plumage, but, with a much more brilliant metallic gloss. The most common species (*Calornis calibeius*) ranges from Tippera, Dacca, and Cachar through the Malay Peninsula to Sumatra, Java, and Borneo.

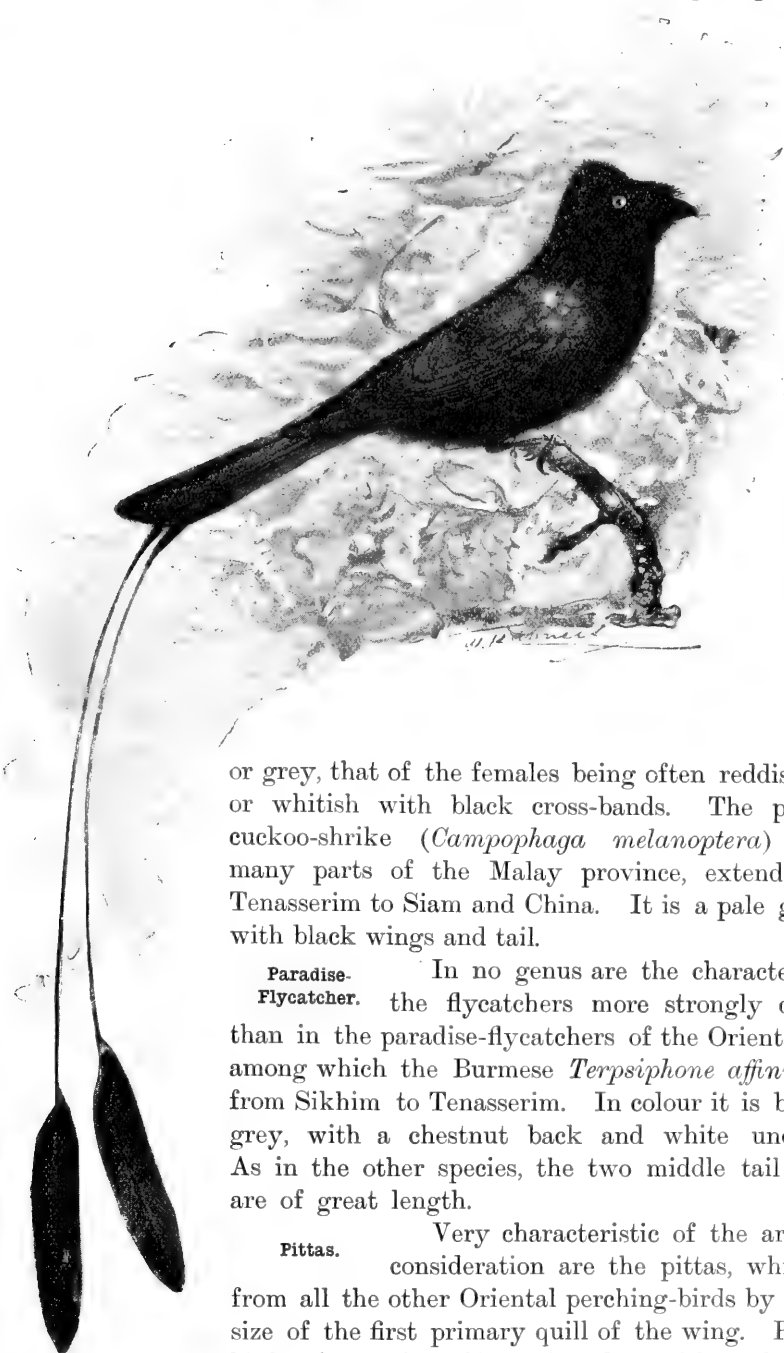
Drongos. Although likewise glossy black in plumage, the African and Oriental drongos form a very different group of birds, characterised by their crow-like beaks, with bristles at the base and round the nostrils, and their long and generally forked tails. These birds, which resemble flycatchers in their habits, live alike in thin forest, plantations, and open plains dotted with trees, from the branches of which they take short flights in pursuit of their insect-prey. In spite of their stings, they capture without hesitation numbers of bees and wasps. The nest, which is very like that of the golden oriole, contains at the proper season, eggs much resembling those of the shrikes. Drongos live in pairs or families; the cocks have an agreeable song, and considerable powers of mimicry. The most remarkable of the group are perhaps the racket-tailed species, the smaller of which (*Bhringa remifer*) ranges from the eastern Himalaya and the hill-tracts of Assam through Burma to Tenasserim, and also inhabits Perak, Sumatra, and Java.

Crows and Kittas. In the crow tribe the Burmese crow (*Corvus insolens*) replaces the Indian crow in the Malay province. Like its Indian cousin, this species generally frequents towns and villages in large flocks, although it will occasionally take up its residence near isolated huts in the forest. In another group, the kittas, which are exclusively Oriental, resemble magpies and their relatives in form and habits, but are more beautiful in plumage. The green kitta (*Cissa chinensis*) is light bluish green with reddish brown wings, a brown-black band crossing the eyes and extending to the sides of the head, a red beak, and coral-coloured legs. Its area of distribution extends from the Jumna valley to Mergui.

Jays and Tree-Pies. The jays are represented by the Burmese *Garrulus leucotis*, a species restricted to tall pine-forests. The tree-pies again, which are distributed over India, southern China, Formosa, Hainan, the Andamans, and Sumatra, are of the size and appearance of magpies; and they resemble the latter in habits, although keeping to the tops of trees, and live principally on fruits, though they eat also insects and young birds. Among them, the Indian tree-pie (*Dendrocitta rufa*) ranges from Kashmir to Travancore and from Assam to Mergui, while another, the Himalayan tree-pie (*D. himalayanus*), is found from the valley of the Sutlej to Tenasserim.

Cuckoo-Shrikes.

The widely spread cuckoo-shrikes represent another group, characterised by the fairly wide beak, which is not distinctly flattened but slightly bent and notched, and seldom very strong. Their plumage is glossy black



SMALL RACKET-TAILED
DRONGO.

or grey, that of the females being often reddish brown or whitish with black cross-bands. The pale grey cuckoo-shrike (*Campophaga melanoptera*) inhabits many parts of the Malay province, extending from Tenasserim to Siam and China. It is a pale grey bird with black wings and tail.

**Paradise-
Flycatcher.**

In no genus are the characteristics of the flycatchers more strongly developed than in the paradise-flycatchers of the Oriental region, among which the Burmese *Terpsiphone affinis* ranges from Sikkim to Tenasserim. In colour it is black and grey, with a chestnut back and white under-parts. As in the other species, the two middle tail feathers are of great length.

Pittas.

Very characteristic of the area under consideration are the pittas, which differ from all the other Oriental perching-birds by the large size of the first primary quill of the wing. Pittas are birds of the size of thrushes, but with a shorter and stouter body, longer legs, and a short tail. They

range from India through the Malay countries to Australia, but have also one outlying African species. Phayre's pitta (*Anthocincla phayrei*), distinguished by the aigrette-like plumes on the upper part of the neck, inhabits Burma and Tenasserim. To an allied genus, distinguished by the absence of these plumes, belongs the giant pitta (*Pitta carulea*), of Tenasserim, the Malay Peninsula, Sumatra, and Borneo. It is the largest member of the group, measuring about $11\frac{1}{2}$ inches in length.

Swifts.

Among the so-called picarian birds, the large needle-tailed swift (*Chætura indica*) ranges from Ceylon and southern India to Assam and the adjacent districts. The allied tree-swifts, specially characterised by their minute nests affixed to the branches or leaves of trees, lay only one large egg, which so completely fills the nest that, when brooding, the females are compelled to hold on to the supporting branch or leaf to prevent falling out, as indeed are the young. These swifts, represented by half a dozen species, are distributed from India through the Malay Peninsula and Archipelago to New Guinea. The smallest members of the group are included in the genus *Collocalia*, whose distributional area includes not only India, the Malay countries, and Polynesia, but also Madagascar. Their nests consist of nothing but saliva, hardened by the air and stuck to rocks in the shape of a ball. These are the well-known edible nests imported in such immense quantities into China, those of most value being the almost pure white ones of *Collocalia fuciphaga*, a species inhabiting the islands lying between Mauritius and Samoa, and also found on the Nicobars and Andamans, as well as in Tenasserim and Arakan, where it invariably keeps to the shore.

Nightjar, Frog-Mouths, etc.

In another group the horned nightjar (*Chordiles cerviniceps*), which in Sikhim and elsewhere spends its days in caves, belongs to a genus widely spread over southern Asia, the Malay Archipelago, Australia, and tropical America, and is distinguished by the absence of bristles on the beak. The allied nocturnal frog-mouths, so called from the enormous size of the gape, are distributed over India, the Malay Archipelago, and Australia. Some build nests of twigs resembling those of pigeons, while others form for their one egg only a loose basis of leaves and feathers on horizontally growing boughs. The group includes the genera *Podargus* and *Batrachostomus*, the members of the latter being exclusively Oriental, and represented in this area by *B. hodgsoni*, which inhabits the country between Sikhim and northern Tenasserim. Among the broad-billed rollers, represented by half a dozen species spread over the tropical countries of the Eastern Hemisphere, the wide-beaked *Eurystomus orientalis* ranges through the Malay countries into China as far as Manchuria.

Bee-Eaters.

In the bee-eater group, the square-tailed species are represented both in India and the Malay Peninsula by Swinhoe's bee-eater (*Melittophagus swinhoei*), characterised by its habit of awaiting its prey on some dead twig, instead of hawking for it in the air like the majority of its kindred. The bearded bee-eaters, which, in place of inhabiting the plains, frequent clearings in the forests of the higher mountains, never associate in parties, but go about in pairs, and are rarely found far away from their nest, which is placed in the hole of some tree. A well-known member of the group is the scarlet-bearded bee-eater

(*Nyctiornis amictus*), of the Malay Peninsula and Isles, a species somewhat larger than the European bee-eater. The plumage of this bird is green with a pale violet band across the forehead and crown, and a scarlet throat.

Kingfishers. Although the group of pied kingfishers is represented in India their true home is tropical America (where, however, they lack the pied type of coloration), while they are also found in Africa and Europe. These birds fly better than the other kingfishers, and wander over a large tract in pursuit of their prey, hawking above the surface of the water and seizing their victims with a jerk. The Oriental species, *Ceryle varia*, inhabits India and the Malay Peninsula. The wood-kingfishers, which live in forest, or in fields and plantations, and feed, according to their size, on insects or small vertebrates, especially snakes, generally sit crouching in a lazy, dreamy attitude, with their beaks on their breasts, yet keeping a keen watch on their surroundings, and ready at any moment to dash down on their prey. They nest in holes in trees, and are distinguished from their kindred by seizing their prey on the surface, instead of diving for it in the water. They are inhabitants of Africa as well as of tropical Asia, the range of the brown Oriental *Halcyon fuscus* extending from Asia Minor to the Philippines. Representing another genus, the Indian three-toed insectivorous kingfisher (*Ceyx tridactyla*), which ranges from India through Burma to the Malay Peninsula, is one of the most richly coloured members of the whole group.

Hornbill. If only on account of its habit (shared by the rest of its kind) of walling up the female in a hole in a tree during the period of incubation, mention must be made of the great pied hornbill (*Diceros bicornis*), the largest representative of its kind, whose habitat extends from the forests of the Himalaya to southern India and Sumatra.

Woodpeckers. Another noteworthy bird is the sultan woodpecker (*Chrysocolaptes sultaneus*), a species about the size of the European green woodpecker, with the mantle and wings golden yellow, the crown and lower part of the back scarlet, the tail black, the lower-parts white and black, and the neck marked by white and black stripes. The haunts of this bird are amid forests and plantations, and in Burma frequently on the banks of rivers. Its near allies, the stump-woodpeckers, have a similar type of plumage, but differ somewhat in the structure of the feet. One of the commonest of this rather large group is the tiger-woodpecker (*Chrysionotus javanensis*), whose range extends from the Malay Peninsula to Sumatra, Java, and Borneo. The piculets differ from the more typical woodpeckers by their diminutive size and short beak and tail, as well as by the circumstance that the feathers of the latter are soft and rounded at the tips instead of hard and pointed. The rufous piculets, specially characterised by having only three toes, are represented by three Asiatic species, among which the ochre-coloured *Sasia ochracea* ranges from Nepal and the eastern Himalaya over the greater part of the Malay countries. It is generally met with in bamboo-jungle, where it may often be heard hammering vigorously at the stems in which it nests. The four-toed piculets, on the other hand, are chiefly an American group, although represented in south-eastern Asia by the Oriental *Picumnus innominatus*, whose habitat extends from the Himalaya to Sumatra.

Barbets.

Resembling the woodpeckers in many respects are the barbets, the species of which vary in size from the dimensions of a wren to those of a green woodpecker. They have strong beaks, with coarse bristles around the base, and inhabit the edges and clearings of forests. All of them, but more especially the larger ones, are lazy birds of dreamy appearance, in the habit of

sitting for hours at a time on a branch, digesting their food, and from time to time uttering their loud shrill call in monotonous repetition. They take to flight reluctantly, and never go far on the wing, although the smaller kinds are in this respect somewhat more active, and are also better climbers. The food of these birds consists of berries and insects and their larvæ, especially those living beneath bark or in decaying wood. In this respect as well as in their habit of nesting in holes (which some cut out for themselves), and in their eggs, the barbets resemble woodpeckers. The distribution of the group extends over the tropical countries of Asia, Africa, and America, but the species of the genera *Megalæma* and *Chotorhea* (distinguished by the very long bristles around the mouth) are exclusively Malayan. A well-known representative of the latter is the red-headed barbet (*Chotorhea versi-*

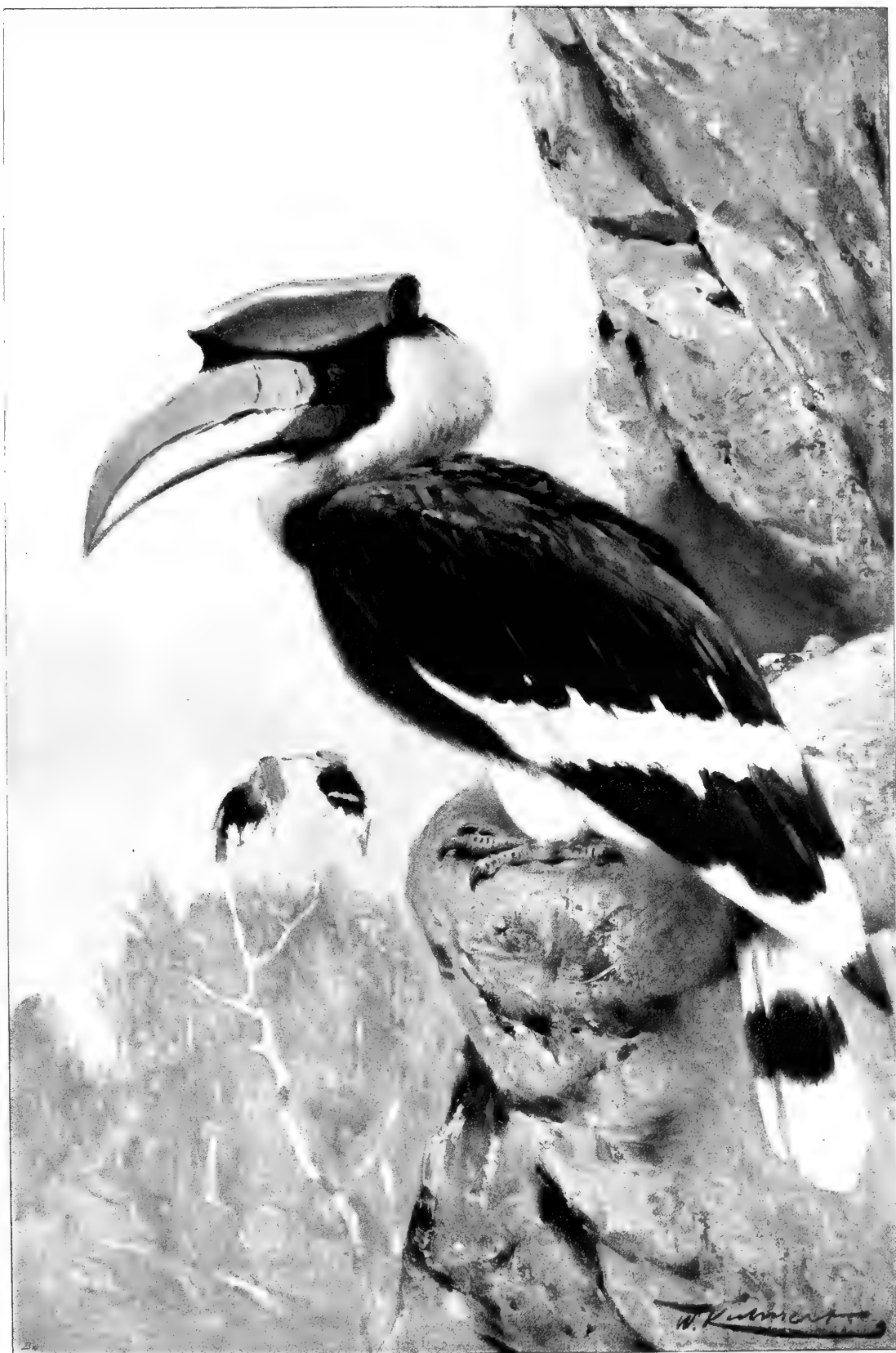


RED-HEADED BARBET.

color) which ranges from the Malay Peninsula to Borneo and Sumatra.

Trogons.

Another allied family is that of the trogons, which differ from the generally green barbets by their soft and glossy plumage being in most cases gorgeously coloured. They derive their name from the toothed edges of their short strong beaks, which are bent like a hook and fairly wide at the base. Although chiefly American, trogons are represented in Africa and southern Asia. They live in the depths of the forest, perching lazily on the branches, looking out



PIED HORNBILL.

for passing insects which they dash down upon like flycatchers and devour when they have regained their station. They also eat berries and other fruits, which they peck at as they fly. Trogons have a remarkably thin and tender skin, from which the feathers readily fall out; and their gorgeous colours soon fade in museums, if not carefully protected from the light. In the Oriental region the family is represented by the surukus, which range from India to the Malay Islands, a well-known species being the necklaced suruku (*Pyrotrogon casumba*), of the Malay Peninsula, Sumatra, and Borneo.

Among the cuckoo tribe may first be noticed the glossy cuckoos, resplendent in gorgeous plumage of green, red, or steel-blue, though occasionally clad in sober grey. These birds are distributed over the warmer countries of the Eastern Hemisphere, excepting Europe, one of their most beautiful representatives, *Chalcococcyx maculatus*, inhabiting the Himalaya, the Andamans, the Nicobars, and Sumatra, where it frequents the highest branches of the forest-trees, uttering its three quickly repeated notes not only by day but on moonlight nights. The allied genus *Chrysococcyx* is exclusively African.

To the same family belong the koels, birds of the size of the European cuckoo, with a black plumage marked by bands and spots when young. They generally lay their eggs in the nests

of members of the crow family; and their range extends from India to Australia. The best-known species is *Eudynamis honorata*, ranging from India through the Malay Peninsula and Islands as far as Flores.

The spur-cuckoos are strong birds of medium size, recognisable by the long straight spur on the hind-toe. They have long reddish brown graduated tails, which often expand like fans; and their call consists of a number of sonorous sounds, uttered slowly at first, and then repeated quickly until they form one long trembling note. There are more than forty species of these



NECKLACED SURUKU.

birds inhabiting the Oriental region and Australia. A common Malay species, also inhabiting India and Ceylon, is the hedge-cuckoo (*Centropus sinensis*), a bird about the size of a jackdaw, with glossy black plumage showing greenish and reddish brown wings. Another characteristic representative of the group is the bush-cuckoo (*Zanclostomus javanicus*), ranging from Tenasserim and the Malay Peninsula to Sumatra, Java, and Borneo, and the only representative of its genus.



BLUE-CROWNED HANGING PARROTS.

It is steely blue and green above, and chestnut beneath, with the head, neck, and breast grey, and the tip of the tail white.

To devote any space to the description of the physical characteristics of the parrot tribe on the present occasion would be quite superfluous, but it may be well to mention that in the wild state these birds are of a sociable nature, associating even during the breeding-time in colonies, which after the young are hatched increase to immense flocks, whose members are accustomed to fly long distances in search of food. Only those of one genus breed on the ground, and those of a second in an open nest, all the rest using holes in the

ground, or rocky clefts, or, oftener, holes in trees, which they generally cut out for themselves with their beaks. They all use their feet and beaks simultaneously in climbing, or eating, the beak helping to grasp the branches and the feet holding the food. These habits are not equally well developed in all cases, for the short-tailed kinds make the most extensive use of their beaks and claws, and are most active climbers, but walk and fly awkwardly, while the long-tailed species make less use of their beaks, and do not climb so well, but run and fly better. Notwithstanding the shape of the beak, only one member of the group, and that but recently, has developed into a bird-of-prey. All the rest feed on seeds or fruit, as well as buds, flowers, and insects, some being very fond of nectar and the sap of trees. Parrots are represented by a host of species, ranging over the warmer countries of all the continents except Europe, and extending from 40° N. latitude to 55° S. latitude, though only a few approach the extreme of these limits, their chief area being within the tropics. Most of the Asiatic species belong to the true parraquets, a group comprising a great variety of species, distinguished by the upper half of the beak being generally coloured red (although occasionally black) and the narrowness of the naked cere. They are spread over an area extending from the West African coast to the Solomon Islands. In south-eastern Asia they are represented by the genus *Palæornis*, most of the five-and-twenty members of which are green in plumage. The common *P. torquatus* ranges from Baluchistan, India, and Ceylon through Burma to Cochin China, but many of the species have a very restricted distribution. The pretty little hanging-parrots are also represented in southern Asia, where they range from India through the Malay Peninsula to the Philippines. These parrots, which feed principally on soft fruits and honey, climb about briskly in the branches and move quickly on the ground. Their note is pleasing; but their chief peculiarity is the habit of hanging head-downwards like bats, in which attitude they not only rest and sleep, but also frequently feed. One of the most beautiful species native to the Malay Peninsula is the small blue-crowned *Loriculus galgulus*, a member of a genus with no less than four-and-twenty species, ranging from India to New Guinea and the Bismarck Archipelago.

Owls.

Among the owls, special mention may be made of the grass-owl (*Strix candida*), a relative of the barn-owl, which ranges from India to Fiji and north Australia, the barn-owl itself being represented in India and the Malay countries by the closely allied *S. javanica*. The grass-owl lives among grass and breeds in the ground. Another owl, the Malay masked owl (*Photodilus badius*), ranges from the eastern Himalaya through the Malay Peninsula to Java and Borneo. The fish-owls are also represented within the area, the best known species being perhaps the Indian fish-owl (*Cetupa ceylonensis*), which ranges from Palestine through India, including Ceylon, into China.

Birds-of-Prey.

Passing on to the birds-of-prey, we find the tiny falconets, whose bodily size rarely exceeds a length of 6 inches, ranging from the Himalaya to the Philippines. They breed in the holes of trees like owls, lay eggs of a dull colour and rather long in shape, and live in clearings of the forest where they perch on the dead branches of medium-sized trees, lurking for insects, and occasionally catching small birds. Of the four species the smallest is the red-

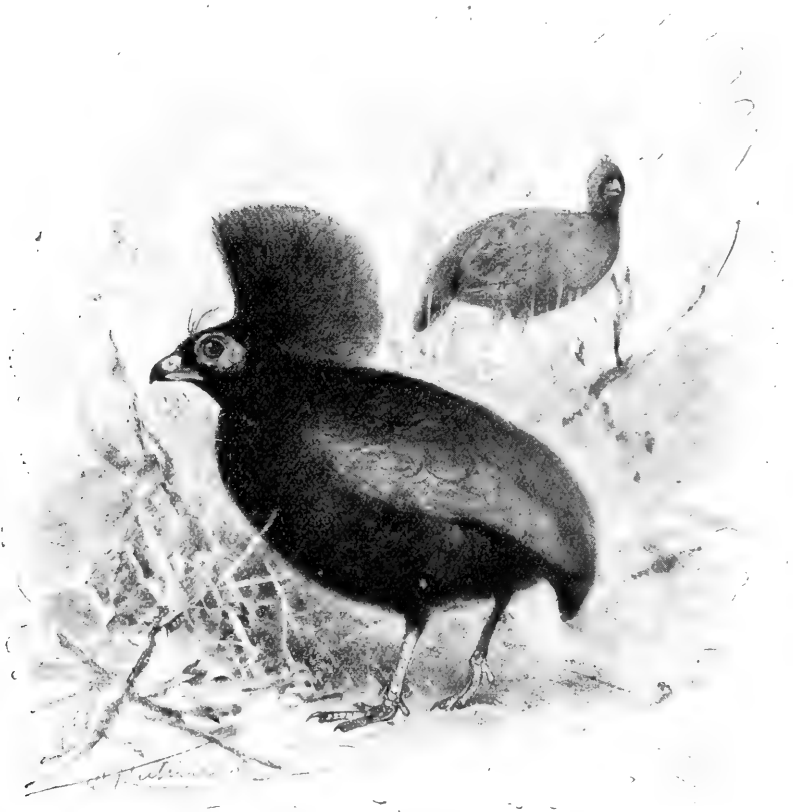
footed *Microhierax caerulescens*, which inhabits Nepal, Burma, and Cambodia. The honey-buzzards are represented in Malaya by the crested *Pernis ptilorhynchus*, whose range extends from India and Ceylon to the larger Malay Islands. To the same group belongs the bramini kite (*Haliastur indus*), whose habitat extends from India to China. The favourite haunts of this species are the neighbourhood of the



RED-FOOTED FALCONET.

seashore, or the banks of rivers, swamps, and large artificial ponds. In Calcutta and other ports where it is abundant it often visits the shipping, and will follow vessels on their voyage for the sake of the kitchen-refuse. It captures small fish from the surface of the water, picks up frogs and crabs in swamps and rice-fields, eats insects, and robs kites and crows of their prey, although it seldom attacks birds, unless they be ill or maimed. A notable group are the falcon-kites, whose range extends from Africa and India to Australia. The common black species

(*Baza lophotes*), indigenous to India, the Malay Peninsula, and the Indo-Chinese countries, has, like all its kindred, a crest on the back of the head, and in colour is glossy black, with the wings grey and white, the under surface of the tail grey, the shoulders marked with chestnut and reddish brown, the breast barred with white and chestnut above, and, lower down, ochre-yellow banded with brown. For a bird-of-prey this is certainly a striking coloration. The handsome serpent-eagles, distinguished by the long, movable crest on the head, range from India to the Malay Islands, their largest representative being *Spilornis chila*, which is found throughout the Oriental region in the neighbourhood of water,

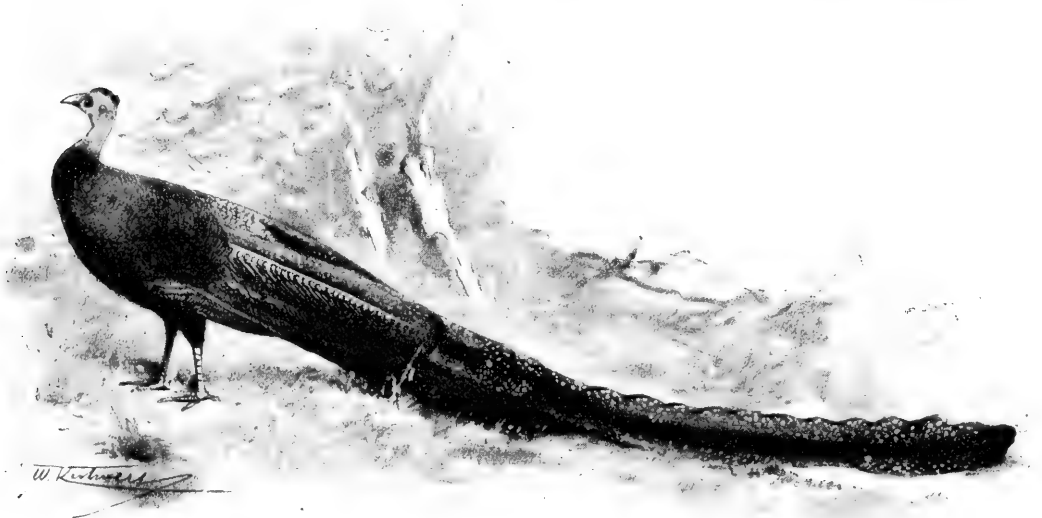


CRESTED WOOD-PARTRIDGES.

where it feeds on snakes, lizards, and frogs, as well as small mammals, birds, and insects. The crested eagles, characterised by their feathered legs, are forest-birds inhabiting Africa, and the tropical parts of Asia and America. The Malay crested eagle (*Spizaetus caligatus*), which ranges from Kashmir and Bengal to the Malay Archipelago, preys on hares, squirrels, and peacocks and other game-birds. Most remarkable of all is the great monkey-eating eagle (*Pitheophaga jefferyi*) of the Philippines, the sole representative of its genus, and first described in 1896.

Among game-birds, a characteristic and peculiar Oriental group is that of the wood-partridges; the crested representative of which, *Rollulus roulroul*, the only member of its genus, ranges from the south of

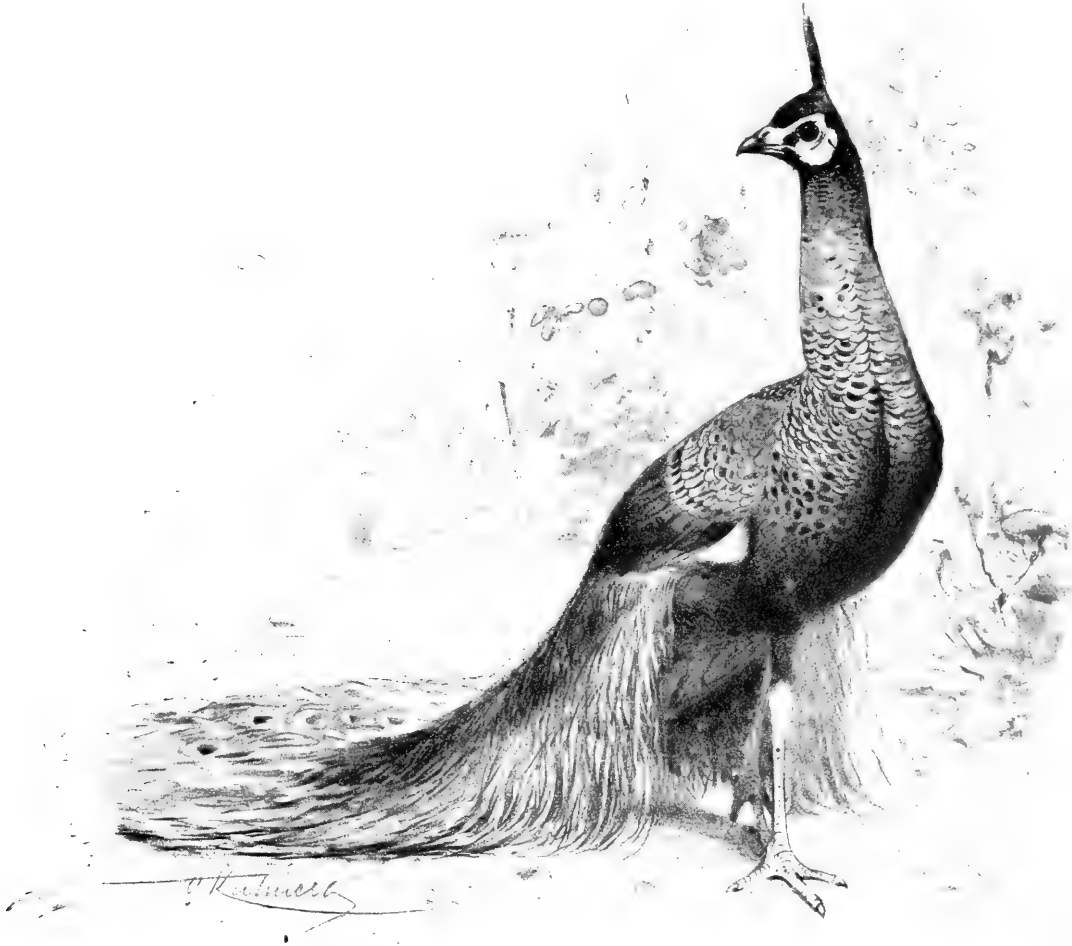
Tenasserim through the Malay Peninsula to Borneo and Sumatra. Not less noteworthy is the red jungle-fowl (*Gallus ferrugineus*), which also occurs in India, and is generally regarded as the ancestral stock of domesticated game. In India it inhabits the lower ranges of the Himalaya from Kashmir to Assam and the greater part of the Peninsula; eastward of the Bay of Bengal it is found throughout Burma, the Malay Peninsula, Siam, and Cochin China, while in Java, Sumatra, and other islands it has probably been introduced. Both sexes crow like domesticated cocks, the call of the female being a little shorter than that of her mate. Jungle-fowl breed in the Himalaya between March and July, but farther south much earlier; they generally lay five or six, but occasionally from nine to eleven, eggs of a pale clay-colour, in a flat depression on the ground, sometimes bare, and at other times lined with grass and dead leaves. Recent experiments demonstrate that in certain



ARGUS-PHEASANT.

circumstances the hybrids between the Ceylon jungle-fowl (*G. stanleyi*) and domesticated fowls are fertile, both *inter se* and with their parents, and under really favourable conditions it is surmised that complete fertility could be established. This being so, Darwin's argument from the infertility of the hybrids that *G. stanleyi* cannot be the parent stock of domesticated poultry no longer holds good. The difficulty, however, is to convert this negative evidence into positive proof that the Ceylon jungle-fowl is entitled to occupy that position. An important point in the case is the fact that when domesticated fowls tend to revert to the wild type, the cocks develop red or brown (never black) breasts. As the Indian *Gallus ferrugineus* is black-breasted, the reversion is thus in the direction of the Sinhalese species, which has a reddish brown breast in the males. An essentially Oriental group is that of the crested fire-backed pheasants, of which the red-backed Malay *Lophura rufa* may be taken as a well-known example, with a magnificent plumage. Its general colour is brilliant purplish blue, with white shaft-stripes on the flanks, the lower part of the back fiery chestnut-brown, the middle tail-feathers

white, and the bare face blue. There are many allied pheasants, but we pass on to the splendid Argus-pheasants, which almost rival the lordly peacock in size, and are distinguished by their very long middle tail-feathers, and by the gradual increase in the length of the flight-feathers which causes the secondaries to largely exceed



BURMESE PEACOCK.

the primary quills in this respect. The true Argus (*Argusianus argus*) is a native of the south of Tenasserim, Siam, the Malay Peninsula, and Sumatra, and takes its name from the delicately shaded eye-like spots on the wings. It is restricted to evergreen forests, and feeds on fruits and insects. Both sexes possess a loud call, which they repeat ten or twelve times, that of the hens being quite distinct from that of the cocks. These pheasants always live alone, the cock, which

seeks its food only in the mornings and evenings, spending the night on a tree, but resting during the day on a spot about 6 or 8 yards in diameter, which is kept scrupulously clear of plants, dead leaves, and other rubbish. The hen makes no such clear space, and seems to wander about the forest without any fixed abode. Pea-fowl, likewise an exclusively Oriental group, are represented in many parts of the Malay Peninsula, as well as in Java and Sumatra, by the Burmese *Pavo muticus*, a species characterised by the feathers of the crest being webbed to the bases of their shafts. Equally characteristic of, and restricted to, the Oriental region are the beautiful peacock-pheasants, which resemble the pea-fowl in their general habits, and have the same way of extending their tails like fans. The grey peacock-pheasant (*Polyplectrum chinquis*), ranging from Sikkim to Mergui, is mainly brown in colour with glossy, green and purple eye-spots on the tail, one on each side of each feather.

Pigeons.

The group of long-tailed pigeons is peculiar to south-eastern Asia and Polynesia, and is somewhat closely allied to the wood-pigeon. They are all slender in shape, with long graduated tails. The small Malay dove (*Geopelia striata*), which ranges from Tenasserim and Siam through the Austro-Malay Islands, may be taken as an example of the group. Another group, the bronze-winged doves, likewise range through the Malay Archipelago into the Australian area. Among these the golden green *Chalcophaps indica*, a species about the size of a turtle-dove, occurs in the Himalaya and certain parts of peninsular India, as well as in Ceylon, the Andamans, and Nicobars, but is most common in the Malay Peninsula and Islands, whence its range extends as far as New Guinea. The fruit-pigeons, again, characterised by the longish beak, dilatable at the base, in order to permit of large fruits being swallowed whole, are also well represented in the Malay area, the most noteworthy kind being, perhaps, the nutmeg-pigeon (*Carpophaga aenea*). The green pigeons include, among others, the genus *Treron*, of which the two species, *T. nipalensis* and *T. nasica*, are found in the present area, the former ranging into north-eastern India. These pigeons are distinguished by the fairly strong beak, which is thickened and bent into a hook at the tip.

Hérons and Storks.

Several handsome species of the heron tribe are met with in the countries east of the Bay of Bengal, among them being the large Sumatran heron (*Ardea sumatrana*), whose habitat extends from Tenasserim to Australia. This bird is remarkable on account of confining its wanderings to the seashore and the mouths of large rivers where, when the tide ebbs, it may be seen stalking about in search of food, which consists of small fishes and crustaceans, while as the tide comes in it perches on the neighbouring mangrove-trees. The Indian cattle-egret (*Bubulcus coromandus*), ranging from India and Ceylon to Korea in the north-east, and the Moluccas in the south-east, is remarkable on account of its habits. It breeds in colonies, one nest close to another; and seldom frequents swamps, after the manner of most of its relatives, but is a constant companion of buffaloes and other cattle, sitting on their backs, and feeding on the insects to be found there. The Indian white-necked stork (*Dissura episcopus*), a species considerably smaller than the white stork, has the plumage black with a coppery gloss, except the hinder part of the back and tail, which are white. The

neck is covered with short, white down, but the crown of the head, unlike that of the African representative of the species, is wholly black. In the giant storks the beak is much compressed at the sides, with the tip bent slightly upwards, and the upper half flattened towards the base. The tropical parts of Asia, Africa, Australia, and America, respectively form the habitats of the four species of these birds. The Indian black-necked stork (*Xenorhynchus asiaticus*) which ranges from the Malay Peninsula to India and Ceylon in the west, and Australia in the south-east, is similar in general habits to other members of the tribe. The ugliest and in some respects the most remarkable of all storks are the adjutants, or marabouts, which are common to the warmer parts of Africa and Asia. Among other distinctive features of these birds are the large, pointed, four-sided beak, the pouch on the breast (absent in one), the bare head and neck, the soft and shaggy plumage, and the soft curling plumes of the under tail-coverts, which are so much valued in the feather-trade. In all these respects adjutants differ markedly from other storks, as indeed they do in their habits, which approximate to those of vultures; these birds living on carcasses and offal, and playing an important part as scavengers. The best known of the two Oriental representatives of the group is the great Indian adjutant (*Leptoptilus dubius*), whose range extends from northern India to Sumatra, Java, and Borneo. The smaller Javan adjutant (*L. javanicus*), which lacks the pouch, inhabits Ceylon and eastern China as well as India and the Malay Islands mentioned above. Africa and India form the respective homes of the three kinds of shell-storks, distinguished from the rest of the tribe by the form of the beak, which gapes in the middle owing to its two halves shutting closely only at the tip and base. These birds feed on fishes, frogs, insects, and worms, but mainly on molluscs, the shells of which their peculiarly shaped beaks are admirably adapted to crush. The Indian shell-stork (*Anastomus oscitans*) inhabits India, Assam, and Manipur, but is rare in Pegu, and unknown in Burma, though it reappears in Cochin China. In the wood-storks, which inhabit the warmer parts of Africa, Asia, and America, the upper half of the beak is rounded, with the point bent slightly downward, being in this respect somewhat intermediate between that of the ibises and that of other storks. The Indian wood-stork (*Pseudotantalus leucocephalus*) is one of the best known birds of the country, being very common in well-watered parts, where it lives alone or in parties, breeding not unfrequently in colonies on large trees in the neighbourhood of villages. It is easily tamed, and inhabits India and Ceylon, Burma, Cochin China, and southern China.

Bustard-Quails. The bustard-quails, which are widely spread through the warmer parts of the Eastern Hemisphere, are represented by the black species known as the island bustard-quail (*Turnix pugnax*), whose range extends through south-eastern Asia from India and Ceylon to southern China, Formosa, Sumatra, and Java. Although these birds live in pairs, it is the male which incubates the eggs and takes care of the young, while the females fight with one another for the possession of partners.

Jacanas and Water-Pheasant. Another noteworthy group are the jacanas, characterised by the inordinate length and slenderness of their legs and toes, whereby they are enabled to walk on the floating leaves of water-plants. The Indian species (*Parra indica*) ranges from India through Burma and the Malay Peninsula

to Sumatra, Java, and Celebes, but is unknown in Ceylon. Nearly allied is the beautiful water-pheasant (*Hydrophasianus chirurgus*), which differs from the jacanas by the absence of the naked shield on the forehead, and the possession of elongated middle tail-feathers. This bird is an inhabitant not only of the Malay Peninsula and southern China, as well as Java and the Philippines, but also of Ceylon and India, and is very abundant on the lakes of Kashmir.

Cotton-Teal. Among the duck tribe, the cotton-teal, the smallest members of the family, are specially distinguished by their goose-like beaks. They occur in Africa, and Australia, as well as in India, China, and south-eastern Asia,



WATER-PHEASANT.

including the Malay Archipelago as far east as Celebes. The Indian species (*Nettopus coromandelianus*), which frequents sheets of water in which plants are plentiful, is rapid on the wing and has a peculiar call. It generally breeds some distance from the water, in large trees, but sometimes in the ruins of old buildings, laying from eight to ten small white eggs.

Pelicans and Darters. The pelicans are represented in the area under consideration by two species, namely, the eastern pelican (*Pelecanus roseus*), ranging over eastern Asia and the Malay Archipelago, and the spot-beaked *P. philippensis*, which inhabits India as well. More remarkable than

the pelicans are the darters, easily recognisable by the slender body, the long thin snake-like neck, the long tail, narrower at the base than at the tip, moderately long wings, and the slender, pointed beak. The group is represented by one species in each continent, except Europe. The Indian darter (*Plotus melanogaster*), which is distributed over India and the Malay countries, lives near fresh water, and is not seen near the sea except at river-mouths. When

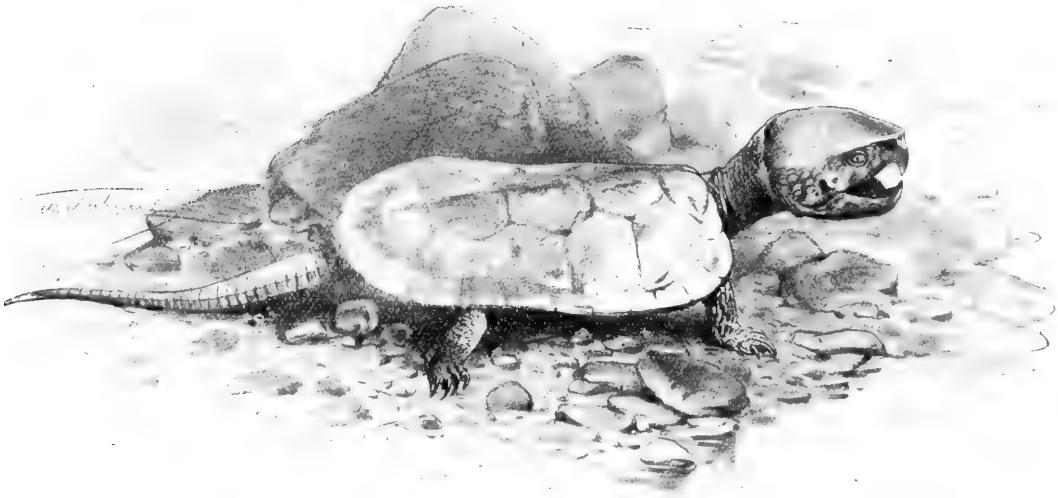


INDIAN DARTER.

swimming, this bird raises only its head and long serpent-like neck out of the water, and dives either from the surface or from a tree-stump or root a little height above. It subsists on fish, which it captures by stabbing through the gills ; afterwards, rising with its victim to the surface, it throws it into the air, catches it, and swallows it head-first. After the meal, it rests, like a cormorant, with expanded wings on the branch of a tree or some other convenient station. The nest and eggs are like those of cormorants, in whose society, as well as in that of herons, darters frequently breed.

**Tortoises and
Terrapins.**

Among the reptiles, there are comparatively few meriting special attention. The land-tortoises and terrapins are, however, abundantly represented. Among these are three kinds of land-tortoise, *Testudo elongata*, *T. platynota*, and *T. emys*, of which the second is confined to Burma and northern Pegu, while the other two range from Assam over a large part of the Malay countries. The three species of the chiefly terrestrial genus *Geoemyda* are peculiar to this area; and the same is nearly the case with those of *Cyclemys*, although one ranges into Cachar. One species of the allied genus *Morenia* is likewise Malay; and batagurs of the genus *Cachuga* occur in the Irawadi. Very characteristic of the province is the big-headed tortoise (*Platysternum megacephalum*), which represents a family by itself, and is distinguished by its slender body, long tail and massive head. It is a rare inhabitant of the rivers of Burma, Siam, and



BIG-HEADED TORTOISE.

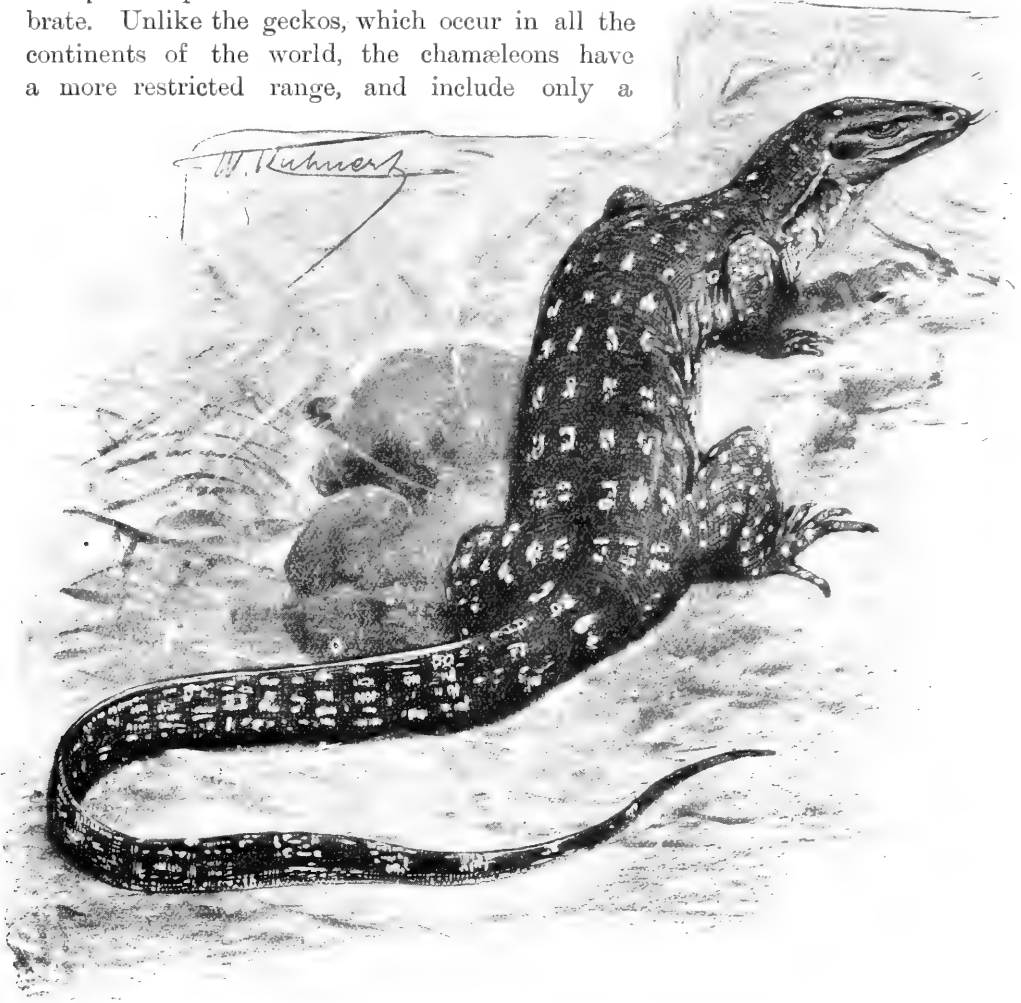
southern China. The fresh-water soft-tortoises, which are distributed over the warmer countries of Asia, Africa, and North America, are represented in the Malay province by *Trionyx cartilagineus*, the shell of which attains a large size.

Lizards.

The largest representative of the lizards is the banded monitor (*Varanus salvator*), which may attain a length of over 40 inches, exclusive of the long tail. It ranges over India as well as south-eastern Asia, dwelling among swamps and in trees above the surface of the water. Among the great group of agamoid lizards, mention may be made of the variable lizard (*Culotes versicolor*), which is reddish yellow in colour with brown cross-bands, and derives its names from its chameleon-like change of colour. This lizard ranges from Afghanistan and Baluchistan into China, and Cochin China.

Of the flying lizards, which are peculiar to the Oriental region, the most common is perhaps *Draco volans*, which ranges from the Malay Peninsula into Borneo. The geckos, which are of much wider distribution, have a fairly common representative

in the touktar (*Gecko verticillatus*), which inhabits eastern Bengal, southern China, and the Malay Peninsula and Archipelago. The stump-tailed gecko (*Gehyra mutilata*) is noteworthy on account of its extensive geographical range, which embraces Ceylon, Burma, the Malay Peninsula and Archipelago, New Guinea, the Mascarenes and Seychelles, and western Mexico. Such a distribution is almost, if not quite, unparalleled in the case of a land vertebrate. Unlike the geckos, which occur in all the continents of the world, the chamæleons have a more restricted range, and include only a



BANDED MONITOR.

single Oriental species (*Chamaeleon calcaratus*), which is confined to India and Ceylon, and does not therefore enter the area under consideration.

Snakes.

Among numerous venomous snakes inhabiting the Malay area, one of the most formidable is Russell's viper (*Vipera russelli*), which is common to India and the Malay Peninsula, and is said to occur also in Sumatra and Java. Belonging to the same genus as the European viper, this species, which attains a length of 4 feet, is sluggish in disposition, fearless of man, and a fierce biter, so that it is one of the most dangerous of all snakes. The cobra (*Naia*

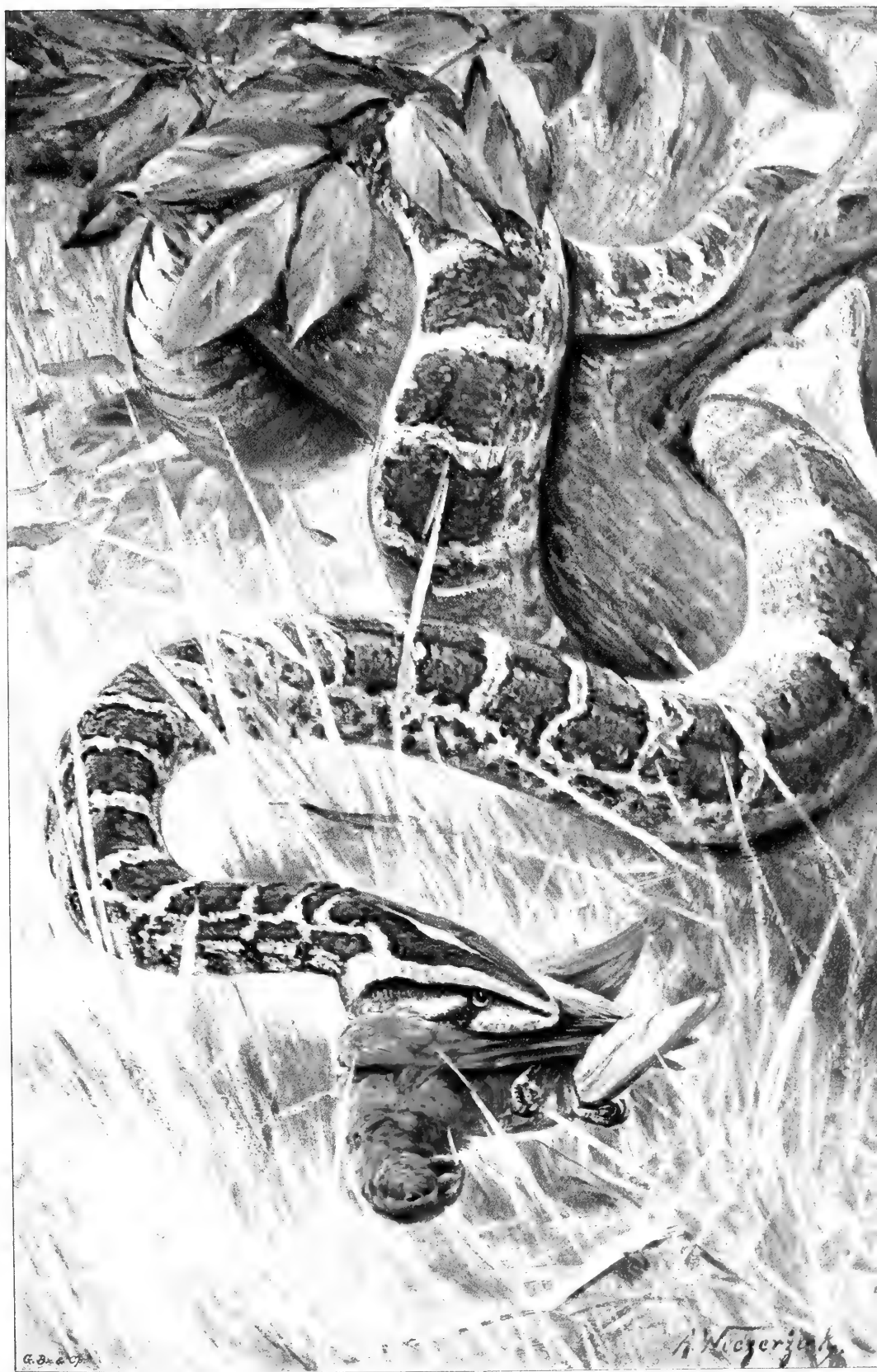
tripudians), which has an even worse reputation, is found as far as the Caspian to the west, and eastward ranges into southern China and the Malay Archipelago. This snake, which preys principally on small reptiles, although also on small mammals and birds, attains in some cases a length of over 6 feet. The giant cobra (*N. bungarus*), which is more than double that length, is a deadly foe to other

snakes, and by reason of its greater ferocity is more dangerous than the typical species, although fortunately less common. It ranges over the greater part of India, Burma, and the Malay Peninsula. The Indian python (*Python molurus*) is a well-known member of a non-venomous group, distinguished, among other characters, by the possession of vestiges of the hind-limbs and a prehensile tail, and is almost entirely confined to the tropics, where it occurs in both hemispheres. The Indian species, which attains occasionally a length of over 20 feet, inhabits India, Ceylon, the Malay Peninsula, and Java. The Malay python (*P. reticulatus*), which ranges from Burma to the Nicobars, and the Malay Peninsula and Islands, is larger, growing to 30 feet. The green whip-snake (*Dry-*



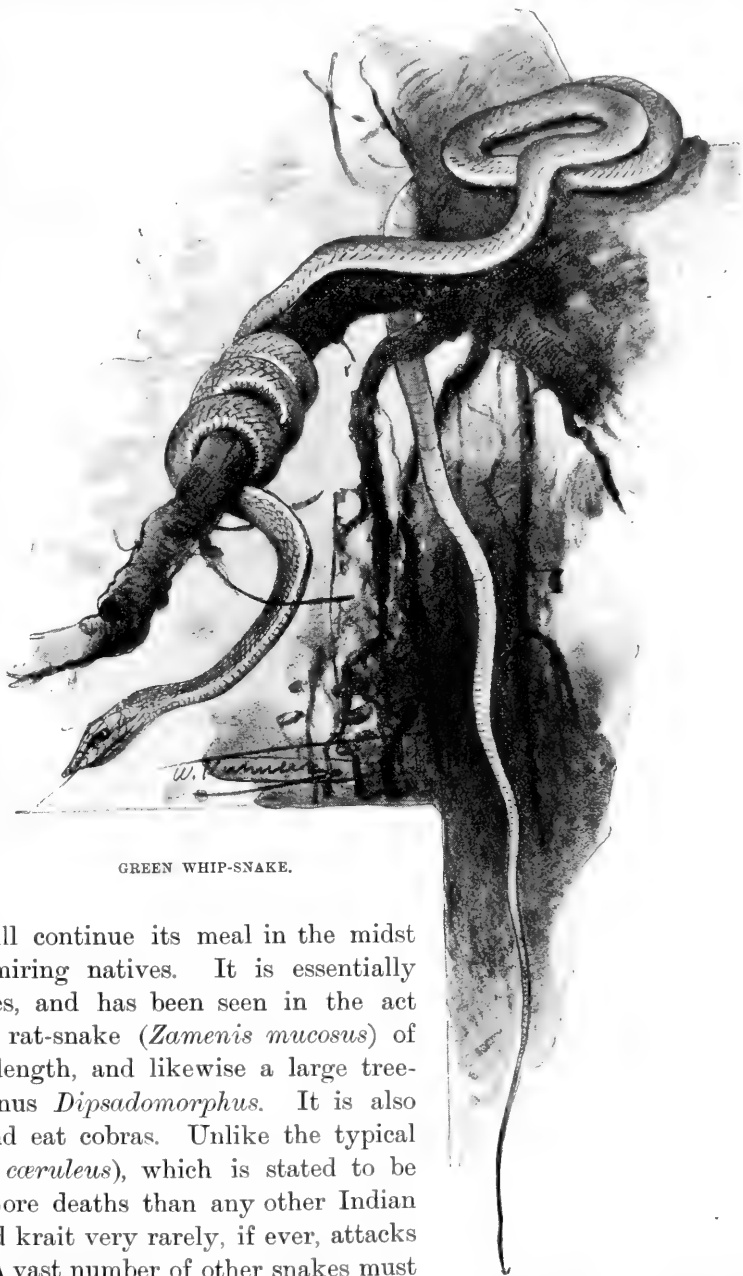
MALAY FLYING-DRAGON.

ophis mycterizans), which is likewise poisonous, and sometimes pale brown instead of green, takes its name from the whip-like shape of its body. In length about 5 feet, it lives principally amid bushes and high grass, and ranges over India, Ceylon, and Burma. That striking Indo-Malay snake the banded krait (*Bungarus fasciatus*) takes its native name of *sankni*, meaning the "wearer of bracelets," from its alternating bands of black and yellow. The same word reappears in *sank* (pronounced like the



INDIAN PYTHON

English "sunk"), the native name of the bangles made from the shell of the great Indian conch. Although seldom exceeding 5 feet, the banded krait, which is a deadly snake, may grow to as much as 6 feet in length. It is mimicked in the matter of colour by a smaller and perfectly harmless snake known as *Lycodon fasciatus*, which has, however, a brown collar on the throat. Whether this is a case of true mimicry may be doubtful, seeing that the banded krait is mainly nocturnal in habit, and is nowadays most frequently seen by Europeans when travelling at night by motor. It is also extraordinarily sluggish, so that when trod upon it will merely crawl lazily out of the way, and when observed in the act of swallowing

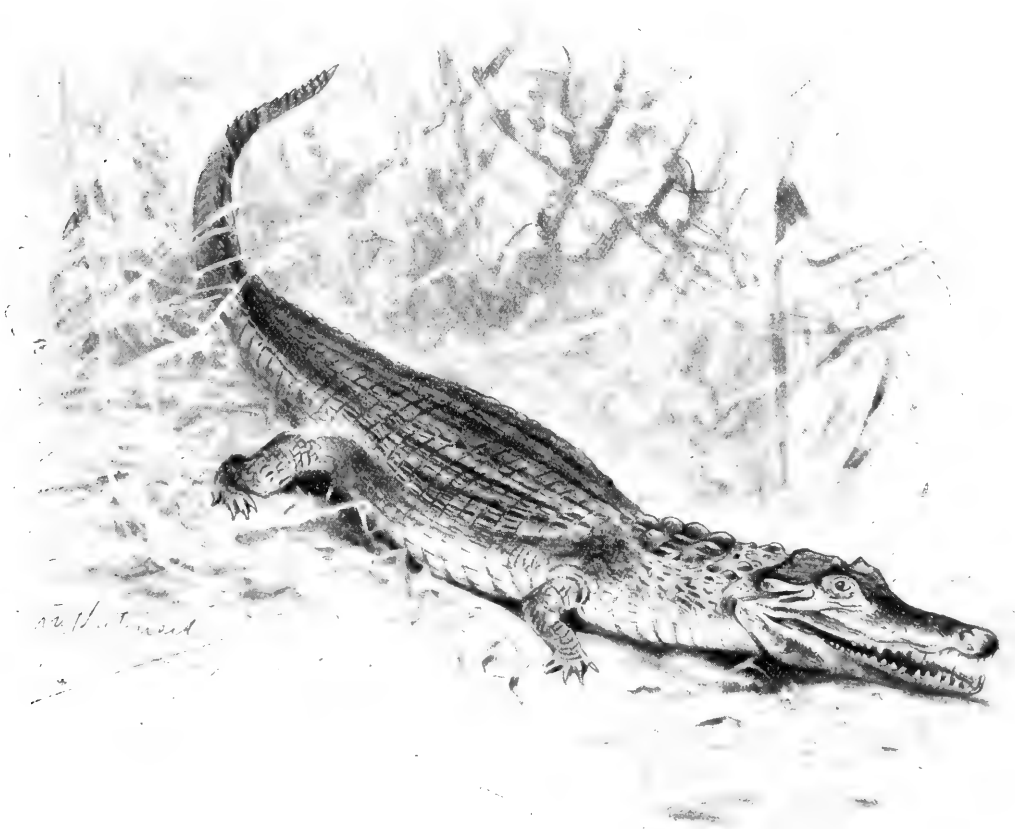


GREEN WHIP-SNAKE.

another snake will continue its meal in the midst of a circle of admiring natives. It is essentially a cannibal species, and has been seen in the act of swallowing a rat-snake (*Zamenis mucosus*) of about 5 feet in length, and likewise a large tree-snake of the genus *Dipsadomorphus*. It is also reputed to kill and eat cobras. Unlike the typical krait (*Bungarus caeruleus*), which is stated to be responsible for more deaths than any other Indian snake, the banded krait very rarely, if ever, attacks human beings. A vast number of other snakes must be passed over without mention, but a few words must be said with regard to the blind-snakes (*Typhlopodidae*), which are represented in India and the Malay area by the typical genus *Typhlops*. The commonest species is *T. braminus*, the range of which extends from southern China and the Malay Peninsula and Islands to

Arabia, Africa, and Madagascar. These remarkable snakes are very similar in habits to large earth-worms.

Crocodiles. Crocodiles, which inhabit all the warmer countries of Africa, Asia, Australia, and America, and are the largest of living reptiles, are mainly denizens of the water, and without exception carnivorous, although

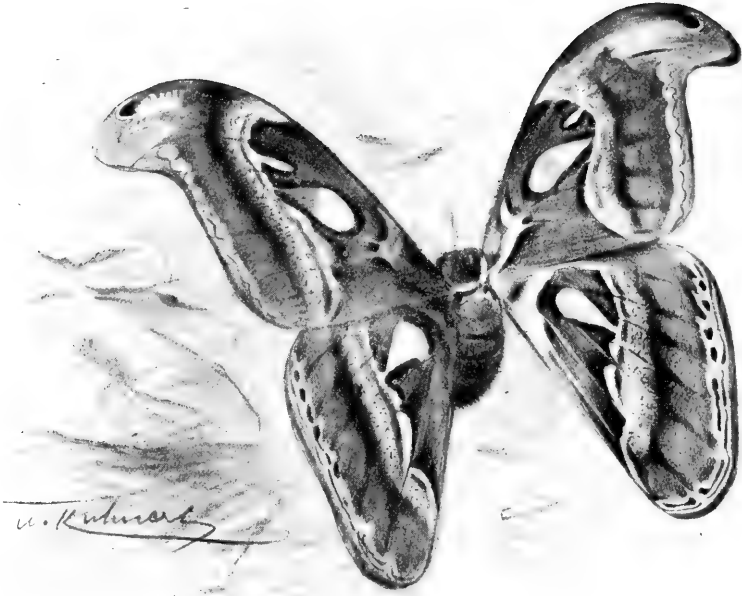


INDIAN LONG-NOSED CROCODILE.

they do not all live on the same kind of food. The gharial (*Gavialis gangeticus*), which feeds mainly on fish, and grows to about 20 feet in length, inhabits the Indus, Ganges, and the Bramaputra, together with a few other rivers in India, is an Indian rather than a Malay species. Among other features, it is characterised by its long and narrow jaws and slender curved teeth. Instances of its attacking human beings have been recently recorded. It is the sole representative of its genus. An allied form, the Bornean gharial, representing a second genus, is noticed

under the heading of the Malay Islands, although it also occurs in the Peninsula. The true crocodiles, which comprise eleven or twelve species, are represented within the Malay area by *Crocodilus porosus*, ranging from Ceylon and eastern India to Australia and the Fiji Islands, and frequenting the lower courses of rivers and the seashore, and also by the swamp or Indian crocodile (*C. palustris*) inhabiting the rivers, ponds, and swamps over an area extending from the Malay Archipelago to Sind and Baluchistan.

In the first of these species the length of the snout is from one-and-two-thirds to two-and-a-quarter times the width, whereas in the second the proportion is one-and-a-third to one-and-a-half. *Crocodilus porosus* has, moreover, from seventeen to nineteen pairs of teeth in the upper jaw, and a more or less strongly developed ridge on the skull in front of each eye, whereas in *C. palustris* the number of pairs of upper teeth is invariably nineteen, and there is no bony ridge in front of the eye. The former is stated to attain the enormous length of 33 feet, and the latter appears to fall but little short of these dimensions.



ATLAS MOTH.

CHAPTER VII

THE FAUNA OF THE MALAY ISLANDS AND THE PHILIPPINES

ALTHOUGH the great Malay Islands of Java, Sumatra, Borneo, and Celebes, together with the Philippines and the smaller islands of the Archipelago, form a part of the Malay province of the Oriental region, they contain so many animals unknown elsewhere that they may be accorded a chapter to themselves. Throughout the great sylvan area of these islands and New Guinea, and the adjacent continental portions of south-eastern Asia, the annual rainfall is very great, attaining an average of about 80 inches, but rising in some places to 120, in others to 160, and reaching in Buitenzorg in Java almost 200. There are indeed districts in eastern Java in which the fall is considerably much less than 40 inches, and where in consequence tall trees or even savannas are scarce, but, speaking generally, most of the land-surface of the Malay Archipelago is clothed with primeval forests, which are types of tropical luxuriance and beauty, and utterly unlike the forest-growth of Europe. Amid this leafy luxuriance flourishes a rich and remarkable fauna, many of the members of which are common to the mainland of the Malay province, under which heading they have been already noticed, while others are peculiar to this island tract.

Siaman. Among the man-like apes, the first to be noticed is the gibbon locally known as the siaman (*Hylobates syndactylus*), which is restricted to Sumatra, where it inhabits forests up to a height of about 3000 feet, and is distinguished from others of its kind by the presence of a web between the second and third toes, and of a kind of pouch on the throat, as well as by the hair of the fore-arm pointing towards the elbow instead of towards the wrist. The siaman, which is about 36 inches in height, and measures 66 inches across the arms, has rather long hair of a black colour, except the whiskers, which are grey or whitish. On account of its exceedingly long arms, it walks awkwardly on the ground, but among the tree-tops, where it spends most of its time, it moves with great agility, often taking long leaps, especially when in danger. By the Malays the siaman is considered dull and stupid, and it is very wary and difficult of approach. Throughout the day it is silent, but at morning and evening, as the sun rises or sets, it indulges in terrific cries, given with the full strength of the troop. Another gibbon, *H. agilis*, is found only in Sumatra and Siam, while a third kind, the wou-wou, or silver-haired gibbon (*H. leuciscus*), is peculiar to Java and Borneo.

Orang-utan. The most remarkable of the man-like apes of the Malay Islands is the orang-utan (*Simia satyrus*), which is peculiar to Sumatra and Borneo. This ape, the mias of the Dyaks and the "man-of-the-woods" of the Malays, attains a height of about 4 feet, and, when standing erect, touches the ground with its finger-tips on account of its long arms. The legs are very short, the calves thin, and the long slender feet carry a short and opposable great toe which is often without a nail, and in old age seems in some cases to lose its terminal joint. Like the feet, which touch the ground only on their outer sides, the long slender hands are horny and wart-like on both sides, with the thumb relatively smaller than the great toe, and a slight web between the fingers. The skull tapers almost to a point at the crown, the forehead is high, the oval face flat, and the nose pressed into the face, while the jaws are projecting, and the long lips broad, smooth, and flexible. In the males each cheek carries a protuberance which almost covers the ear, and the front part of the neck is furnished with a loose pouch of skin communicating with the windpipe. The shaggy reddish hair, a foot or more in length, is very sparse on the front of the body, although somewhat more abundant than on the face, ears, hands, and feet, which, except for the whiskers and beard, are almost entirely bare, and bluish or brownish in colour.

The mias inhabits the primeval forests of the plains, where, with the aid of its long powerful arms, it moves amid the foliage so easily and rapidly that a man walking in the same direction on the ground is scarcely able to keep up with its progress. At a height of some 25 feet from the ground it builds of branches a sort of nest or platform on which it sleeps, and where it stays until the morning dew has disappeared from the leaves. The food of the mias consists mainly of certain fruits, among which the evil-smelling but tasty durian seems to be the favourite. Orang-utans live in small family parties, consisting of the two parents and their offspring. The young, which are very much like human infants in their ways, signify their wants by crying, but cease their wailing when they find themselves alone, to resume their crying when they become aware of the return of their parents. In captivity they enjoy being caressed to such an extent that they cry

when put down, and fully appreciate the delight of a bath, especially the subsequent drying and combing. They soon grow tame and accustomed to all kinds of food, including meat, and they will drink beer, wine, and spirits, as well as coffee and tea. Unfortunately, the life of captive orang-utans in Europe is invariably brought to a premature close.



PROBOSCIS MONKEY.

Proboscis Monkey. Langurs of peculiar species inhabit the larger Malay Islands with the exception of Celebes, but they are eclipsed in interest by their ludicrous-looking relative, the proboscis-monkey (*Nasalis larvatus*) of Borneo. This ape, the sole representative of its kind, is recognisable at a glance by its long and flexible nose, which often attains its maximum development in the old male. In colour this grotesque monkey is reddish brown, with blackish ears, and much yellow and whitish on various parts of the body. Its size is considerable, the head and body measuring about 30, and the whip-like tail 26, inches. These monkeys associate in small troops, and, like langurs, apparently spend most of their time in the trees. The object

of the ungainly proboscis of the adult male, which hangs down over the upper lip, is quite unknown.

Moor-Macaque and Black Ape. Peculiar to the south of Celebes and the neighbouring island of Bouton is the moor-macaque (*Macacus maurus*), whose tail is merely a short bare stump about an inch long curving upwards. In colour this monkey is black, with a long narrow face and a flat nose. Another black monkey inhabiting Celebes, Batchian, and some of the Philippines, far to the east of its nearest allies, is the black ape (*Cynopithecus niger*), a species representing a genus by



ORANG.

itself, with affinities to the macaques and the baboons. It is likewise a short-tailed, or rather almost tailless, species, and its long narrow face looks all the longer from the curving crest of long black hair with which the head is crowned.

Tarsier. Among the lemurs, the slow loris is common to the mainland and Sumatra, Java, and Borneo, but the strange tarsiers are confined to the islands of the Archipelago. The typical *Tarsius spectrum* is an inhabitant



THE BLACK APE.

of Java, Sumatra, Borneo, and some of the smaller islands, and a second species, *T. fuscus*, has been described from Celebes and some of the islands of the Philippine group. Ghostly in appearance, tarsiers are characterised externally by their nails, which are developed into claws only on the second and third toes of the foot, but more especially by the disc-like expansion of the tips of the fingers and toes, as well as by the remarkably long ankles and the enormous eyes and ears. Tarsiers, which are not so large as rats, are nocturnal animals, living in trees, where they hop along the branches. When feeding, they hold their food, which consists of insects and small lizards, between their fore-paws like squirrels.

Pen-Tailed Tree-Shrew. Omitting mention of the bats, as being of no very special interest, and merely referring to the occurrence of a species of flying lemur, or cobego (*Galeopithecus philippinensis*), in the Philippines, and of the largest of

the tree-shrews (*Tupaia tana*) in Borneo, attention must be concentrated on the remarkable pen-tailed tree-shrew (*Ptilocercus lowi*), the sole representative of a type long supposed to be peculiar to Borneo, but now known to occur also in the Malay Peninsula. From ordinary tree-shrews this curious little animal, which is about the size of a mouse, differs by the terminal third of the otherwise short-haired long tail bearing on opposite sides two rows of elongated hairs resembling the vanes of a feather.

Gymnura. A peculiar generic type of gymnura (*Podogymnura*) has been obtained from Mount Aboo in Mindanao, Philippine group.

Cats. Among the beasts-of-prey, the tiger is found in Sumatra and Java, but not in Borneo or the other islands, while the leopard also occurs in Borneo, although, like the tiger, it is unknown in Celebes. The rare Bornean bay cat (*Felis badia*) is restricted to the

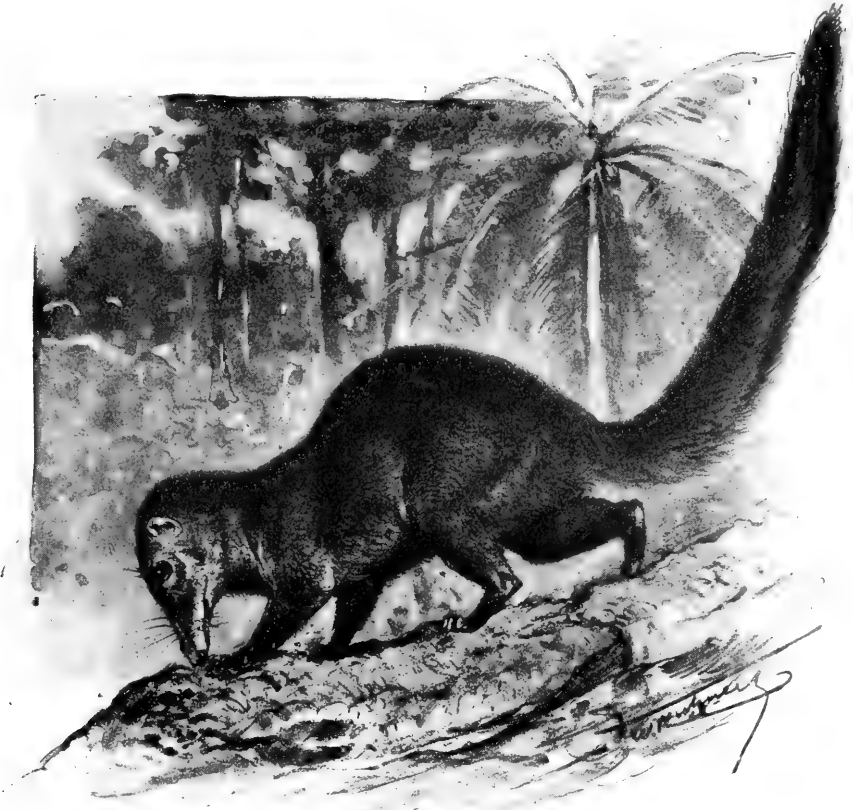


TARSIER.

island from which it takes its name, and is of a uniform bright chestnut-brown colour, except for a white streak down the under surface of the terminal half of the tail.

Other Carnivora. The civet-cats are represented by *Viverra zangalunga*, which inhabits Java, Sumatra, Borneo, and the Philippines, and is also found in the Moluccas, its distributional area thus extending farther east than that of any other member of the group. Borneo is the home of the banded civet

(*Diplogale hosei*), the sole member of its genus, while it is also one of the habitats of other species mentioned in the last chapter. The Malay wild dog ranges from the mainland of the Peninsula to Sumatra and Java and possibly to Borneo; while the only bear found in the islands is the small smooth-coated Malay species (*Ursus malayanus*), which inhabits Sumatra, Java, and Borneo, as well as the Malay Peninsula and north-west China. The weasel group is more numerous in the islands, one of the most peculiar types being the Malay badger (*Mydaus meliceps*), the only species of its genus, which inhabits the mountains of Java, Sumatra, and



TANA TREE-SHREW.

Borneo. This animal is to be avoided by the hunter on account of its habit of ejecting a noisome fluid well nigh as evil-smelling as the secretion of the American skunks. It is much smaller and also browner than the European badger, with a stripe of white down the back.

Buffaloes.

Several hoofed mammals are indigenous to the Malay Islands. Whether the karabau or wild buffalo of Java is an indigenous race of the Indian buffalo or imported is uncertain, but a small Bornean buffalo has been described as a distinct race under the name *Bos bubalis hosei*. Another buffalo, the tamarao (*B. mindorensis*), inhabiting the island of Mindoro in the Philippines, is covered with coarse, thick, blackish brown hair, and stands only about 3½ feet at

the shoulder. In many respects it forms a transition from the Indian species to the small and more aberrant pigmy buffalo, or anoa (*B. depressicornis*), of Celebes. The latter stands about 39 inches high, and is slightly lower at the withers than at the hind-quarters. The small triangular horns are set much more upright and are much less curved than in the Indian buffalo: their length is seldom more than a foot even in the bulls. In colour the anoa is either reddish yellow or black in



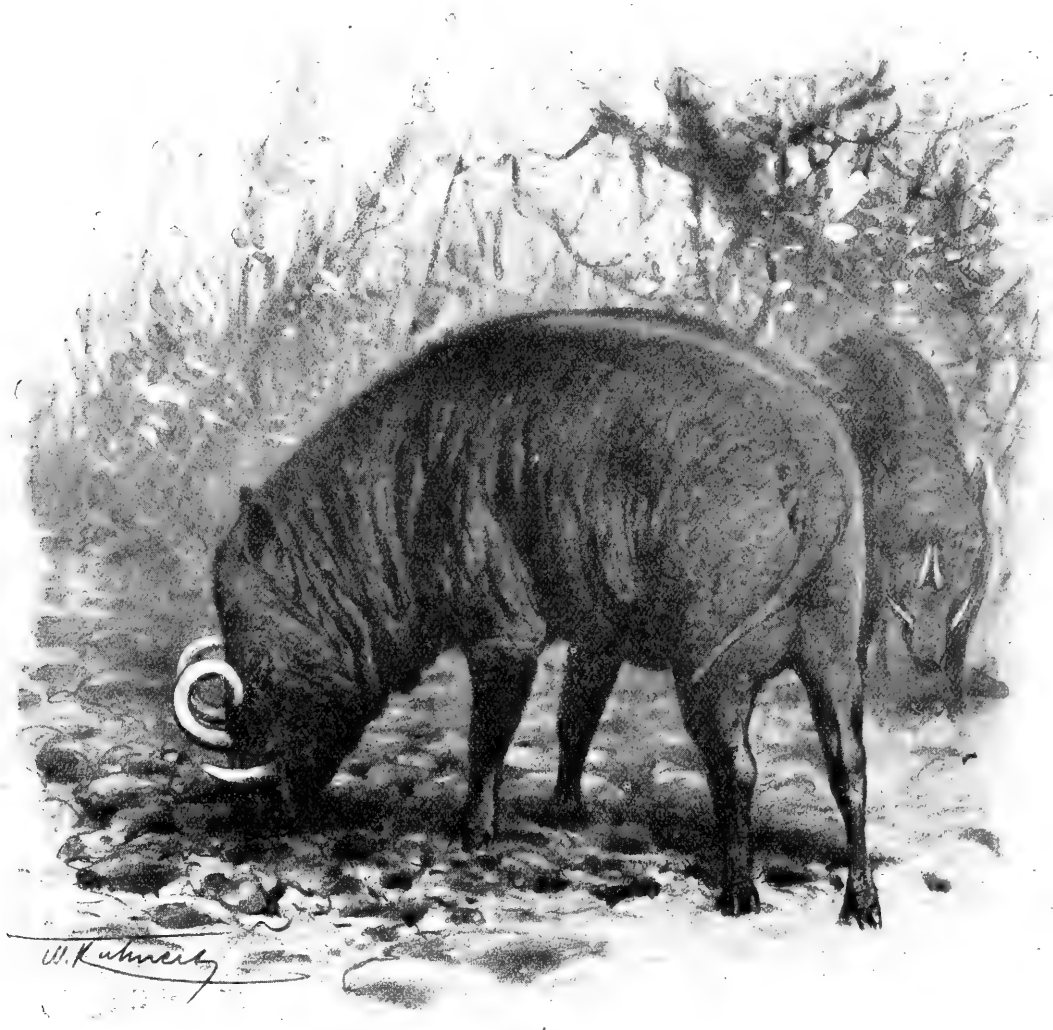
THE ANOA.

youth, when it has a thick coat of woolly hair, but dark blackish brown in old age, the under-parts being always paler; there are sometimes two white spots on each cheek, and white markings on the legs, and the whole animal much resembles a young Indian buffalo. Although it apparently presents signs of affinities to the antelopes, it is essentially, alike in colour, structure, and habits, a buffalo, although less specialised than the typical members of that group.

Deer.

The deer of the Malay Islands include the rusa or Javan sambar (*Cervus hippelaphus*) of Java, with local races in the Moluccas and Timor, the Luzon race of the sambar (*C. unicolor philippinus*), the Basilan race

of the same (*C. unicolor nigricans*) from the small island of Basilan in the Philippines, the much larger Malay sambar (*C. unicolor equinus*) in Borneo, as well as the very distinct Bavian deer (*C. kuhli*) from a small group of islands lying between Java and Borneo, and the equally distinct but much handsomer Philippine



BABIRUSA.

spotted deer (*C. alfredi*). There are probably other species still to be named from the Philippines.

Wild Swine.

That puzzling group, the wild swine, has numerous representatives in the islands under consideration. Among them, the collared pig (*Sus vittatus*), which inhabits Sumatra, Java, and Borneo, is distinguished by a white stripe on the sides of the face and neck. The warty pig (*S. verrucosus*), with three warts on each cheek, is a native of Java and Borneo, and is nearly related to

the wild pig of Celebes (*S. celebensis*). Very different is the long-snouted bearded pig (*S. barbatus*) of Borneo, easily recognisable by its whiskers and elongated head, and represented by races, of which one has been named *S. oi*, in the islands near the Malay Peninsula. Most remarkable of all is, however, the babirusa (*Babirusa alfurus*) of Celebes, represented by an allied species in Boru. This strange pig, which has a highly arched back and a peculiarly rough, thick, and almost bark-like skin, stands about 42 inches in height at the middle of the back. The ears are small, the tail is short, and the skin, which is ashy grey in colour and hangs in loose folds, is almost bare, although sparsely haired along the middle of the back. The babirusa differs, however, from other swine most notably in regard to the peculiar formation of the tusks of the boar, which are devoid of enamel, and attain an excessive length. Their abnormally large growth is due to the circumstance that those of the upper jaw are not worn against the lower pair, after the manner obtaining in most wild swine. The upper tusks of the males, which occasionally measure between 12 and 14 inches in length, pierce the skin of the muzzle, and after rising vertically for a short distance, curve backwards and downwards and finally forwards, with their tips often touching the forehead. The lower pair, which do not grow so long, are less stout than the upper ones, but are curved in a more or less similar fashion. Both pairs are relatively small in the females.

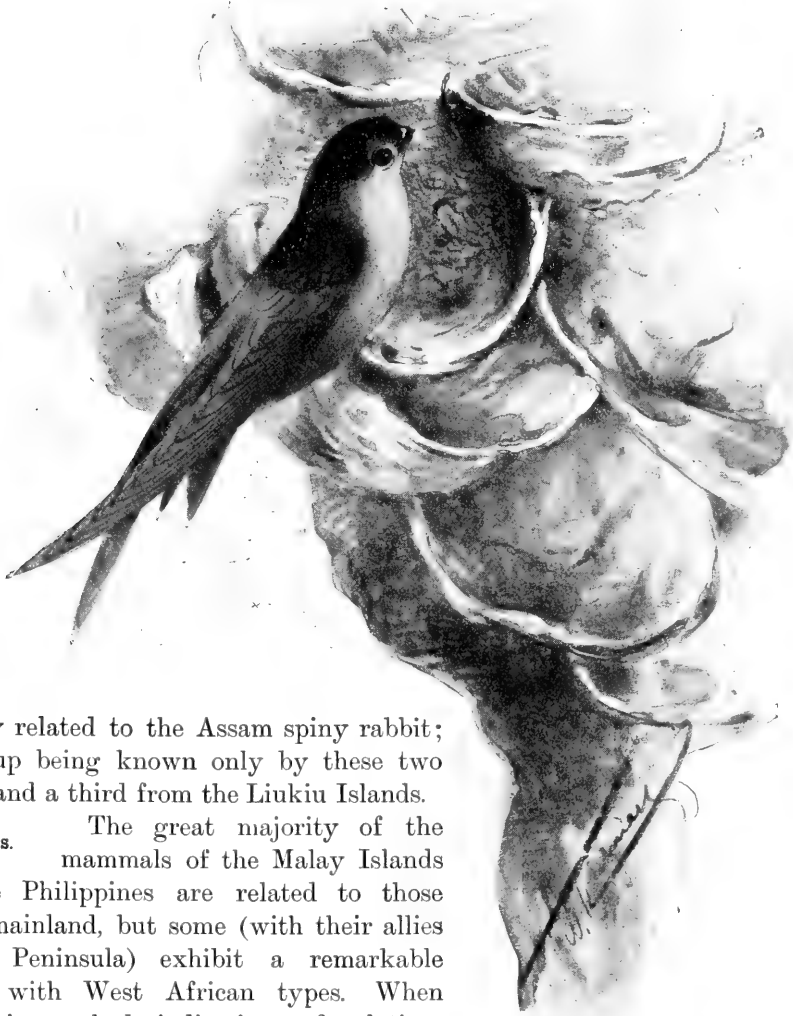
Squirrels.

Generally speaking, the rodents are very similar to those of the Malay Peninsula and neighbouring parts of the mainland, but there are certain more or less peculiar types. Among the squirrel family the sharp-nosed *Sciurus tupaioides* is notable on account of its extraordinary resemblance to the tree-shrews, having the fur similar both in texture and colour, as well as the same pointed nose, and even the pale stripe across the shoulders. A peculiar genus, characterised by its grooved incisors and large tufted ears, is typified by the groove-toothed squirrel (*Rhithrosciurus macrotis*), a native of Borneo. It has a long bushy tail, and the flanks are ornamented with black and white bands; in habits it is terrestrial. Borneo is also the home of certain species of pigmy squirrels, another member of the same group inhabiting the Philippines, while yet another inhabits West Africa. These squirrels are distinguished not only by their diminutive size, but also by certain peculiarities in their skull and teeth. One of the prettiest members of the group is Whitehead's squirrel (*Nannosciurus whiteheadi*) of north Borneo.

Rats.

The Philippines are remarkable on account of being the habitat of a number of peculiar generic types of rats, the majority of which are confined to the mountains of Luzon, and two of which greatly exceed all the other members of the family in size. One of these large forms is Cuming's rat (*Phlaomys cumingi*), a long and rough-haired species found in the lowlands. Of the Luzon rats, *Crateromys schatenbergi* is another large long-haired form, but the remainder are of smaller size. These have been named *Chrotomys whiteheadi*, *Carpomys melanurus*, *C. phaeurus*, *Batomys granti*, and *Rhynchomys soricoides*; the last remarkable for its long shrew-like nose. Another Luzon rat, *Xeromys silaceus*, has been assigned to a genus typically Australian.

Porcupines and Rabbit. The porcupines are represented in Borneo by Günther's porcupine (*Trichys guentheri*), a relative of the brush-tailed group, but with shorter spines and parallel-sided tail-bristles. The Sumatran rabbit (*Nesolagus nitscheri*)



is nearly related to the Assam spiny rabbit; the group being known only by these two species, and a third from the Liukiu Islands.

Cuscus. The great majority of the mammals of the Malay Islands and the Philippines are related to those of the mainland, but some (with their allies of the Peninsula) exhibit a remarkable affinity with West African types. When Celebes is reached, indications of relationship to the Australian fauna are exhibited by the presence of the black cuscus (*Phalanger ursinus*), a member of an otherwise exclusively Australasian group.

MALAY SWIFT AND ITS EDIBLE NESTS.

Perching and Picarian Birds. Among birds peculiar to the islands under consideration, attention may first be directed to the white-necked starling (*Streptocitta albicollis*) of Celebes, a bird about the size of a thrush, with shining bluish black plumage, relieved by a white ring round the neck, and with long narrow feathers

curving forwards on the forehead and cheeks. The swifts which build edible nests are represented by *Collocalia nidifica*, a species unknown on the mainland; while among the broadbills the black Sumatran species (*Eurylæmus sumatranus*) is confined to the Archipelago. Closely allied to these is the beautiful *Calyptomena viridis*, a bird the size of a nightingale, with a short, broad beak almost covered by the curly feathers of the forehead. The powdered woodpecker (*Alophonerpes pulverulentus*) is common to India, the Malay Peninsula, and the Malay Islands

except Celebes; but the latter island and the Philippines are the sole habitat of the four species of the nearly allied genus *Microstictus*. Of these the Celebesian *M. fulvus* is slaty grey above, and light brown below, sprinkled with small spots on the head, neck, and throat, the males being red on the crown, face, and cheeks. In size and colour these birds approximate to the black woodpeckers.



SUMATRAN BROADBILL.

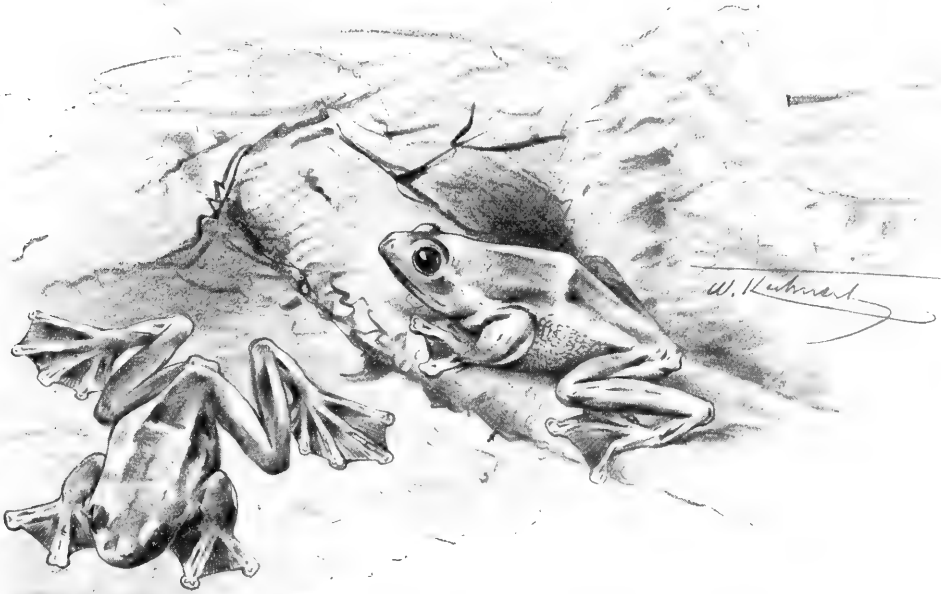
Notable Pigeons.

among the pigeon tribe is the flightless Nicobar species (*Calœnas nicobarica*), which ranges from the Nicobars to the Solomon Islands, and is the only representative of its kind. Feeding, like most of the group, on seeds, this bird, which is a

little larger than an ordinary pigeon, is distinguished by its short body, the presence of a collar of narrow ribbon-like feathers, the blue plumage with green and yellow metallic reflections, the black head, and the white tail. Several types of ground-doves (some of which were formerly assigned to the American genus *Geotrygon*) are peculiar to Celebes and the Philippines, and belong to the Austro-Malay genus *Phlogœnas*.

Reptiles and Amphibians. The majority of the reptiles of the Philippines and Malay Islands are so nearly related to those of the Malay mainland, that they require but little notice here. In Borneo and Java lives, however, Schlegel's gharial

(*Tomistoma schlegeli*), the sole living representative of its kind. Schlegel's gharial was first discovered in Borneo, to which island it was long supposed to be peculiar, but in 1890 it was recorded from Sumatra, and later from the Malay Peninsula. From the Indian gharial the Malay species differs by its proportionately shorter snout, but still more markedly by the circumstance that in the skeleton of this

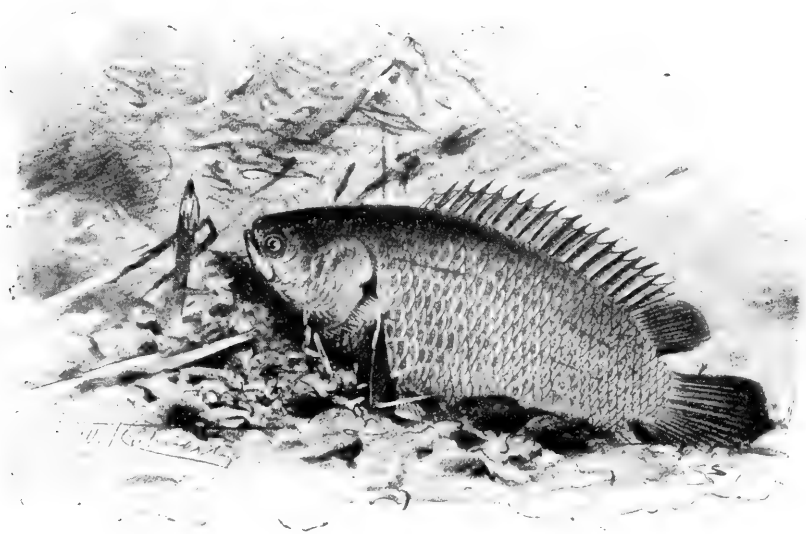


REINWARDT'S FLYING FROG.

region the nasal bones extend so far forward as to join the premaxillary bones which form the tip of the muzzle, instead of being separated from them by a considerable interval. The teeth, too, are less numerous, and some of them are considerably larger than the others instead of the whole of them forming a nearly even and regular series. Java is the home of the common Malay flying-lizard (*Draco volans*). A few amphibians, though common to the islands and the mainland, are worth mention, such, for instance, as the tiger-frog (*Rana tigrina*), whose range extends westwards to India and Ceylon. This, the largest of the Indian

frogs, lives principally in water, and leaps along its surface in the same way as on firm ground. The flying-frogs, ranging from India to China, Japan, and Madagascar, and characterised by their long webbed toes which act as a kind of parachute, are represented in the Archipelago by the Javan *Rhacophorus reinwardti*, and another species in Borneo. The first account of the habits of the flying frog of Borneo (*Rhacophorus pardalis*) was received with incredulity, and the statement as to its flying powers thought to be exaggerated. Recent observations, however, tend to show that in the main this account is correct, and that the frogs of this genus

really take flying leaps by the aid of the interdigital membranes. The Javan species, which is about 4 inches long, and of a deep shining green above and yellow beneath, and is arboreal in its habits, even breeding amid the foliage. It is, moreover, remarkable for its power of changing the colour of its skin. A specimen captured in the daytime and examined in strong sunlight will, for instance, be found of a brilliant greenish blue; towards evening it will, however, change to green, and finally to nearly black, the transformation taking place more rapidly in males than in females. Night is the time when these frogs are really active, and it is then that they awaken from their diurnal torpor and commence to search for grasshoppers and other orthopterous insects. Like other tree-frogs, they hold on to leaves and boughs by means of adhesive discs to their toes. In regard to the leaps from which they take their name, flying-frogs will leap to a height of about a



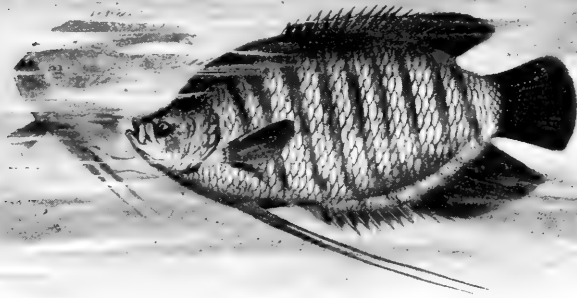
CLIMBING PERCH.

foot in an arc of a circle and alight two or three yards distant in a characteristic attitude, with their bodies inflated to the greatest possible degree and their toe-membranes fully extended. During these flying leaps, which are for the purpose of escaping foes, the webs perform the part of a parachute. Each leap is of extreme rapidity, lasting only a fraction of a second. Among the curious worm-like amphibians or cœcilians, the widely-spread *Ichthyophis glutinosus*, whose range includes Ceylon, many parts of India, and Burma, occurs in Sumatra Borneo, and Java. This creature, which is about 15 inches long and half an inch thick, lives in damp places, particularly in soft mud, where it lays large eggs, forming a heap like a bunch of grapes, in a hole near the water, made for the purpose. The mother winds her body round the eggs, and thus protects them and the young, which do not hatch out till they have lost their outer gills. The young, which have fish-like heads and flat

tails with a fin above and below, lead an aquatic life during the early stages of their existence.

Fishes.

Like the reptiles, the fishes of the islands under consideration are to a great extent similar to those of the mainland. The labyrinth-gilled perches, taking their name from the complicated structure of their gill-chambers, which are modified to enable their owners to live for a considerable time out of water, are represented by three generic types in the islands, one of which is known only by a single species, the celebrated climbing-perch *Anabas scandens*, whose range extends from India to the Philippines. This fish works its way through herbage on the ground by means of its pectoral fins, and is somewhat doubtfully reported to climb trees in a similar manner. Nine inches is the usual length of this fish. In an allied genus the paradise-fish (*Polyacanthus signatus*) affords an example of what is known as discontinuous distribution, since it occurs in Ceylon

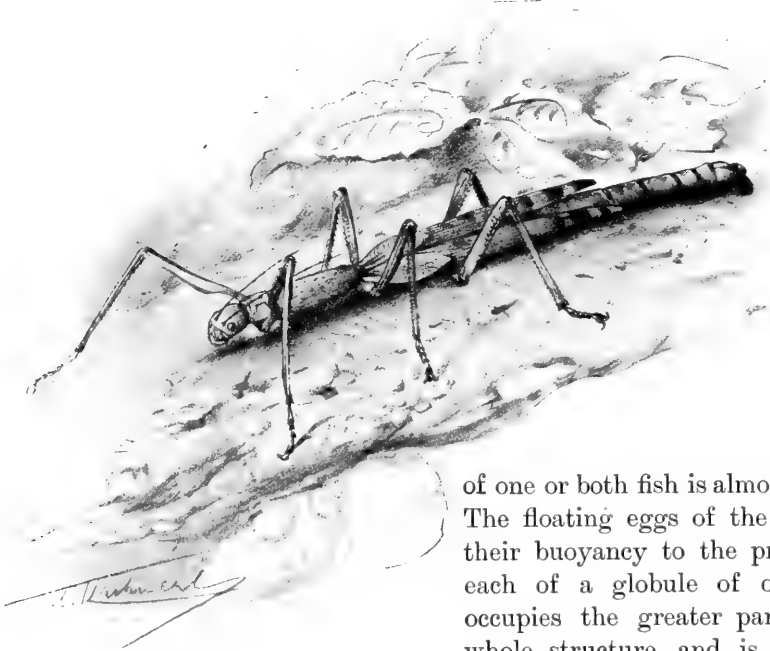


THE GURAMI.

and Java and nowhere else. A third type is represented in Java, Sumatra, and Borneo by the gurami (*Osphromenus olfax*), one of the best flavoured fresh-water fishes of the Malay province. It has been acclimatised in Mauritius, Cayenne, and Australia, and attains a length of over 5 feet. In shape the gurami is not unlike a large turbot, and it is one of the few fishes which build nests. This nest, which is ball-shaped and constructed of plants, is built by the united efforts of the two sexes.

Very characteristic of the Indo-Malay fresh waters are the big-headed and long-bodied fishes of the family Ophiocephalidæ. There are two genera, *Ophiocephalus* and *Channa*; three of the representatives of the former being African. A well-known species is the lula (*O. striatus*) of India and Ceylon, which constructs a nest and hatching-place for its eggs by beating back the rushes in the shallow portion of a tank with its tail, and then biting off the ends of weeds left growing in the water so as to clear a space of sufficient size to serve the purpose of a nursery. Ways leading to and from the nest are cleared, and in these both parents take up their position during the breeding season, although the male, which is the smaller,

alone fights when protection of the eggs is necessary. The eggs, which are of large size and of a translucent golden yellow or amber colour, are spread out when first laid like a sheet flush with the surface of the water between tufts of rushes which serve in some degree to protect them from the direct rays of the sun. During the breeding season lula cannot be tempted to take a bait of any kind, but are caught by the Singhalese in a trap known as a kuda. This is a small, wide-meshed bucket of deep and conical form, about 20 inches long, terminating blindly at the narrow end, and opening like a funnel at the opposite extremity, while beyond this it is just wide enough to receive the body of the fish, which when inside becomes jammed. The kuda is set in one of the ways to the nest, when the capture



STICK INSECT (CYPHOCRANIA GIGAS).

of one or both fish is almost certain. The floating eggs of the lula owe their buoyancy to the presence in each of a globule of oil, which occupies the greater part of the whole structure, and is immersed in the golden yellow yolk. As the eggs lie immediately below the surface and are exposed to the full

effects of the influence of the sun's rays, development proceeds with astonishing rapidity, hatching taking place within three days, if not within twenty-four hours, of the time when the eggs are deposited.

Insects.

Among the insects of the Malay Islands, the Atlas moth (*Attacus atlas*) is noteworthy on account of its size, the wing-spread being almost a foot. Many other insects of the area, although by no means all, are likewise very large, and also remarkable for their gorgeous colours. Others, again, as the stick-insects, or *Phasmidæ*, attract attention on account of their strange forms. These large insects, which are slow-moving vegetable-feeders, are almost entirely confined to the tropics; one of the largest Malay Island forms, *Cyphocrania gigas*, presenting, like others of its kind, a striking resemblance to a dry twig. The leaf-insects (*Phyllium*), another genus of the same family, are

similarly protected by their shape and colouring. One of the best known is the dried leaf-insect (*P. siccifolium*), the external appearance of which is sufficiently indicated by its name.

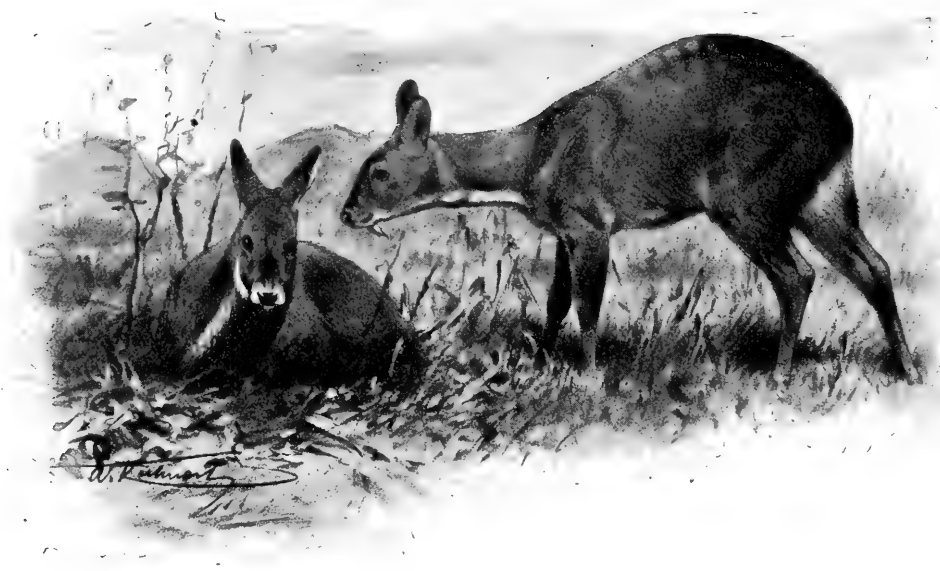


DRIED LEAF-INSECT.

Whip-Scorpions. In the Malay Archipelago, as in other parts of the tropics, are several kinds of whip-scorpions, so-called on account of their long thread-like many-jointed tails. The common thread-scorpion (*Thelyphonus caudatus*) of the islands of the Archipelago is a well-known representative of this family, which is spread over both the Old and New Worlds.



THREAD-SCORPION.



MUSK-DEER

CHAPTER VIII

THE FAUNA OF THE CHINESE PROVINCE

THE area of which the animals form the subject of this chapter consists, roughly speaking, of a triangle, the angles of which are formed by the Pamir plateau in the west, by the island of Formosa in the south, and by that of Saghalin in the north. The features of the landscape of the area differ greatly in its different divisions. The greater part of China proper, for instance, is occupied by forest-tracts characteristic of a dry climate; tropical forests of considerable extent are on the other hand found in Formosa and the adjacent coast of the continent, while an extensive forest, whose primeval condition is only retained in the sacred groves, exists in southern Japan. In this forest some of the trees and many of the tropical shrubs of the Malay area have their northern limit. In addition to deciduous forests recalling those of eastern Korea, there are large pine-forests in those parts of Japan which have a cold winter. The largest of these forests occur in the northern islands of the group as well as in Saghalin, though in the latter island the forested tracts frequently alternate with meadows, so as to form park-like landscapes recalling those of north-western China and the Amur countries.

The grassy steppes of northern China and the Amur countries are bordered by the great Gobi desert, extending from the Pamirs to Chingan at an average elevation of from 3000 to 5000 feet. This tract is broken into by mountain ranges, and dotted with lakes, small and large, saline and fresh-water, the beds of which dry up at certain seasons of the year as do those of many of the rivers. Few of the plains are destitute of vegetation, but, except in certain cases, there is no forest. Tulips are the most striking plants, and when they are in blossom the Dzungarian

desert, forming the north-western branch of the Gobi, which at other times is a barren waste, is carpeted with flowers. The Gobi is separated by the Kuen Lun Mountains from the plateau of Tibet, an area of very scanty vegetation and almost entirely devoid of trees, where the sandy soil produces only a few grasses and other plants together with low bushes. The Tibetan plateau, in its turn, is bounded by the mountains of south-eastern Tibet at the point of exit of the four large rivers, the Irawadi, Salwin, Mekon, and Yang-tsi. The mountains are cleft in all directions by valleys which develop a richer vegetation than that of the plateau itself. In the north-west Tibet is bordered by the tableland of the Pamirs, or *Roof of the World*, where the Himalaya unites with the other great ranges of central Asia, namely, the Karakorum, the Kuen Lun, the Tian-Shan, and the Hindu Kush, to form an almost rectangular mountain group attaining an average height of 12,000 feet, and therefore to a great extent above the limits of tree-growth, while many of its higher peaks tower considerably over 20,000 feet. An extensive portion of this tract consists of desert valleys and steppes; but in some parts dense bushes clothe the banks of the rivers, and vegetation abounds on the slopes of the highlands.

The fauna of the area under consideration includes many animals common to the adjacent tracts, or species and races nearly related to the same. Some of its animals are, however, related to American types, and a large number are peculiar to the province, and it is these which claim principal attention.

Monkeys.

Among the mammals of the Chinese area are a few monkeys. The highlands of eastern Tibet and the mountains of Sze-chuan, especially those parts which are covered with snow during the greater part of the year, are inhabited by the orange snub-nosed monkey (*Rhinopithecus roxellanae*), a brilliantly coloured species, taking its name from the peculiar shape of its nose. Another member of the same genus (*R. bieti*) is a native of the Mekon Valley, a third (*R. avunculus*) inhabits lower Tonkin, and a fourth (*R. brelichi*) central China. In the same tract as the first dwells the Sze-chuan macaque (*Macacus arctoides*), a large brown, stump-tailed species, inhabiting the coldest and most inaccessible forests of Sze-chuan. To the same group belongs the macaque of Japan (*M. fuscatus*), in which, however, the short tail is more thickly haired and terminates in a tuft.

Carnivora.

Among the beasts-of-prey are the long-haired Manchurian tiger (*Felis tigris longipilis*), the heavily-spotted and thick-built Manchurian leopard (*F. pardus villosa*), and the snow-leopard or ounce (*F. uncia*). The last of these, whose range extends at least as far east as the Altai, is found throughout the mountains of central Asia. Its ground-colour is whitish grey, marked with black spots, which form irregular rosettes on the back, sides, and tail, and are much larger than those of the true leopard. The ocelot-like Fontanier's cat (*F. tristis*), the smaller but allied *F. scripta*, and a race of the golden cat (*F. temmincki wardi*) are likewise distinctive of this tract. The most remarkable member of the dog tribe inhabiting this limit is the raccoon-dog (*Canis procyonoides*) of the Amur district and Japan, which takes its name from its superficial resemblance to a raccoon, and is characterised by its pointed muzzle, short, rounded ears, shaggy coat, and mingled black and yellow coloration.

A small banded civet from Tonkin has been made the type of a peculiar genus, under the name of *Chrotogale owstoni*. It resembles the banded *Hemigale hardwickei* of the Malay countries in colouring, but is distinguished by the spatulate crowns of its milk-incisor teeth—a difference which is regarded as of generic value.

Even more noteworthy is the short-tailed panda (*Ailuropus melanoleucus*) of Sze-chuan and Kansu, long regarded as an aberrant bear, but the skeleton of which indicates relationship with the long-tailed Himalayan panda. This strange animal, which has a rudimentary tail and thickly haired soles, is white in colour, with a black ring round each eye and thick ears, shoulders, and limbs, and inhabits bamboo-jungle. The true bears are represented by the blue bear of Tibet (*Ursus pruinosus*) and a larger species, both allied to the brown bear, as well as by



RACCOON-DOG.

local races of the Himalayan black bear and the Malay bear in Tibet and Sze-chuan. A bear from the Tian Shan (*Ursus leuconyx*) appears to be the Asiatic representative of the American grisly. There is also in the Altai and Siberia a wild dog (*Canis primævus*).

Yak.

Among a large number of hollow-horned ruminants inhabiting central Asia, the foremost place is occupied by the yak (*Bos grunniens*), whose habitat includes Tibet and part of the Chinese province of Kan-su. The yak, which appears to be most nearly allied to the bison, is distinguished from all other oxen by its peculiar coat and tail. On the head and upper part of the rump the hair is comparatively short, but long hair covers the under-parts of the body and extends over the shoulders and thighs, falling low on the hocks. On the chest is a tuft of long hair, and the tail, which does not generally reach below the hocks, is very bushy. The general colour is dark blackish brown, with white round the muzzle, and in old age tending to grizzled grey on the crown of the head and throat. The wild yak is a large animal, old bulls probably reaching nearly 6 feet



DOMESTICATED YAK.

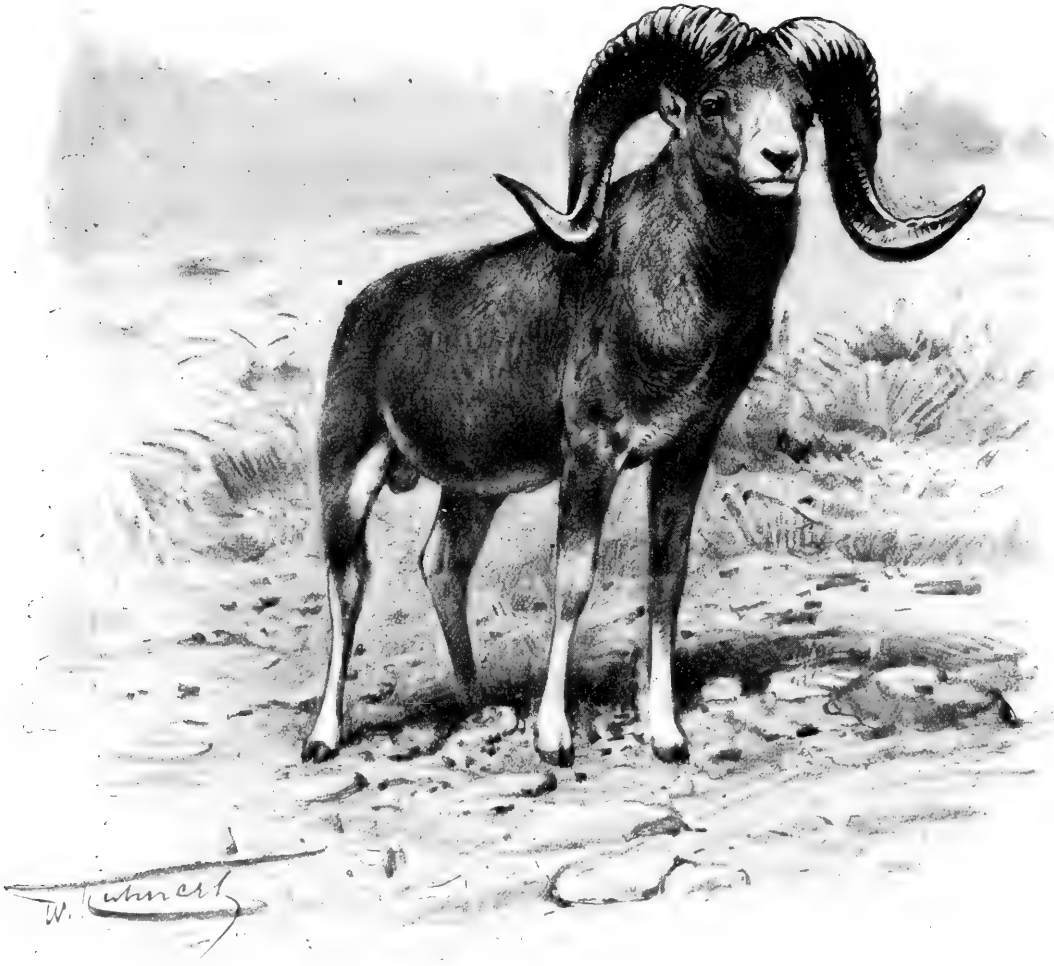
in height, while the horns often measure from 25 to 30 inches, and may occasionally be longer. It is distributed northwards from Tibet into the Kuen Lun and westward into Ladak, where it is found near the Pangong Lake and in the Changchenmo Valley. It is said to be numerous in the valley of the upper Indus, east of Ladak, and to be less shy there than elsewhere. A great number are found in



SHORT-TAILED PANDA.

north and south Tibet, where they frequent the neighbourhood of streams, attracted by the luxuriant growth of grass, although the yak is able to live on the scantiest pasture, upon which it is forced to exist in the higher valleys. The country throughout the greater part of its range is sterile and dreary enough, but it chooses the wildest and most inaccessible regions, and in summer is found at heights of from 13,000 to 19,000 feet, being a decided lover of cold and extremely sensitive to warmth. The yak is a great wanderer, travelling in summer regularly

to grassy plains where it is quite unknown in winter; but these journeys are made only by the cows and calves, the old bulls, which live alone or in small companies of threes and fours, being supposed to remain in the same district throughout the year. In summer the cows form herds of from ten to a hundred head, or more in districts where pasture is good, grazing at night-time and in the early morning.



KULJA ARGALI.

Yak retire during the day to some steep barren slope, where they remain for hours on the same spot. Old bulls prefer resting-places where they can obtain a good view of the surrounding country, and often wander far above the limit of vegetable growth to the summit of some steep mountain. Very little is enough to warn the yak—which has a sharp sense of smell, but appears not to see well—of the approach of the sportsman, and, when anxious and expecting danger, the cows and old bulls place themselves at the head and on the flanks of the herd with the calves in the middle; but when the sportsman draws near the whole herd takes to flight, rushing

swiftly away with their heads lowered and their tails in the air, although very often a wounded bull will turn and attack its assailant, when it is an opponent by no means to be despised. In many districts of Tibet yak are used as beasts of burden, and are also valued for their milk or flesh. In some districts these domesticated yak are much smaller than their wild relatives, and their colour departs from the original type by being more or less mingled with white. It is from the domesticated breed that the white tails are obtained which in India are used as fly-whisks under the name of "chowries."

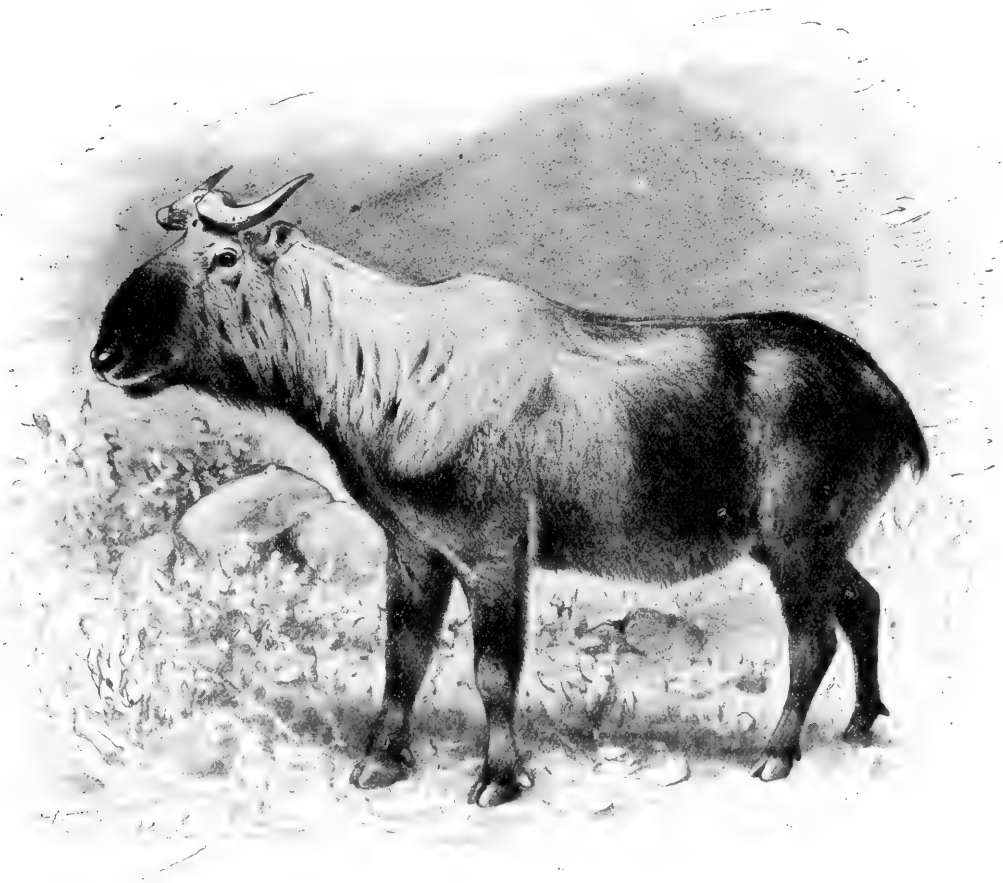
Wild Sheep. The districts inhabited by the yak, as well as the adjacent tracts, are also the home of several species and races of wild sheep. Foremost among these is the true argali (*Ovis ammon*) of the Altai, which is probably the largest member of its tribe. In Ladak and Tibet this species is represented by a distinct race, the Tibetan argali (*O. ammon hodgsoni*), characterised by the large white ruff on the chest of the rams in winter. In Mongolia is a third race (*O. ammon mongolica*), while the Sair Mountains and adjacent districts are the home of another race (*O. a. sairensis*), and a fifth race (*O. a. littledalei*) inhabits the Kulja district. Marco Polo's sheep (*O. a. poli*) of the Pamir is another well-marked race, characterised by its still longer and more curving horns. Of quite a different type is the bharal (*Pseudovis nahura*), which ranges across Tibet from the Himalaya to the Kuen Lun, the Altyn Tagh, and Kan-su. In habits and structure this species is between a sheep and a goat, but in external appearance it is somewhat more of a sheep.

ibex. The goats are represented by the magnificent Siberian ibex (*Capra sibirica*), inhabiting the mountain-ranges of central Asia from the Altai to the Himalaya, and including several local races.

Goral, Serows and Takin. The gorals are represented in Sze-chuan by the ashy *Urotragus cinereus*, and by a second species, *U. caudatus*, in north China, characterised by its long tail. Another species (*U. swinhoei*) inhabits Formosa. Japan possesses a small serow (*Capricornis crispus*), of which there are two local races; and a race of the Sumatran species, as well as the large white-maned serow (*C. argyrochaetes*), are peculiar to Sze-chuan and Kan-su. Allied to the serows are the larger ruminants known as takin (*Budorcas*), inhabiting the Mishmi Hills, north of the Assam Valley, Bhutan, and western and central China. They are heavily built ruminants, of the size of a Kerry cow, with curiously twisted horns, and long, shaggy hair. The Mishmi takin (*B. taxicolor*) is mainly brown in colour, but the Sze-chuan *B. tibetanus* is mostly yellowish or grey, with a black face, whereas the Shen-si *B. bedfordi* is entirely golden yellow. The last species, which inhabits the Tsin-lin Shan of southern Shen-si, the eastern continuation of the Kuen-Lun, has a special interest on account of the approximation of its type of colouring to that of the golden snub-nosed monkey (*Rhinopithecus roxellanae*) of Sze-chuan. The Tsin-lin takin forms the culmination of a series of colour-changes which have resulted in the transformation of a comparatively short-haired chocolate-brown animal, with a tawny saddle patch and black limbs, under-parts, and head, into one in which the coat is of great length and of a uniformly golden yellow. The dark phase is represented by the Mishmi takin and its Bhutan relative; the intermediate stage by the Sze-chuan species, in which the greater part of the fur of the body is

yellow (replaced by grey in some individuals), while the face, ears, and limbs are black or blackish; and the wholly yellow phase by the Tsin-lin animal, the coat of which may be likened to that of a yellow Polar bear, if such a creature existed.

These colour-changes are paralleled by the snub-nosed monkeys (p. 225), which, like takin, are peculiar to this part of Eastern Asia, although differing somewhat in regard to the limits of their range. The Mekon species (*Rhinopithecus bieti*), from the mountains bordering the valley of the upper Mekon, in Tonkin, is, for



SZE-CHUAN TAKIN.

instance, a slate-coloured monkey, with the cheeks, under-parts, and a patch on the thighs, white. On the other hand, in *R. brelichi*, from the mountains of Kwei-Chow, in central China, a golden yellow tint appears on the forehead, inner sides of the arms, and backs of the legs, while there is a tawny patch between the shoulders, and the under-parts have become grey. Finally, in *R. roxellana*, of Sze-chuan, the prevailing tint is bright golden yellow mingled with darker yellow. This species lives at a height of about 1000 feet, but the other two probably dwell at lower levels; it is further characterised by the great length and silkiness of the hair of the back, thereby showing another resemblance to the golden takin.

That these two series of colour are dependent, in some degree at any rate, on environment and altitude, seems almost certain, but the reason of the development of the yellow remains a mystery. Animals inhabiting hot moist regions are known to display a tendency to melanism, while in certain other localities there is a similar tendency to erythrism; but this development of a golden tint in two groups from central and eastern China seems unparalleled. The length of the coat in the golden takin and golden monkey may be explained by the coldness of the high ranges on which these animals dwell; a similar feature characterising the Sze-chuan bamboo rat (*Rhizomys vestitus*) as compared with its lowland relatives, but this has nothing to do with colour.

Takin are now known to inhabit the Mishmi Hills, Bhutan, Sze-chuan, Kan-su, and the Tsin-lin Shan. In the later Tertiary period the group appears to be represented by the extinct *Bucapra* of the Siwalik Hills of northern India, at present known only by a single imperfect skull, unfortunately lacking the horn-cores.

Takin inhabit thick bamboo-jungle, and are adepts in getting over rough and precipitous ground.

Gazelles and Chiru. Of the antelopes there are several representatives in the Chinese area. Of the goitred gazelle, a local race (*Gazella subgutturosa sairensis*) inhabits the Altai, while the Saikik gazelle (*G. yarcandensis*) is a native of Kashgaria. The Mongolian gazelle (*G. gutturosa*) is a native of the region from which it takes its name, and, like the goitred species, is characterised by the presence of a dilatable sac in the throat of the males. Of a very different type is the goa or Tibetan gazelle (*G. picticaudata*), which is found at heights of from 13,000 to 18,000 feet in Ladak and Tibet. Nearly allied is Przewalski's gazelle (*G. przewalskii*) of Mongolia. Ladak and Tibet are likewise the habitat of the chiru or Tibetan antelope (*Pantholops hodgsoni*), the sole representative of its kind, characterised by its inflated nose the long slender black horns of the bucks, and the presence of only two pairs of premolar teeth in each jaw.

Deer. Deer are numerously represented in this extensive tract. Of the wapiti (*Cervus canadensis*), which is typically a North American species, there are several local races, such as the Tian Shan race (*C. canadensis songaricus*), the Siberian race (*C. canadensis asiaticus*), and the Manchurian race (*C. canadensis xanthopygus*) ranging into Amurland. The Bokhara wapiti (*C. c. bactrianus*) is another race of the same species, while a fifth is the Tibetan wapiti *C. c. wardi*. Very distinct from the wapiti type is the Yarkand deer (*C. yarcandensis*) of the forests of the Tarim Valley. Other types are the hangul (*C. cashmirianus*) of the valley of Kashmir and adjacent districts, and the pale grey Sze-chuan *C. macneilli*, with a darker race, *C. m. kansuensis*, in Kan-su. The mansarowar (*C. wallichii*), of which the shou (*C. w. affinis*), of upper Sikkim and the district north of Bhutan, is a local race, is a large stag of somewhat allied type. More distinct is the white-muzzled Thorold's deer (*C. albirostris*) of eastern Tibet.

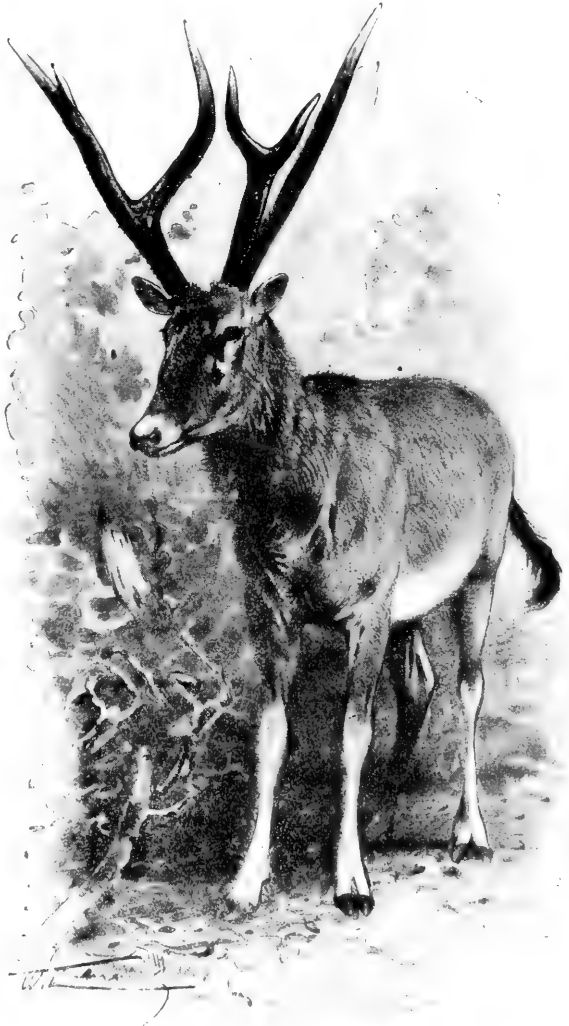
All the foregoing belong to the typical group of the genus, but the sikas, which are peculiar to this tract, form a group confined to the area under consideration. The largest of these is the Pekin sika (*C. hortulorum*) of Manchuria, represented by a smaller race (*C. hortulorum kopschi*) in the Yang-tsi Valley. This

deer is chestnut, brilliantly spotted with white in summer, but uniformly dark brown in winter. The Manchurian sika (*C. sica manchuricus*) is a smaller animal, of which the still smaller typical race (*C. sica*) is a native of Japan. Another species (*C. taëvanus*) is found in Formosa. A race of the sambar (*C. unicolor dejeani*) is found in Sze-chuan.

The most remarkable of the deer of this area is, however, the large Père David's milou deer (*Elaphurus davidianus*), a species formerly kept in confinement in the Imperial Park at Pekin, but now represented only by a herd in the Duke of Bedford's park at Woburn. The true habitat of this species is not certainly known, although it is suggested that it came from Kashgaria. The carriage is more like that of a mule than a red deer (which the species equals in size), the general colour of the long hair is reddish dun, and the antlers of the stags are of an altogether peculiar type, having a very long back tine. The Siberian roe (*Capreolus pygargus*) ranges from the Altai to Manchuria, the latter country being the home of a second species (*C. bedfordi*).

Muntjacs are represented in the area by the Sze-chuan *Cervulus lachrymans*, together with *C. sclateri*, *C. bridgemani*, and *C. reevesi*, of central and western China. Their allies, the tufted deer,

are absolutely characteristic of the tract. Of the latter, Michie's tufted deer (*Elaphodus mitchianus*), which is common along the reedy rivers of eastern China, is blackish grey in colour, the lower half of each hair being white and the upper half black. Another species, the Sze-chuan tufted deer (*E. cephalophus*), inhabits Sze-chuan and Kan-su, and a third kind is found in the mountains of central China. The swamps of the Yang-tsi form the haunts of the little Chinese water-deer (*Hydropotes*, or *Hydrelaphus, inermis*), an



PÈRE DAVID'S DEER

animal of the approximate size of the Indian muntjac, with a long body, short legs, and light reddish brown hair marked with indistinct rows of black spots in the young. Like the musk-deer, the bucks have no antlers, but long curved tusks in the upper jaw. The does are peculiar in producing from three to six young at a time; those of other deer generally having only one or two.



MICHIE'S TUFTED DEER.

Musk-Deer.

The Himalayan musk-deer (*Moschus moschiferus*), which ranges all over the Himalaya, whence it extends northward into Tibet and so on through central Asia to Siberia, represents a very distinct group of deer. In this species the bucks attain a shoulder-height of about 20 inches, and are slightly higher behind. The coat is formed of coarse, brittle, pithy hair, the fore-legs are long with narrow, pointed hoofs, of which the outer pair are abnormally long, the tail is short, and the bucks carry long scimitar-like upper tusks. The colour is brown, more or less sprinkled with grey, and indistinctly spotted. Some animals are paler, others yellowish, and in Kashmir there are some with rows of grey spots on their backs. The musk-deer lives alone, seldom more than two being seen together; and inhabits steep mountain-slopes, where it leads the life of a hare, sheltering, like the latter, in a lair made by itself, and feeding in the morning and evening. Very active in its movements, it is enabled to traverse slippery and precipitous rock-surfaces by means of its large lateral hoofs. It leaps rather

than runs, and, where not much hunted, is by no means shy. According to some accounts, it feeds on grass and lichens; according to others, on leaves and flowers. A second species (*M. sifanicus*) has been described from Kan-su, and a third (*M. parvipes*) from Korea.

Bactrian Camel. The Bactrian camel (*Camelus bactrianus*), distinguished by the possession of two humps, and its long and shaggy winter coat, is certainly a native of the Gobi Desert and adjacent districts. The colour of the hair is generally uniform, but varies in different individuals from dark brown to



BACTRIAN CAMEL.

pale yellowish grey, similar differences in colour being noticeable in the camels found in a wild state in some parts of central Asia. Many of these latter are undoubtedly descended from animals which have escaped from captivity, but others are probably truly wild. To the east of Yarkand, however, between Khotan and Lob Nor in the Gobi Desert, occur herds of wild camels said to be characterised by their comparatively small size, and the very distinct callosities on the knees as well as by certain peculiarities of the skull. They are exceedingly wary, and so swift that the native horsemen are unable to overtake them in the deep sand, so that none have as yet been caught and tamed. So long as there is no snow on the ground, these camels wander about on the beds of the Yarkand and Tarim Rivers, where they find pools of stagnant water, but after the first snowfall they repair to



MANCHURIAN CRANE.

the desert, where they apparently exist without water. Possibly they prefer snow to the stagnant water, on account of its not being salt, but even snow soon acquires a saline taste from contact with the salt-impregnated soil of the central Asiatic desert.

Wild Horses or Tarpan. The domesticated horse (*Equus caballus*) is distinguished from the African wild ass and zebra, not only by the possession of bare leathery callosities, or "chestnuts," on all four legs, but also by the long hair clothing the tail to the root, as well as by the pendent mane and the forelock. It has also a smaller head, shorter ears, considerably longer legs, and broader hoofs, this being notably the case with the front pair, which are very much broader than the hind ones. Domesticated horses, it is almost needless to say, show great variation in colour, dun-coloured individuals occasionally displaying two or three dark cross-stripes on the shoulders, and dark bars on the legs. Formerly wild horses inhabited the open plains of Europe and northern and central Asia; and till within half a century ago the tarpan was still abundant on the Kirghiz steppes; while less than a couple of centuries since its range extended from the Dnieper to the Altai. Although these tarpan were undoubtedly more or less extensively crossed with horses escaped from captivity, it is probable that they were the direct descendants of the wild horses which roamed over the plains of Europe contemporaneously with the mammoth and woolly rhinoceros.

The Gobi Desert is, however, the home of the truly wild tarpan (*E. caballus przewalskii*) named in honour of the great Russian traveller, Przewalski, by whom it was discovered. The muzzle is frequently white, the tail is not haired completely up to the root, there is a small forelock, and the mane is upright, but may fall over in the adult. The general colour is dun, without a dark stripe down the back (at least in the summer coat) or any trace of a shoulder-stripe or of bars on the legs; but the fetlocks and the front of the legs are dark brown; and the mane and tail-tuft black. These wild tarpan were probably the ancestors of the ordinary horses of western Asia and Europe, where they are still represented by the dun ponies of Norway. They are so fleet that it is impossible to come up with the adults, and the young alone can be taken and then only with relays of horses.

Kiang. The kiang (*E. kiang*) of Tibet and Mongolia, to which the chiggetai of the Kirghiz steppes is allied, is a large red-coloured animal, with the muzzle, under-parts, and inner surfaces of the limbs white, and a broad chocolate stripe down the back. "Chestnuts" are present only on the fore-limbs, the lower half of the tail is alone clothed with long hair, and the ears are longer than in the wild horse, although not nearly so large as in the African wild ass. In this respect, as well as in the absence of a shoulder-stripe and of bars on the legs, and in the great breadth of the hoofs, especially the front pair, the kiang approximates to the horses and differs from the asses and zebras of Africa. Kiang go about frequently in small parties, but sometimes alone; and are most active in getting over rough ground. In Chang-chemo they are found at an elevation of from 13,000 to 18,000 feet.

Smaller Mammals. Tibet is the home of a peculiar genus of water-shrews (*Nectogale*), and the Yarkand district is inhabited by the remarkable long-eared jerboa (*Euchoretes naso*), the sole representative of its genus. Voles of the genus

Microtus are also common in this tract, which is also the habitat of one of the zokors or the mole-voles (*Myotalpa fontanieri*). Zokors, which inhabit central and north-eastern Asia, are members of the mouse tribe which lead a burrowing life, and although nearly allied to lemmings, are almost identical in appearance with the mole-rat. Both have the same curious flattening of the head and rounding of the muzzle which give to the mole-rat its remarkable physiognomy, and in both the eyes are rudimentary and the external ears wanting. Indeed, the likeness between a zokor and a mole-rat, if we except the more powerful front claws of the former, is much greater than that between a swift and a swallow. Till recently zokors were generally known to zoologists by the name of *Siphneus*, but it is now the fashion to replace that term by *Myotalpa*. Very noticeable is the occurrence in north-eastern Asia of a representative of the jumping-mice (*Zapus*) of North America. American affinities are also displayed by the occurrence in Japan of the mole-like *Urotrichus talpoides*, a near relative of the North American *Neurotrichus gibbsi*. Quite recently another peculiar generic type, *Scapanulus oweni*, allied to the American *Scapanus*, has been discovered in Kan-su. The Japanese *Dymecodon* and the Sze-chuan *Scaptonyx* are also mole-like types peculiar to this region.

The scattered distribution of the members of the Insectivora and the remote corners of the earth in which many of them are found afford conclusive evidence of the antiquity of this primitive and waning group of mammals. Additional evidence of this is afforded by the discovery in Sze-chuan of a member of the group which has been named *Neotetracus sinensis*, the name being intended to suggest affinity with the small and imperfectly known *Tetracus nanus* of the French Miocene. The smallest member of its group, *Neotetracus* is nearly related to the Malay *Gymnura* and *Hylomys*, and the Philippine *Podogymnura*; but while approximating to the last in external characters, and especially the well-developed tail, it agrees with the hedgehogs in the character and number of teeth and likewise in the presence of vacuities in the palate, so that it forms a kind of connecting link between the *Gymnurinae* and *Erinaceinae*. In size the Sze-chuan species may be compared roughly to a half-grown rat; but the general colour of its coat is reddish yellow.

The Japanese dancing mouse is widely spread in China and Japan, and differs from ordinary mice in several structural details. That its original home was China seems to be demonstrated by the fact that it was formerly known in Japan by the name of *Nankin Nesumi*, meaning the mouse from Nankin. Perhaps the most important difference between the dancing and ordinary mice is to be found in the structure of the internal ear, in which there are several peculiarities, notably the larger size of the so-called crystalline otoliths. In size the dancing mouse is smaller and of lighter build than the house mouse, besides being of a more delicate constitution. The dancing mouse, moreover, has a shorter tail with much fewer rings of scales, and in this respect it resembles Wagner's mouse (*Mus wagneri*) of China, a species allied to *M. musculus*, but with a shorter tail. Wagner's mouse is found not only in China but also in southern Russia, while in central Asia it takes the place as a semi-domesticated species of the ordinary house-mouse of Europe. The conclusion arrived at is that the dancing mouse is a variety of *Mus wagneri*, originally domesticated in China, whence it was carried first to Japan, and then to Europe.



GIANT SALAMANDER.

Birds.

Among the few birds of the Chinese province of which space allows mention, one of the most characteristic is the mandarin-duck (*Ægalerita*), a near ally of the summer-duck (*Æ. sponsa*) of North America, the Asiatic species being the most brilliantly coloured member of the family on that continent. Both kinds nest in the hollows of trees. Among the geese may be mentioned the swan-geese (*Cygnopsis cygnoides*), the largest of the living geese, from which many of the domesticated geese of the east are derived. The stateliest of the cranes is the Manchurian species (*Grus viridirostris*). Pheasants abound in this tract, among these being the gorgeous golden pheasant (*Chrysolophus pictus*) and its near relative, the still more handsome Amherst's pheasant (*C. amherstiae*). The Turkoman eagle-owl (*Bubo turcomanus*) is a larger and paler representative of the great eagle-owl of Europe. Lastly, the Asiatic blue-winged magpie (*Cyanopica cyanea*) is remarkable on account of the great distance by which its habitat is separated from that of its only relative, the Spanish species.

Alligators and**Salamanders.**

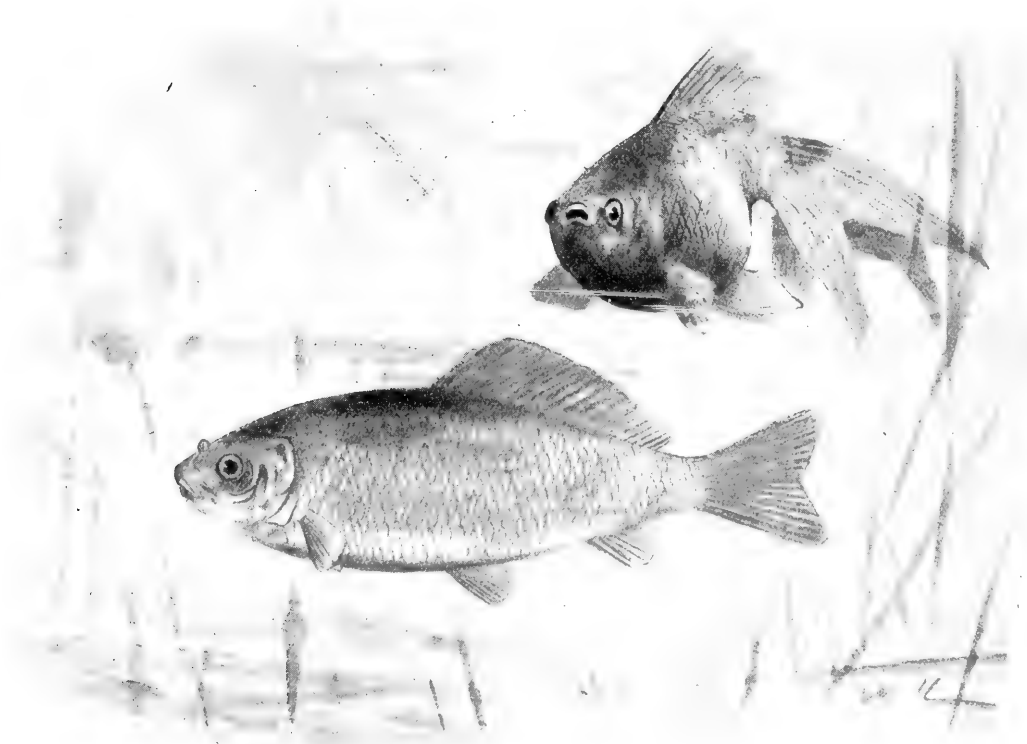
The resemblance to American types exhibited by some of the mammals of north-eastern Asia is paralleled by the existence in China of an alligator (*Alligator sinensis*) which inhabits the Yang-tsi River, and is closely allied to the Mississippi species. Despite the fact that two living examples were exhibited in London in 1890, the Chinese alligator, first brought in modern times to European notice in 1870, appears to be rare in collections. It seems, however, that the existence of the species was known to Marco Polo and Father Martini, who published a Chinese atlas in the year 1656 at Amsterdam, although in neither case was a specimen seen. According to Martini, the river at Chingkiang was infested by these reptiles, which were a terror to the populace. A specimen seen in the early part of 1869 was carried about the city of Shanghai as a dragon by a party of Chinese; but it was not till 1879 that the species was scientifically described on the evidence of one specimen from the Yang-tsi at Wuhu, and a second at Chingkiang, and was definitely recognised as a true alligator akin to the Mississippi species, the other well-known representative of the genus. Alligators occur, however, in the Tertiary strata of Europe, and these explain the distribution of the existing forms, one of which may have travelled to America by way of Bering Strait. So far as is known, the distribution of the Chinese species seems to be restricted to a small area in the Yang-tsi Valley. The giant salamander (*Megalobatrachus maximus*), the largest living member of its tribe, is an inhabitant of the fresh waters of China and Japan, and attains a length of about 40 inches. Curiously enough, this huge amphibian is frequently found in clear mountain-streams not above a foot or so in width, where it lies curled up among the stones. Its flesh is a favourite article of diet with the Chinese. Special mention must be made of the occurrence in Siam of a salamander of the genus *Amblystoma*, of which the other seventeen members are American.

Domesticated**Fishes.**

Although it is impossible to allude to the fishes of the rivers of the area under consideration, brief reference may be made to the golden carp, as being a domesticated breed of the Chinese crucian carp notable for its variation in colour. Some of these fish are golden yellow with a metallic gloss, others bright red, and others again black; while there are yet other colour-variations, one of which is piebald, and a second silvery white. Besides these

variations in colour, there are breeds distinguished by their strange form, such as the so-called telescope-fish and the veil-tailed fish, which have been imported into Europe from Japan. The former is characterised by its large goggle-eyes and long tail-fin and the latter by its short body and complex tail.

Another curious type is presented by the paradise-fish, a domesticated form of



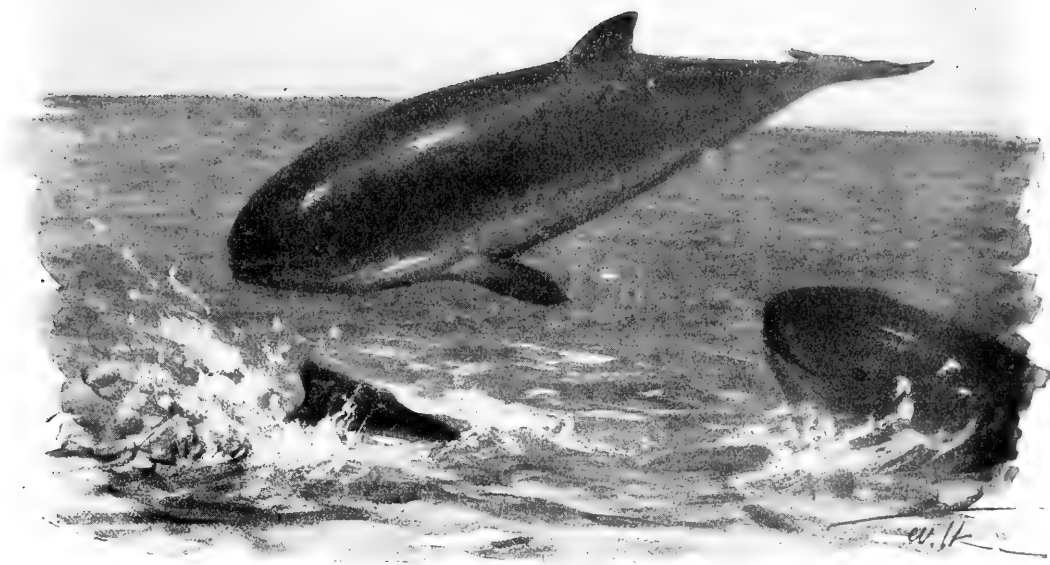
TELESCOPE FISH AND VEIL-TAILED FISH.

a species of carp of the genus *Polyacanthus*. This fish, which is from 3 to 4 inches long, is banded with blue and red, and assumes a specially brilliant hue during the breeding-season. The males, which are much lighter-coloured than their partners, are distinguished by the excessive development of their fins. The paradise-fish is indigenous to China, but has been introduced into Europe as an ornamental denizen of aquariums. It is one of several fishes which build nests for their young.

THE NORTHERN SEAS







PORPOISES

CHAPTER I

THE MAMMALS OF THE NORTH ATLANTIC

Seals. The most abundant mammal of the shores of the North Atlantic is the common seal (*Phoca vitulina*), the typical representative of a group of Carnivora specially modified for an aquatic existence. This adaptation is remarkably displayed by the limbs, which take the form of paddles, or flippers. Seals are also distinguished from the land Carnivora by the number and structure of their teeth, none of them having three pairs of front, or incisor, teeth in each jaw, and none showing the so-called carnassial teeth characteristic of the more typical flesh-eating mammals. Other features of the group are the absence of collar-bones in the skeleton, the shortness of the tail, and the prominence of the eyes.

With the exception of a few which ascend rivers some distance above their estuaries, and others inhabiting inland seas or lakes, seals are confined to the sea, where they subsist almost exclusively on animal food, especially fishes, molluscs, and crabs and lobsters of which they devour immense quantities. Although all are fairly intelligent and easily tamed, the various kinds differ considerably in their mode of life. The walruses and eared seals, for instance, in which the males exceed the females in size, are polygamous animals, resorting during the breeding-season to certain particular shores, where they remain for a considerable part of the year. The typical, or earless, seals, on the other hand, for

the most part associate in pairs, and only leave the water for short periods. The distribution of the three groups of these animals is somewhat noteworthy. Out of the whole assemblage only a single kind appears to be restricted to the tropics, although a few others range into that zone, either from the north or the south, the great majority being thus denizens of the cooler seas.

Seals inhabit not only the Caspian and Aral Seas and Lake Baikal, but also certain other inland lakes. Apparently neither the seals of the Caspian and Aral, which inhabit salt water, nor those of Lake Baikal, which live in fresh water, are specifically distinct from the ringed seal (*Phoca hispida* or *foetida*), of which they respectively constitute local races. In addition to those of Lake Baikal, seals, probably of the same race, occur in the comparatively small sheet of fresh water lying to the north-east of it which is known as Lake Onon. The seals which occur in a few of the Russian and Finnish lakes are stated to come so close to the typical form of the ringed seal that they are not even racially separable, this being in accordance with physical conditions as the lakes in question are even now not completely landlocked, and at no very distant epoch probably had more free communication with the ocean. Seals of this type occur in Lake Saima, in the south-eastern corner of Finland, and likewise in Lake Ladoga, both these sheets of water, although now fresh, having been doubtless at one time in close connection with the Gulf of Finland. Farther east seals are stated to inhabit Lake Onega, in the government of Olonetz, but the evidence is inconclusive. There seems, however, no reason why it should not be true, seeing that Onega is connected by water with Ladoga, as well as with the White Sea.

The typical, or earless seals, forming the family *Phocidæ*, are specially characterised by the absence of external ears, the shortness of the neck, and the circumstance that the hind-flippers are directed backwards so as to lie parallel with the tail, and are of use only in swimming. Moreover, even the front flippers are, as a rule, not used in progression on land, these animals shuffling along by means of a kind of serpentine movement with the front flippers held close to the sides of the body and the hind-pair stretched out behind. The Greenland and the crested seal are, however, in the habit of making use of the front flippers when on land, and drag themselves along by their aid. During pairing-time many members of the group associate in large herds, and nearly all the typical seals are sociable animals, which display remarkable affection for their young.

Common Seal. The typical representative of the group, the aforesaid common seal, grows to a length of between 5 and 6 feet, and in colour is mostly yellowish grey spotted with dark brown or blackish above, and yellowish white blotched with greyish brown beneath. At birth the fur is woolly in texture and yellowish white in colour, but within a few hours the young seal exchanges its first coat for a hairy dress like that of its parents.

This species inhabits not only the North Atlantic, but likewise the North Pacific, in both areas ranging into the Arctic Ocean, so that its distribution is probably circumpolar. Along the European coasts the range of this seal extends into the Mediterranean, and on the American side as far south as New Jersey; while on the Asiatic coast of the Pacific it reaches Kamchatka, and on the American side, South California. Off the Spitzbergen and Greenland coasts the common



COMMON SEAL.

seal is still abundant, but in the North Sea it is less plentiful than formerly and from many places has quite disappeared. In the North Atlantic this species keeps exclusively to the shore, and is never found on ice-floes in the open sea. From the shore it ascends many of the larger rivers, having been found in North America far up the St. Lawrence. Preferring sheltered channels and shallow bays, it chooses such rocks and sand-banks as are isolated from the shore, where it may be met with at low tide all the year round, for it does not migrate.

Another British species is the grey seal (*Halichærus grypus*), attaining a length of from 8 to 9 feet, and silvery or yellowish grey in colour, generally with blackish or smoky brown irregular spots, which are sometimes so large as to cause the whole coat to be nearly black, though occasionally these are absent. The under-parts are lighter. This is essentially a northern species, most common in Britain in the Hebrides.

Although often seen along the Scandinavian coast as far as Finmarken and around Iceland, it is apparently unknown in Spitzbergen and the other European Arctic Islands. Its occurrence on the east coast of Greenland is doubtful, but on the west side of that country it is found as far north as Disco Island, Sable Island off the coast of Cape Breton forming its southerly limit.

Very distinct is the monk seal (*Monachus albiventer*), inhabiting the Mediterranean and Black Sea, as well as the eastern Atlantic, inclusive of the coasts of Madeira and the Canaries. Like the West Indian seal of the same genus, it is remarkable on account of being a native of the warmer seas. This seal is 8 feet or more in length, and in colour is dark brown and grey above, and whitish below. It is distinguished by having the first and fifth toes of the hind-feet longer than the rest, as well as by the presence of small or rudimentary nails to all the toes.

The West Indian monk-seal (*M. tropicalis*) was discovered in August 1494, when the sailors of Columbus killed eight of these "sea-wolves" as they called them on the rocky island of Alta Vela off the coast of Hayti. In colour this seal is glossy black when young, gradually turning to dark brown with a greyish tinge on the sides and lower-parts, and becoming more or less yellowish white with age. Its teeth are well developed and apparently adapted for crushing shells as well as catching fish, but little has been ascertained as to its feeding habits beyond that, like others of its family, it is able to fast for months when captured. Though known for centuries, and its haunts being neither inaccessible nor distant from the habitations of man, there is a strange want of information regarding this species, which has so decreased in numbers that it is becoming, or has become, extinct.

As breathing air and producing living young which are suckled by the female parent, whales and dolphins, collectively forming the Cetacean order, come within the category of mammals of the littoral zone. All are able to remain a long time under water, and breathe rapidly by raising the blow-hole slightly above the surface. In the group of toothed whales, which includes the sperm-whale and all the dolphins and porpoises, the blow-hole is single. One of the most familiar representatives of this section of the group is the common dolphin (*Delphinus delphis*), which grows to a length of about $7\frac{1}{2}$ feet, and is generally dark grey above, and white or whitish below, with grey or pale bands on

the flanks, though there is much variation in the colour and markings. The body is slender, the head small, the muzzle long and slender, and the front flipper nearly three times as long as broad. Dolphins feed chiefly on fish, although some kinds also eat crabs and shell-fish; all associate in "schools" of larger or smaller size.

**Bottle-Nosed
Dolphin.**

Nearly allied is the bottle-nosed dolphin (*Tursiops tursio*), which attains a length of 12 feet, and is sometimes grey in colour, in other cases black above and pale grey below, but more generally leaden grey above, and white below. The beak is shorter and thinner towards the end than that of the common dolphin, and the body stoutly built. These dolphins congregate in schools of considerable size, which are composed during pairing-time of about equal numbers of males and females of all ages. In spring they are said to migrate north, and in autumn south, but at Cape Hatteras, North Carolina, where they have been carefully observed, some are reported to frequent the same station throughout the year.

**Short-Beaked
Dolphins.**

The group of short-beaked dolphins, which are mostly natives of warm and temperate seas, are characterised by the shortness of the head and the ill-defined beak. Among them, the white-beaked species (*Lagenorhynchus albirostris*), which grows to a length of about 9 feet, inhabits the North Atlantic, where it ranges as far north as Greenland and Davis Strait. In colour it is generally purplish black on the back and whitish below, with the sides greyish, the muzzle whitish, and some whitish spots behind the blow-hole and near the base of the terminal fin.

A second kind, the white-sided dolphin (*L. acutus*), resembles the last more or less closely in shape, but the head appears more swollen, the back-fin broader and more erect, and the flippers shorter. It attains a length of 8 feet, and inhabits the North Atlantic, where it is most common around the Orkneys. The colour is grey above and white below, with a wide yellowish band along the side enclosing a large white spot, a narrow black stripe extending from the dorsal fin to the tail, a similar stripe running from the base of the pectoral fin on to the head, and the eyes being ringed with black. There are several other members of this group of dolphins.

Blackfish.

In the so-called blackfish the rounded head has no distinct beak, the back-fin is long, low, and stout, the flippers are long and narrow, and the few teeth confined to the front half of the jaws. The common and widely distributed blackfish (*Globiocephalus melas*), frequently called the pilot-whale, grows to a length of at least 20 feet, and is wholly black, save for a large white spear-shaped patch on the breast. This dolphin goes about in schools of a hundred or more, always piloted by a leader a little distance in advance, who is followed under all circumstances even when driven to destruction on a sandy beach. Appearing frequently, although irregularly, on the northern and western coasts of Europe, the blackfish seems to be scarce in the Mediterranean, but its range includes Greenland, the Cape of Good Hope, and New Zealand.

Risso's Dolphin.

Resembling the last in general external appearance, Risso's dolphin (*Grampus griseus*) is distinguished by the head being less rounded, the shorter flippers, the greater length of the pointed back-fin, and the very narrow tail. This species is about 13 feet long, and mainly grey in colour, although greyish white below, with the head and fore part of the body of a lighter or darker grey

and showing a yellowish tinge. The whole body is marked irregularly with light streaks, apparently due to wounds inflicted by the spines on the suckers of the squids upon which this species feeds. Though a stranger to the Arctic seas, this dolphin has a very wide distribution, having been found in the North Atlantic, the North Sea, and the Mediterranean, as well as in the South Atlantic and North Pacific.

Killer. Still more widely distributed appears to be the killer, or grampus (*Orca gladiator*), which is one of the largest of the group, growing to a length of fully 20 feet. It is easily recognised by its striking coloration, conical depressed head, and tall back-fin, as well as by its armature of powerful teeth, of which there are from ten to thirteen pairs in each jaw. In colour, killers



THE KILLER.

are generally black above and whitish below, the white extending in a tongue-like form on to the flanks, and also as a patch above each eye. Killers are generally seen in small shoals, sometimes consisting of males and females only, and sometimes of individuals of both sexes and all ages. They surpass all their relatives in ferocity, and their principal prey appears to be porpoises, but they often join in small parties to attack the largest whales, such as the Greenland species, which become so terrified by the onslaught as to make little or no attempt at escape or resistance.

Porpoise. Familiar to almost all is the European porpoise (*Phocaena communis*), a species dark slaty grey above and whitish below, with the tail-fin reddish or yellowish. Growing to a length of about 5 feet, this species is characterised by the sloping head, the equality in the length of the upper and lower jaws, and the large triangular back-fin placed a little in front of the middle of

the back. In many cases the fin has horny tubercles on the fore-edge, and it is always longer along the base than it is high. The species is widely distributed, not only in the North Atlantic but also in the North Pacific, where it ranges from Alaska to Mexico. It generally keeps near the coast, but will swim up large rivers for a considerable distance in quest of food. Porpoises feed exclusively on fish. The members of a shoal, alternately rising and diving as they swim, form one of the most interesting sights of the sea.

The beaked whales (*Ziphiidæ*) and sperm-whales (*Physeteridæ*) form family groups, distinguished, among other features, from the majority of dolphins by the absence of teeth in the upper jaw, at least in the existing members of the group. The beaked whales have, at most, a single pair of teeth in the lower jaw, which are placed about the middle of its length, and are more or less laterally compressed, so much so, indeed, in some cases as to assume a strap-like form. The commonest species is Sowerby's beaked whale (*Mesoplodon bidens*), attaining a length of about 15 feet, and characterised by the rather small teeth which in some cases project but little above the edges of the mouth when closed. The long beak is nearly straight, and above it the head gradually curves upwards so as to form a fairly high protuberance in front of the blow-hole, while behind there is a second step which gradually merges into the line of the back.

Beaked Whales. Cuvier's beaked whale (*Ziphius cavirostris*), although but seldom met with, appears to be of world-wide distribution. It is distinguished by the two conical teeth at the tip of the lower jaw, as well as by the circumstance that only the first three vertebræ of the neck are fused together. In the bottle-nosed whale all seven of these vertebræ are united.

Cuvier's Beaked Whale. The bottle-nosed whale (*Hyperoodon rostratus*), is a near ally, generally seen in schools, or "gams" as they are called, whereas the beaked whales are generally met with alone or in pairs. These whales have the back-fin sickle-shaped and situated a little behind the centre of the back; the head rises abruptly from the beak, protected by a cushion of fat in front of the crescent-shaped blow-hole. They differ from the cachalot and resemble the beaked whales in having only one or two pairs of teeth in the lower jaw, which are largest in the males. This sex attains a length of 30 feet, but the females do not exceed 24 feet. The bottle-nose ranges south to the English Channel, and as far north as the Arctic Circle, or even a few degrees beyond, and although more frequently stranded on the British coasts than any other whale, is more of a deep-water species than any of those mentioned above.

Bottle-Nosed Whale. With the fin-whales, or rorquals, we reach the first representatives of the second great group of cetaceans, the whalebone whales, or *Mystacoceti*. These are distinguished by the development of plates of whalebone from the whole surface of the upper jaw, by means of which they strain off the water taken into the mouth with their food, which may consist of fish of considerable size or of minute organisms floating on the surface of the sea. The members of this group take their name of fin-whales from the presence of a small back-fin, and their Norse designation of rorquals from the flutings on the collapsible pouch on the throat when in its contracted condition. On account of the presence of this pouch, in which the food is contained, the whalebone is very short, and of no

commercial value. Fin-whales are all of long slender build, and may be regarded as the racers of their tribe. In habits they are migratory, the northern forms visiting Norway, Iceland, and even Greenland in summer, and returning in winter to warmer seas. Of the four species inhabiting the seas of the Northern Hemisphere, the common fin-whale, or rorqual (*Balænoptera musculus*), rarely exceeds 70 feet in length, and has relatively long jaws and a long slender body. It is dark slaty grey above, and often white beneath and on the inner side of the flippers. The dark colour of the upper-parts generally extends to the left side of the lower jaw, and the white of the under-parts to the right side of the same, this difference in the coloration of the two sides corresponding to a want of symmetry in the skull common to many whales. The first few plates of whalebone are white, and the others dark-coloured with grey tips. This finner seldom visits the Mediterranean, but is otherwise well represented in European seas; it also extends along the coast of North America, and may occur in New Zealand waters, as the so-called southern rorqual does not appear specifically separable. It feeds largely on fish, devouring enormous quantities of herring, and though often found alone, is frequently noticed in shoals of from ten to twenty head. When about to dive, it turns almost on to one side, and at times stands almost vertically for a moment or so in the water. Its breathing is so rapid and so powerful as to cause a loud noise, by means of which this species is said to be distinguishable from its allies.

The whalers of Finmarken recognise three varieties, or phases, of this rorqual—namely, a darker, a lighter, and a yellowish. The dark phase is stated to be met with in company with shoals of herrings. These rorquals usually arrive off the Faröes in the middle of June, coming from the south-west and proceeding in a north-easterly direction; the immigration lasting till about the middle of July. Early in August they commence their return journey southwards, when they keep principally to the south side of the islands. By the end of the same month nearly all have left the Faröes. They arrive off Finmarken in two divisions, the first of which is composed of members of the dark phase. These dark whales arrive early in March and advance in an easterly direction, but do not, as a rule, go beyond the Varanger Fiord, whence they return in April along the coast; the migration being completed by the end of that month. The second division consists chiefly of the two lighter-coloured phases; and it seems probable that it is this light-coloured phase which is taken off Mayo feeding on shrimps, etc. The members of this second division reach the Faröes in the first half of June, and are then met with about fifteen miles off Sörö, where they stay till about the beginning of July, when they move eastwards as far as Baadsfiord, whence they disappear in a north-easterly direction.

The gigantic Sibbald's fin-whale (*B. sibbaldi*) generally has 16 pairs of ribs, or one more than the common species, from which it differs by the stouter body. It attains a length of 85 feet, and is the largest of existing animals. This species may always be recognised by the long flippers, as well as by the small size and position of the back-fin, which is situated close to the tail. In colour it is dark bluish grey, with a few white spots on the chest and the inner side and edges of the flippers. The whalebone is black. This finner is said to swim faster than any other whale, and when gliding along the surface of the sea occasionally shows

its whole vast length, although it seldom leaps into the air: when about to descend, the huge flukes are lifted high above the waves. Like the last, this species feeds on fish, especially pilchards and sprats, but also consumes minute crustaceans. In spring it journeys northwards, and resorts to the neighbourhood of the shores during the breeding-season, although it spends the winter in the open sea.

The lesser fin-whale (*B. rostrata*), which has a pointed muzzle, and seldom exceeds about 33 feet in length, is characterised by a glistening white band across the upper part of the flipper, which contrasts conspicuously with the greyish black of the rest of the outer side of this appendage and the upper-parts generally. The under-parts, inclusive of the lower side of the flukes, are white. The species is further distinguished by having only eleven pairs of ribs, and the almost white whalebone. Inhabiting the northern seas of both hemispheres, it is specially common off the coast of Norway, and is likewise by no means rare around the British Isles. It occurs in the Arctic Ocean, which it enters from the Pacific by way of Bering Strait. In the North Pacific it occasionally visits the estuaries of large rivers, as it does the fiords and bays of Norway in the other hemisphere. The fourth and last European member of the group is Rudolphi's fin-whale (*B. borealis*), which attains a length of about 50 feet, and has thirteen pairs of ribs. It may be distinguished from the last species by its smaller back-fin and the shorter flippers. In colour it is bluish black with long white spots above, and more or less white below, though the under sides of the flukes and flippers are black. The black whalebone is more curled and frayed at the ends than that of the other species, for, unlike it, this finner never eats fish, but feeds exclusively on small crustaceans.

A very different animal is the hump-backed whale (*Megaptera boöps*), another North Atlantic species, which attains a length of some 50 feet, and is black above, and more or less marbled with white below. The flippers are either white or spotted with white, and the species owes its name to the presence of a protuberance on the hinder half of the back, which apparently varies in height in different individuals. This hump carries a small back-fin, which, together with the fluted pouch on the throat, indicates its relationship to the fin-whales. From these it differs, however, by the comparatively large size of the warty head, the greater depth of the body, and the excessive length of the flippers, which measure from 10 to 12 feet in length, and have scalloped edges. The black whalebone is short and thick. Humpbacks occur north and south of the equator in both the Atlantic and the Pacific, and also in the Indian Ocean; but some naturalists regard the one inhabiting the Indian Ocean and the Persian Gulf as distinct from the European form.

The Atlantic black whale or right-whale (*Balæna biscayensis* or *glacialis*) is referred to in another chapter.



THE MANX SHEARWATER

CHAPTER II

THE BIRDS OF THE NORTH ATLANTIC

THE birds frequenting the coasts of the North Atlantic are so numerous that a mere list of the species would occupy several pages. Many have been referred to in earlier chapters, and only a few of importance remain to be mentioned.

Among the waders of the coast, one of the most noteworthy is
Avocet. the avocet (*Recurvirostra avocetta*), conspicuous on account of its pied plumage, stilt-like legs, and long, thin, up-turned beak. Wherever common, this bird nests in colonies, and the limits of its range include the British Isles (where it is now but an occasional visitor), Scandinavia, Mongolia, Hainan, Ceylon, South Africa, and Spain. The nest is a mere depression in the sand or mud, or a hollow in the grass near the shore, and the pear-shaped eggs are four in number, as is usual with the birds of this group. The young birds are fully feathered in a few weeks, although they are taken about and fed by their parents for a long time. Avocets feed at the water's edge, following the ebbing tide to the shallows, and returning with the flood. Their food consists mainly of fish-spawn, shell-fish, young shrimps, and larvæ, which are caught by searching the mud of the pools with a sideways motion of the beak, and sifting it between the two jaws. On the wing an avocet holds its long legs stretched out behind in a line with the beak, while the wings curve away from the body in a characteristic manner.

Ringed Plover. A far commoner shore-bird is the ringed plover (*Ægialitis hiaticula*), whose range extends from the far north to Cape Colony and from Greenland to Kamchatka. The nest is the usual depression on the beach, and the eggs are the normal four. In length this bird measures only 7 inches, or not half the size of the avocet. It is one of the most intelligent of birds, and is an adept at feigning death or lameness when its eggs are threatened. One of the first to warn other birds of approaching danger, it may frequently be seen

piloting a flock of dunlin across the waves to a place of safety. The colour is greyish brown above and white below, with a conspicuous black-bordered white forehead, a white eye-stripe, and a blackish gorget.



AVOCET.

Kentish Plover. Sandy shores covered with short grass mingled with other plants form the favourite resorts of the Kentish plover (*Æ. alexandrina*), a species which, except on migration, rarely frequents fresh water, although common on some of the large lakes of Hungary. Ranging from Iceland to Japan, it winters in the north of Africa, the Malay Archipelago, and Australia. It is never found very far north,

and is remarkably capricious in the choice of its halting-places and breeding-grounds. The nest is generally placed close to the water, although far enough away to be safe from the tide, and is most difficult of discovery owing to the size and coloration of the eggs, which are three or four in number. It has been stated that wherever the nest of the ringed plover contains four eggs, that of the Kentish plover has only three, but this may be merely a generalisation from insufficient instances. In size this bird is about half an inch shorter than the ringed plover, from which it may be distinguished at a glance by its black legs and incomplete gorget.

Turnstone.

The turnstones take their name from the fact that they obtain their food in great part by turning over shells and stones, and thus capturing the small worms and molluscs which live beneath. Wherever the shore has grassy patches adjoining sandy pools and banks of pebbles, the European species (*Streptilas interpres*) may be seen, either in families or solitary. Its breeding-area includes the north of Europe, Asia, and America, and in Europe extends as far south as the shores of the North Sea and Baltic. In August and September the turnstone starts on its migrations, which take it over almost all of the Southern Hemisphere, and in April and May it returns to its breeding-places.



OYSTER-CATCHER.

The nest is a mere depression in the beach, lined with a few hairs and sheltered by low scrub or a tussock of grass. In this the female lays her four greenish grey eggs, which are not unlike those of the snipe.

Oyster-catcher.

The oyster-catchers are easily recognisable by the long solid beak, slightly bent upwards, which is about double the length of the head and so much compressed at the sides that towards the end it resembles the blade of a knife with a rounded point. This peculiar type of beak is employed for prising open the shells of bivalves, as well as for thrusting into those of whelks and drawing out the soft bodies of the molluscs on which these birds chiefly subsist. Their diet includes worms and molluscs, as well as the shoots of maritime plants. Pebbly or rocky shores with patches of vegetation are the usual haunts of the European species (*Hæmatopus ostralegus*), whose breeding-area extends from the

North Cape to Spain, and eastwards into Siberia. Large numbers of these birds frequent the shores of the North Sea and Baltic, while many resort to the Black Sea and Caspian. In winter they journey as far south as Portuguese East Africa and Senegambia, but this migration is undertaken only by a section of the species, as in Iceland oyster-catchers migrate in winter only from the north to the south of the island, where the influence of the Gulf Stream renders the climate sufficiently warm for them to exist at that season. Unlike most shore-birds, oyster-catchers do not take to the water solely in cases of necessity, but will enter it occasionally at all times. They swim well, and escape from danger by diving. Their gait is a brisk walk, with many hops, but it may become a quick, although frequently interrupted, run; the flight is low and duck-like.

Oyster-catchers are generally found in small parties and are singularly watchful and courageous birds. They will attack crows, gulls, and birds-of-prey with such loud cries and impetuosity that they generally succeed in driving them away, and their nesting-grounds are consequently but seldom invaded. The nest, which is never far from water, consists of a shallow hole scratched by the bird in the shingle, and lined with pebbles and broken shells. Several of such nests are generally made, in one of which (not necessarily the last) are laid the stone-coloured eggs, indistinguishable at a short distance from the pebbles with which they are surrounded.

Sheldrake.

Among the duck tribe mention may be made of the sheldrake (*Tadorna cornuta*), which ranges from Britain to Japan as a breeding species, and migrates in winter to the Mediterranean, India, and South China. Although essentially a shore-bird, the shelduck generally makes its nest in a rabbit-burrow or some other hole some distance away from the beach. When a convenient hole cannot be found ready to hand, the bird will make one for itself, and in the Isle of Sylt shelducks are induced to lay in holes made by the natives with the object of collecting the eggs. By taking these judiciously, as many as thirty may be obtained from a single hole, although the normal number is about ten. Of the hosts of other kinds of ducks which visit the coasts of the North Atlantic in winter, to return to the Arctic breeding-grounds in spring, mention here is unnecessary.

Little Tern.

Nearly all the terns are sea-birds, but the little tern (*Sterna minuta*) often frequents inland waters, although its nest is generally situated near the shore. When looking for food, this tern seldom comes nearer the surface than 10 feet, and often flies three times as high, nevertheless it discovers quite small creatures from that height, and generally flutters some time above them before dashing down into the water, to rise again as rapidly with its prey. These lively birds, which scream as they chase one another in the air, are distinguished from other terns by their brisk movements and diminutive size. About 9½ inches long, they have a black crown, a white tail, a yellow beak, and orange legs. As breeding-birds, they range from 60° N. latitude down to the Mediterranean, the Black Sea, and the Caspian, and as migrants reach Cape Colony and Java. The eggs are usually laid on the sand or among the shingle, with no perceptible attempt at a nest; but on the east coast of Scotland there is frequently a hollow surrounded—not lined—with a ring of brightly coloured fragments of shells.

Arctic Tern.

The Arctic tern (*S. macrura*), well known on both sides of the North Atlantic, as well as in the North Pacific, breeds within the Arctic Circle and as far south as the Humber and the islands off the south of Ireland, anywhere in fact north of 50° in Europe and 42° in America. A migrant, it appears every year in Chile and Cape Colony and as far south as 66° N. latitude in the Southern Ocean. Its two or three eggs are laid close to the sea, sometimes on the bare rock, but generally in a hole among shingle (occasionally lined with a little grass), and bear so great a resemblance to pebbles that they are only recognisable by being alike. In flight this tern appears slower than many of the others, owing to the long sweeping curves it takes, but it nevertheless flies lightly and easily, and occasionally hovers. It may be recognised at a glance by the absence of a black tip to its red beak, as well as by its short red legs. The crown is black, the head grey, and the tail white and grey, while there is a narrow grey band on the inner webs of the primaries. In length the Arctic tern measures about 15 inches.

Common and**Roseate Terns.**

The common tern (*S. fluviatilis*), which has a red beak with a black tip, is also a shore-bird, breeding in colonies on shingly beaches. Much handsomer is the roseate tern (*S. dougalli*), which breeds in a few localities in the British Isles, and on some of the islands in the North Sea, as well as in many favourite spots within the temperate and tropical zones, its nests having been found in the Bermudas, the West Indies, Ceylon, the Andamans, New Caledonia, and northern Australia. In the Atlantic it ranges from 57° N. latitude to the Cape of Good Hope. The species is distinguished by the evanescent roseate tinge on the breast and under-parts, as well as by the inner webs of the primaries being white throughout, the very long outer feathers of the tail, the black beak and orange-red legs, and, lastly, by its particularly loud and grating scream.

Sandwich Tern.

Another species, the Sandwich tern (*S. cantiaca*), nests from the Orkneys to the Mediterranean and on the Black Sea and the Caspian, while on the American coast its breeding-grounds extend from the north of Florida to Honduras. As a migrant, this bird appears on the western side of Central America, but is unknown elsewhere in the Pacific; in the Atlantic its range includes Cape Colony; from the Mediterranean it makes its way down the Red Sea to the Indian Ocean as far south as Natal, and from the Black Sea and Caspian it journeys to the Persian Gulf and the north-west coast of India. It still breeds in the British Isles, though no longer near the Kentish town from which it takes its name, the main settlement being on the Farne Islands, though there are others on both the east and west coasts. This is the largest of the native British terns, and may be known by the yellow-tipped black beak, black legs and forehead, long white nape-feathers, and the deeply forked white tail.

Gull-Billed Tern.

The gull-billed tern (*S. anglica*) is so distinct from all its relatives that it is frequently assigned to a genus apart, under the name of *Gelochelidon*. Ranging over Europe, Africa, North and South America, and Asia, it is nowhere very common, and generally, as in the British Islands, known only as a visitor. It nests on the west coast of Denmark, in the Mediterranean, in Australia, and on the west shore of the Atlantic from New Jersey southwards, and it occurs all down that coast to Argentina, but is not found

on the Pacific side except in Central America, where, like the Sandwich tern, it crosses the isthmus from the Caribbean Sea. The head, beak, and legs are black and the tail is grey. On account of its cry of "ya-ha, ha, ha," it is known in many places as the laughing tern.

The largest European member of the group is the Caspian tern (*Hydroprogne caspia*), which is 20 inches long, with a stout red beak, occasionally horn-coloured at the tip, short black legs, and a short and not deeply forked white tail. Nesting in the Baltic and the inland seas of Asia, as well as on both coasts of North America down to Florida and California, in the Persian Gulf, and in Australia and New Zealand, it does not occur on the Asiatic side of the Pacific.

Gulls.

Among the *Laridæ* of the North Atlantic are the little gull (*Larus minutus*) and the black-headed gull (*L. ridibundus*), both of which breed in northern Europe and Siberia, and have a wide range of migration.

A third kind, the herring-gull (*L. argentatus*), rarely occurs in the Baltic, but is common on the shores of the North Sea, and, like the black-backed species, is a common British breeding bird. Attaining a length of 23 inches, it has the back and wing-coverts bluish grey, and the primaries black with white tips and spots and a grey wedge down their inner webs, which increases in width on the hinder feathers till the black is reduced to a band near the tip. The head is white spotted with grey and the beak yellow, while the legs are flesh-coloured. This gull inhabits both shores of the North Atlantic, as well as the eastern side of the North-Pacific, and is most common near the mouths of rivers. It lives chiefly on the shore, where it feeds on the eggs of other birds, molluscs, crustaceans, and dead fish. Living fish, however, also form a portion of its diet, and in capturing these the bird will often dash down with such force as to dive a couple of feet or more into the water. It is said to prey on the shoals of herring as they pass along the coast, and from this habit derives its popular name. The nest, which is always near the sea, may be either on flat sand, sand-dunes, or amid rocks, but on the American side is frequently in trees or bushes. Sometimes it is a small and loosely built structure, but it may be large and built of grass and seaweeds lined with stalks.

The other sea-gulls of the North Atlantic have their chief breeding-places in the far north, and may therefore be more appropriately noticed among the birds of the Arctic Ocean.

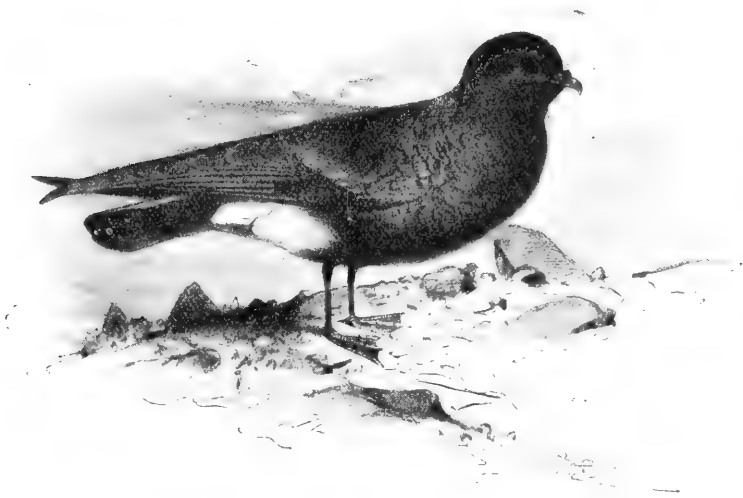
Petrels.

The petrels and their allies differ from the gulls (to which many of them present a superficial resemblance) by having the nostrils taking the form of a pair of tubes on the upper surface of the beak, which is generally hooked. These birds are more decidedly oceanic, or pelagic, than the gulls, and although met with in all latitudes, are more numerous in the tropics, and especially in the Southern Hemisphere, than in the north. During the breeding-season they resort to unfrequented coasts, where they nest either in cavities of rocks or in holes in the ground dug by themselves. At this season they feed much more on land than at other times, a large portion of their nutriment consisting of carrion.

The members of the group met with in the North Atlantic are few in number

and small in size. The most common is the storm-petrel (*Procellaria pelagica*) which measures only $5\frac{1}{2}$ inches in length, and is the smallest web-footed bird met with in the British Isles. Its colour is blackish, relieved by a white band across the rounded tail. To its habit of skimming the surface of the wave this bird owes its name of petrel, or peterel, the equivalent of little Peter.

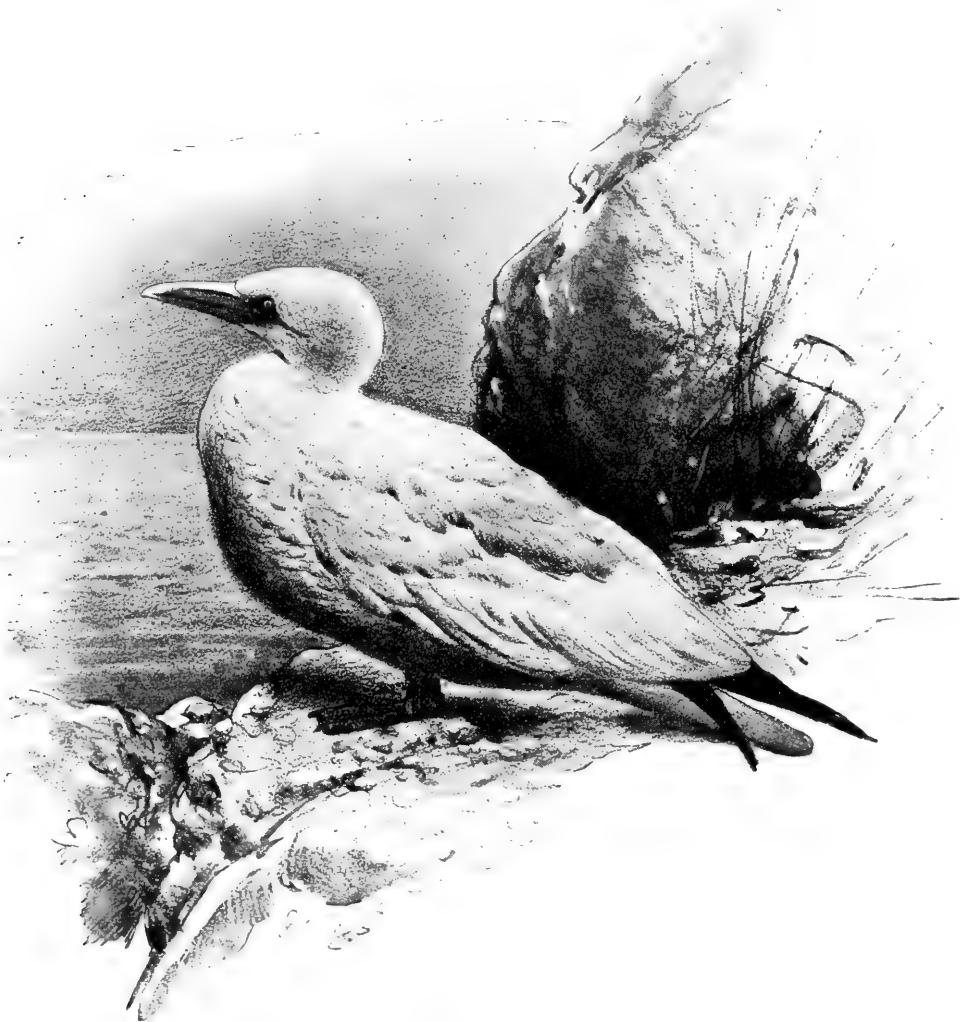
An allied species, the fork-tailed petrel (*Oceanodroma leucorhoa*), likewise breeds on the islands of the North Atlantic, especially those on the American side, and also occurs in the Pacific. Slightly larger than the storm-petrel, this bird is distinguished by the white band being restricted to the upper surface of the tail, which is deeply forked.



STORM PETREL.

Shearwaters If the petrels may be compared to swallows, their relatives the shearwaters may be likened to swifts, since when on the wing they assume the form of a crossbow. The flight of these birds is indeed remarkable, the members of a flock darting about almost with the swiftness of arrows in all directions, although generally following one another in single file. One of the best known forms is the white-breasted Manx shearwater (*Puffinus anglorum*), remarkable on account of the length of the winding burrows it excavates for its nest. About 14 inches long, this bird is blackish grey in colour, with greyish pencillings on the head and neck and a white breast. Its home is the North Atlantic from Iceland to the Canaries on the one side, and from Greenland to Brazil on the other. Its food consists of fishes and other creatures to be met with near the surface of the water. Although this bird captures its prey while swimming or diving, it never descends deep into the water, and never follows in the wake of a ship for the sake of the offal. It takes its name from the manner in which it ploughs through the waves as it alights.

Cormorants and Gannet. The cormorants having been alluded to in an earlier chapter, it will suffice to mention in this place that they are met with on almost all coasts save those of the South Pacific. To the same group belongs a very characteristic bird of the North Atlantic, the gannet (*Sula bassana*), a species of the approximate size of a goose, with a generally creamy white plumage relieved

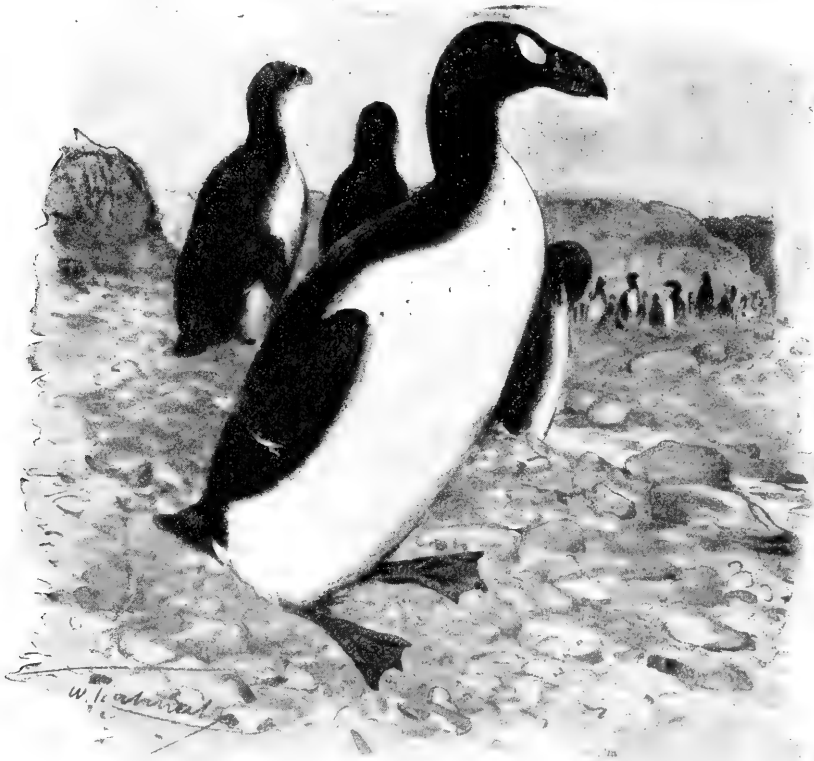


GANNET.

by black primaries. The bare face is bluish black, the beak yellowish white, and the leg greenish black. Gannets breed on a few islands round the British coasts as well as in the Gulf of St. Lawrence; the almost inaccessible localities where it nests in large colonies including North Barra, Ailsa Craig, and the Bass Rock. In October gannets migrate south, generally following the coast, the limit being seemingly Madeira and its latitude on the mainland. In the north the breeding-area extends to Iceland. On the American side, where they have five or six well-known breeding-places, gannets travel as far south as the Gulf of Mexico on

migration. On land these birds are awkward, their short legs being placed far back, and the under surface of the body almost touching the ground; the wings, which are long enough to be crossed over one another at the tail, are, however, very powerful, and endow their owners with great powers of flight. These birds rest and sleep on the water, their slumber being so sound that they may sometimes be approached so close by boats as to be captured before they awake.

Although auks are more birds of the ocean than of the shore, **Great Auk.** their breeding-places are on the coasts of the North Atlantic, and they accordingly come within the purview of the present chapter. The most in-



GREAT AUKS.

teresting member of the group is undoubtedly the great auk (*Alca*, or *Plautus, impennis*), distinguished not only by its size, but likewise by its total incapacity for flight, being the only bird in the Northern Hemisphere thus handicapped. In early times, especially in North America, it was termed penguin, a name afterwards transferred to the well-known Antarctic birds. The head, neck, and back of the great auk are black, and its under-parts white, but the glossy black head is marked by a peculiar white patch between the beak and the eye. Although its wings were not strong enough to support the body in the air, they formed an excellent pair of paddles. Like its relatives, all of which use their wings to move beneath

as well as above the water, the great auk was indeed particularly well adapted, both for swimming and diving. The resistance of the water being so much greater than that of the air, wings employed for swimming beneath the surface of the former must necessarily be moved by muscles of great strength. In the great auk this condition is fulfilled by the shortness of the terminal segments of the wings, while in other diving birds the same end is attained by the wings never being fully opened.

The great auk was confined to the North Atlantic and never entered the Arctic Circle, although it ranged along the European side from Iceland to the Bay of Biscay, and on the American side from Greenland to Virginia. It was, however, only in winter that the bird was seen in the more southern parts of this habitat. Generally known as the garefowl, it bred in large numbers on the Geyrfuglasker—or Garefowl-rock—a small rocky island off the south-west coast of Iceland; and on Funk Island to the north-east of Newfoundland. The colony on the Geyrfuglasker might have existed for many years if that island had not sunk into the sea in consequence of a volcanic eruption, so that the birds were obliged to move to the rocky islet of Eldey, which is nearer the shore, and thus more accessible. There the last two survivors were killed on the 3rd of June 1844.

The history of the extermination of the great auk begins with the 21st of May 1534, on which day two boats' crews from Cartier's ships landed on Funk Island, and in less than half an hour filled their boats with birds as easily as if they had been so many stones. Besides those eaten fresh, each ship took away five or six barrels of salted birds. After this date the French fishermen relied to a great extent on the supply of these birds for food, and it became a practice for passing ships to call at Funk Island in order to lay in a store of salted auks. The immense numbers of the bird may be judged from the fact that although each laid only a single egg, and the increase, even under favourable conditions, was consequently but slow, yet it took more than two hundred years to kill off the colony. Some might have survived to the present day, if it had not become the practice to hunt the birds for the sake of their feathers as well as for food. Frequently the crews of several ships would spend the summer on Funk Island for the sole purpose of auk-hunting, when they would kill the birds in thousands and leave the carcasses to decay, the result being that by the year 1840 a clean sweep had been made of the entire colony.



SEA-OTTER.

CHAPTER III

MAMMALS AND BIRDS OF THE NORTH PACIFIC

Sea-Otter. ALTHOUGH the air-breathers of the North Pacific include a considerable number of species identical with those of the North Atlantic, yet there are a certain number of types quite unknown in the latter area. Among these is the sea-otter (*Latax lutris*), whose long flipper-like hind-feet are quite unlike those of ordinary otters, and more nearly resemble those of the eared seals. As these are doubled under when on land, the progress of the animal is not a walk but a succession of short leaps. The sea-otter also differs from ordinary otters in its dentition, especially in the form of the hinder cheek-teeth, which are surmounted by lobulated blunt tubercles well adapted for crushing the shell-fish and sea-urchins which constitute its principal food. On the American coast sea-otters range as far south as Oregon, but are most common round Alaska and near Vancouver Island; on the Asiatic side they frequent the shores of Kamchatka, where, however, they are more rare than in Alaska. Formerly the Pribiloff Islands, in Bering Sea, were inhabited by sea-otters, more than five thousand being killed on these islands soon after their discovery. From these and many

other of their former haunts the otters have, however, long since disappeared, and as they are being constantly hunted for the sake of their valuable fur, there is a probability that the species will be exterminated at no very distant date.

Unlike the common seal, which, as mentioned in a previous chapter, is common to the two oceans, the elephant-seal, or sea-elephant (*Macrorhinus leoninus*), has no representative in the Atlantic. It considerably exceeds the walrus in bulk, and is the largest of all the members of the seal tribe. In addition to its huge bulk, this seal is specially distinguished by the



NORTHERN SEA-ELEPHANTS.

dilatable trunk of the old males, as well as by the circumstance that the first and fifth toes of the hind-flippers are much longer than the rest, a feature in which the species resembles the crested seal. All the hind-toes are devoid of nails. Elephant-seals are found on both sides of the equator, but are much more numerous in the south, the typical northern species, first discovered by Lord Anson on Juan Fernandez, making annual migrations from that island to the coast of California. Considering the numbers in which this seal formerly occurred on the Californian coast, the information concerning its habits is singularly meagre. Apparently elephant-seals inhabited the area between the 25th and the 35th degree of N. latitude; and previous to the year 1852 were common on the Cerros Islands, where, in spite of their bulk and slow movements, they were accustomed to go

up the ravines from the bays, and there assemble in herds of several hundreds, thus easily falling into the hands of the hunters. About 1860 they had become so rare that hunting did not pay, and from that time to 1880, so few were seen round the islands of Guadaloupe and San Benito, that they were believed to be exterminated, but in that year the crew of a schooner killed thirty in the Bay of San Cristobal, and in 1882 forty more were killed and six young ones brought alive to San Francisco, one of which was sent to the Zoological Gardens at Philadelphia. A larger number were killed in 1883, and in October 1884, when the schooner *Laura* visited the Bay of San Cristobal by order of the National Museum of the United States, the crew found three young animals, which were spared in the hope that later on they might be joined by others. All the other localities in the south of Lower California which in former times had been inhabited by elephant-seals were afterwards searched, but without success. Returning to San Cristobal in December, the party found fifteen head, all of which were killed. Since that date specimens have been obtained from Guadaloupe Island.

Northern Sea-Lion. The largest representative of the eared seals, a group entirely unknown in the North Atlantic, is the northern sea-lion (*Otaria stelleri*), a species which grows to a length of 13 feet, with a girth of 10 feet, and a weight of as much as 1300 lbs. Eared seals, it is almost unnecessary to mention, differ from the typical seals by the retention of small external ear-conchs. They are further distinguished by the hind-flippers being disconnected with the tail, and directed forwards when on land, and the relatively great length of the fore-flippers, as well as by a distinct constriction at the neck. The males are also much larger than the females, and both sexes pass the breeding-season on land, when each male collects a party of females.

In colour this species is light chestnut-brown when young, but the older animals are light reddish brown when they reach the breeding-grounds. Later on the hair bleaches to an ochery tint, but the new coat of the males in November is a full brown, darker on the under-parts, the females being much lighter. This seal ranges from the islands of Bering Sea to California and Japan, and on the Pribiloffs is found in company with the northern fur-seal, or sea-bear, from which it differs not only by its general appearance and greatly superior size, but likewise by its gait and habits. On land it is a much slower mover than the fur-seal, its pace being only about one-third as fast. During the breeding-season the males travel less far inland, seldom ascending above the line of the highest tides. The males arrive early in May at the breeding-grounds, where they are followed by the females three or four weeks later. The most powerful males collect from ten to fifteen females around them, with which they remain until the end of September. The males allow the females to go wherever they please, and often carry the young on their backs down to the surf, where they play together. In this respect they are quite unlike the sea-bears, which never indulge in any such games. They also differ from the latter in not deserting the breeding-grounds to return in spring, remaining near the Pribiloffs throughout the year, although from the setting-in of rough weather in January until the melting of the ice and snow they divide into small parties.

**Californian
Sea-Lion.**

The Californian sea-lion (*O. gillespii*), which inhabits not only the shores of California, but both sides of the North Pacific, is distinguished from the northern sea-lion by its inferior size; the largest specimens not exceeding 8 feet in length, including the outstretched flippers. It is further distinguished by the head being more arched above the eyes.

One of the sights for which the traveller visiting San Francisco for the first time is always on the look out are the sea-lions on the Farallone and Santa Barbara Islands. Although some of these animals belong to the northern species, the majority, and the whole of those on Santa Barbara, are referable to the Californian sea-lion. To the inexperienced it is by no means easy to distinguish between the two by their appearance; but there is such a marked difference in the nature of their cries, that there is no chance of these ever being confounded. The northern sea-lion utters only a deep bass growl and a prolonged steady roar. The Californian species, on the other hand, never roars, but utters a sharp bark, occasionally approaching a howl.

The late Captain Scammon, writing of his experiences of the sea-lions on Santa Barbara in 1852, says that "at the close of the season—which lasts about three months on the Californian coast—a large majority of the great herds, both male and female, return to the sea, and roam in all directions in quest of food, as but few of them could find sustenance about the waters contiguous to the islands, or points on the mainland, which are their annual resorting places. They live upon fish, molluscs, and sea-fowls, always with the addition of a few pebbles or smooth stones, some of which are a pound in weight."

Some years ago it was estimated that the total number of sea-lions in the neighbourhood of San Francisco was 25,000, each of which consumed from 10 to 40 lbs. weight of fish daily. Captain Scammon, in his account, mentions that these seals display extraordinary skill and cunning in the capture of the sea-gulls which form a notable item in their diet.

Acting on information of this nature, the Fish Commissioners of California have of late years taken steps to largely reduce the numbers of the sea-lions on account of the injury they are supposed to inflict on the salmon-fishery. The Board claim that it is not their intention to exterminate the seals but merely to reduce their numbers—estimated at 30,000—by one-third. Men have been employed to shoot the sea-lions, of which a considerable number have been already slain; but the Government lighthouse reserves have been closed against the work of destruction.

A protest against this slaughter of these animals has been raised by Dr. C. Hart Merriam, who is of opinion that the number of sea-lions on the Californian coast has been greatly overestimated, and that long before the contemplated 10,000 were killed there would not be one left alive.

Not content with merely raising a protest against the destruction of the seals, Dr. Merriam endeavoured to show that they do comparatively little harm to the fishery. "The local fishermen, the State Fish-Commission, and others assert without qualification, that the sea-lions feed extensively on salmon, and the inference from their statements is that the animals subsist chiefly, if not entirely, on fish. A few years ago, when similar complaints were made against the fur-seals, I took the trouble



CALIFORNIAN SEA-LION.

to examine the stomach-contents of a large number of these animals, and found to my surprise that the great bulk of their food consisted of squids, hundreds of whose beaks and pens were found in their stomachs, while in only a few instances were any traces of fish discovered."

This is valuable testimony so far as it goes, but the advocates of the slaughter might urge that what is true of fur-seals may not hold good in the case of sea-lions. Dr. Merriam is, however, fully prepared for such possible objections; and quotes the results of observations made by Professor Dyche upon the stomachs of twenty-five sea-lions he had the opportunity of dissecting. In the case of eight of these the stomach was found to contain remains of cuttles and squids, several being completely filled with large pieces of the giant squid. Moreover, although salmon were being caught in numbers by fishermen in the same spot and at the same time, not a bone or a scale was detected in the stomachs of the sea-lions. Of the seventeen other sea-lions, which were examined at another place, the stomachs of eight were filled with the flesh of the giant squid, two were gorged with large cuttlefish, while the remaining seven contained pens and beaks of squids, varying in quantity from about half a pint to a quart or more.

"Professor Dyche was told that there were no fish within two or three miles of the sea-lion rookeries near the camp, as the sea-lions had caught or driven them away. In the face of this statement, he himself caught a dozen rock-cod one morning between shore and the seal-rocks; and his boatman, an old salmon fisherman, caught plenty of rock-cod, weighing from one to eight pounds each, within sixty feet of the flat rock where from one to three-hundred sea-lions landed daily. The water close to these rocks, where the sea-lions had lived for ages, proved to be the best fishing-ground in the locality. Professor Dyche states further that he landed a number of times on the rocky islands where in places the excrement from the sea-lions formed a layer a foot thick. He hunted through this for fish-bones and scales, without being able to discover a single one. On the other hand, the tough pens from the backs of the squids were abundant."

Although the fishermen were loud in their denunciations of the sea-lions as salmon-fishers, they were quite unable to substantiate their assertions by ocular demonstration; and their surprise was great when they were shown the masses of squid and cuttle taken from the stomachs of the seals. It is no argument to say that sea-lions in captivity will feed greedily and thrive upon a fish-diet;—of course they will, rather than perish from starvation. Neither does it much affect the question when salmon in nets are found bitten or eaten, since this may be the work in many cases of otters or sharks, although it is quite likely that the sea-lions themselves might sometimes be tempted by such attractive prey.

Dr. Merriam is careful not to spoil his case by attempting to prove too much. "It is not claimed," he writes, "that sea-lions in their native element never eat fish; at the same time the only actual evidence we have on the subject fails utterly to substantiate the allegations of the fishermen. On the contrary, all the twenty-five stomachs of sea-lions examined by Professor Dyche contained remains of squids or cuttle-fishes, and not one contained so much as the scale or bone of a fish. And is it not significant that in former years, when sea-lions were much more plentiful than now, salmon also were vastly more abundant? If the fishermen will look

into their own habits and customs during the past twenty-five years, it is believed that the cause of decrease of the salmon will be not difficult to find, and this without charging it to the inoffensive sea-lion, whose rookeries constitute one of the greatest attractions to the visitor on the California coast."

Northern Sea-Bear. The northern sea-bear (*O. ursina*) displays a greater difference in the size of the two sexes than any other eared seal. The males are full grown in the sixth year, at which age they measure from 7 to 8 feet long and about 7 feet in girth. The females, on the other hand, which are fully developed by the fifth year, rarely exceed 4 feet in length and 30 inches in girth. The northern sea-bear is thus very much smaller than the northern sea-lion; it has also



NORTHERN SEA-BEARS

longer ears, and is furnished with the close under-fur characteristic of all sea-bears, which forms commercial sealskin. In 1890 the American Commercial Company was granted a lease by the Government of the United States conferring upon them the exclusive right to kill, under certain restrictions, fur-seals or sea-bears on the Pribiloff Islands, for commercial purposes. This licence expired in April 1909. Consequently the control of the seal herds reverted to the American Government, who had to decide what measures should be taken for their protection, and to what extent killing should be continued on the islands, or whether it should be altogether prohibited for a certain number of years. The Pribiloffs were acquired by the United States by purchase from Russia about the year 1867; and a few years later (1874) it was estimated that they were annually visited by something like four and a half million sea-bears. At the present time these enormous hosts

have dwindled down to a remnant of between thirty and fifty thousand head; and in order to preserve this remnant, the United States Government has recently established a close time for five years.

The sea-bears reach the Pribiloffs (St. George and St. Paul Islands) during June and July, the old males arriving first, and each collecting round him a harem of breeding females, as the latter make their appearance somewhat later. Younger seals, of both sexes, associate by themselves in herds apart from the breeding parties, and of the former only the males or "bachelors" may legally be killed for commercial purposes. During the time of their sojourn on the Pribiloffs many of those not actually engaged in breeding (exclusive of the old males) take long excursions out to sea, frequently travelling to a distance of from fifty to one hundred miles from the shore, and remaining at sea from ten days to a fortnight at a time. It is these seals which fall victims to pelagic, or open sea, sealing, a pernicious practice which appears to be the main factor in the recent depletion of the herds.

By a treaty executed a few years ago American subjects were debarred from pelagic sealing, while British subjects resident in Canada were permitted to engage in this pursuit only outside the sixty-mile limit, and this alone during the non-breeding seasons. Japan was no party to the Anglo-American agreement, and Japanese vessels were consequently at liberty to practise pelagic sealing to any extent their owners please anywhere outside the three-mile limit without restriction as to season.

**Northern
Sea-Cow.**

The manatis and dugongs were formerly represented in the North Pacific by the northern sea-cow (*Rhytina gigas*), a gigantic species exterminated soon after its discovery. In the autumn of 1741 Bering was shipwrecked on the larger of the two Commander Islands, which lie about 100 miles off the coast of Kamchatka. The survivors, who remained on the island for ten months, are said to have lived chiefly on the flesh of the large sea-cow they discovered, although they did not begin to kill these animals until the 12th of June 1742. For a sirenian, the size was gigantic, the length being from 25 to 30 feet, the girth 20 feet, and the weight estimated at over $3\frac{1}{2}$ tons. The head was small; and, with the exception of a couple of small incisors shed in early youth, the jaws were without teeth, whose function was discharged by horny plates on the palate and lower jaw. The flippers, too, were devoid of nails, terminating merely in some coarse bristles, and the dark brown bare skin was so thick, rough, and wrinkled that Steller compared it to the bark of a tree. In habits the northern sea-cow was social, living in herds near the mouths of rivers and feeding on seaweed. It was unable to dive, and so poor a swimmer as to be occasionally washed ashore by heavy seas.

Soon after Bering's crew returned to Kamchatka expeditions of fur-hunters went out to winter on the Commander Islands, where the sea-cows afforded plenty of fresh meat. These expeditions were succeeded by others, the members of which also killed sea-cows for food; and ships sailing to the north-western coast of North America were in the habit of landing parties on Bering Island to kill and salt sea-cows, there being at that time no cattle in Kamchatka.

In 1754 the sea-cow was exterminated on Copper Island, and by 1763 there were very few left on Bering Island, where at the time of its discovery the number was estimated at from 1500 to 2000.

Up to 1883 two skeletons, one in the Imperial Museum in St. Petersburg and the other in the collection of the Imperial Academy at Helsingfors, and two ribs preserved in the British Museum, were all the remains of the northern sea-cow known to science. In that year, however, Dr. Stejneger was sent to Bering Island by the United States National Museum in search of skeletons, and within two years he succeeded in procuring a number of more or less incomplete skulls, together with vertebræ and other bones from the sand of the island. Many of these were found so far from the shore that it was suggested that the island must have been elevated since Bering's time, a supposition confirmed by the discovery of a skeleton near its centre.

Dolphins and Killers. Although the cetaceans of the North Pacific are very similar to those of the North Atlantic, there are some peculiar types. Among the forms common to both oceans, the bottle-nosed dolphin is apparently indigenous to all the warmer seas, as are also the common dolphin and Risso's dolphin. The blackfish is likewise widely distributed, although the North Pacific form is distinct enough to be ranked as a separate race, while by some it is regarded as a species under the name of *Globiocephalus scammoni*. The killer of the Pacific has likewise been distinguished from the one inhabiting the Atlantic, although there is apparently but one widely spread species. Allied to the true killer is the lesser killer (*Pseudorca crassidens*), which is as cosmopolitan, although apparently more common in the Pacific than elsewhere. It is uniform black, with a total length of about 14 feet, and has generally eight teeth on each side of the upper jaw and ten on each side of the lower jaw. The porpoise inhabits the Pacific as far north as Alaska.

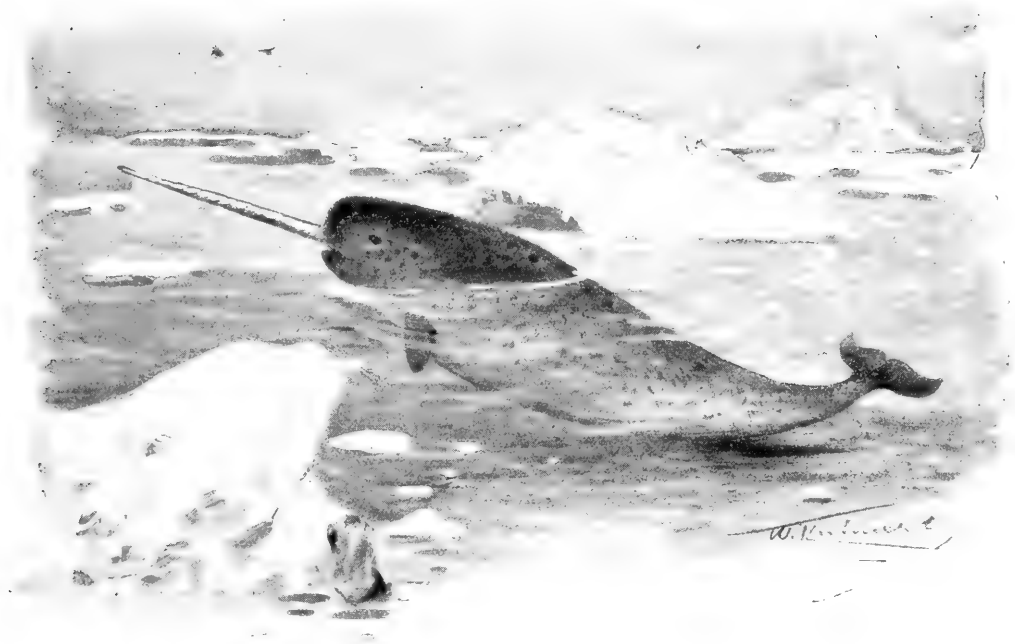
Lesser Sperm-Whale. The sperm-whale is likewise an inhabitant of the North Pacific, as is also Cuvier's beaked whale, referred to in the chapter on North Atlantic mammals. More noteworthy is the lesser sperm-whale (*Cogia breviceps*), which does not exceed 10 or 12 feet in length, and is the sole representative of its genus. Widely distributed, this species is black above and paler below, with a large back-fin and short, sickle-shaped flippers. The muzzle is short, and the blow-hole crescentic in shape, and placed on the top of the head in front of the eye, somewhat to the left of the middle line.

Grey Whale. The largest North Pacific representative of the whalebone-whales is Sibbald's fin-whale, which occurs at all seasons off the Californian coast. The common rorqual is represented in the North Pacific by a variety, as is also the hump-backed whale. An exclusively Pacific type is the grey whale (*Rhachianectes glaucus*), which represents a genus by itself. This remarkable whale, which is peculiarly a coast species, and frequently runs aground in the surf where it remains till floated by the next tide, attains a length of 40 or 50 feet, and has flippers 6 feet long, but no back-fin. In colour it is bluish grey with pale mottlings, becoming paler below, though occasionally black all over. The yellow whalebone is short and the oil poor both in quality and quantity; nevertheless, the ease with which it is caught has led to this whale being well-nigh exterminated. The skeleton presents several curious peculiarities.

Black Right-Whale. The right-whales form a small group characterised by the absence of a back-fin, the relatively large size of the head, the arch-like curvature of the edges of the lower lips, the shortness of the five-toed flippers,

the union of the seven vertebræ of the neck into a solid mass, and the length, narrowness, elasticity, and black colour of the whalebone. There are two species, the Greenland whale (*Balena mysticetus*), restricted to the Arctic Ocean, and the black right-whale (*B. glacialis*), now somewhat rare in the North Atlantic, but still found in all the south seas, and ranging in the North Pacific as far north as Japan. The black species has a relatively smaller head than the Greenland whale, and a broader muzzle, the latter bearing a peculiar horny protuberance commonly known as the "bonnet." The whalebone is also shorter, and the edges of the lower lips form a higher arch. The Atlantic form of this whale was once abundant in European seas, where it was hunted by the Basques and others until the discovery of Spitsbergen at the close of the sixteenth century, when, the present species being almost exterminated, attention was directed to the Greenland whale.

**Pallas's
Cormorant.** The North Pacific birds, as a whole, are so similar to those of the North Atlantic and, in somewhat less degree, Indo-Pacific that with the exception of one interesting species they may be passed over without notice on this occasion. The species in question is Pallas's cormorant (*Phalacrocorax perspicillatus*), which deserves attention on account of its comparatively recent extermination. Like the northern sea-cow, this northern bird was the largest of its tribe. With a bare white ring round each eye and a crest on the head, the plumage in general was dark green both above and below, the neck showing a blue gloss, and the wings and shoulders being deep red. So far as known, this bird was confined to Bering Island, where, at the time of Bering's shipwreck in 1741, it was used as food by the survivors of the crew, and scientifically described by Steller. Its extermination may be attributed to much the same causes as that of the great auk, the destruction of both birds having perhaps been accelerated by volcanic eruptions. The great auk, as already mentioned, was incapable of flight, and in the present species the wings were disproportionately short and the body heavy and clumsy, the weight being about 15 lbs. As it was easily caught and its flesh more appreciated than any other available food, the bird was so much sought after by Bering's shipwrecked crew and those who followed them that when Dr. Stejneger visited the island in 1882 in search of the remains of the northern sea-cow he found the present species had been extirpated some thirty years before.



NARWHAL.

CHAPTER IV

MAMMALS AND BIRDS OF THE ARCTIC

Arctic Fox. THE beautiful Arctic fox (*Canis lagopus*), so valued on account of its fur, is unique among mammals in presenting two distinct colour-phases in the same locality at the same time of year. In winter, for instance, some of these foxes are pure white, while others are pale slaty blue; and there is a difference, although less marked, between the summer coats of the two phases. Arctic foxes range northward from Iceland and Norway to Grinnell-land.

Polar Bear. Even more Arctic in its distribution is the polar bear (*Ursus maritimus*), which retains its snowy livery at all seasons. This animal is met with both on ice-girdled shores and the open ice-fields, but is rarely seen in large parties. Generally, indeed, a male and female, often accompanied by one or two cubs, wander about in company, but where sealers and whalers have left the carcasses of their victims in large numbers, there the bears will frequently collect to enjoy the banquet. Seal and whale flesh and blubber form, indeed, the main food-supply of the polar bear, but in some districts quantities of fish, especially salmon, are consumed by them, and, in summer, grass, lichens, and seaweed are eaten with relish. Although some polar bears undoubtedly migrate in winter, males and cubs being often seen at that season much farther south than in summer, it is possible that many old males hibernate in the far north, and the females certainly do so, or at least retire beneath the snow before the birth of their young.



C. B. & C.

POLAR BEAR.

Seals.

Like its relative the common seal, the ringed seal (*Phoca foetida*) inhabits the Arctic, the North Atlantic, and the North Pacific Oceans, but does not range so far south, although occasionally appearing off the British coasts. To the same genus belongs the Greenland, or harp, seal (*P. grænländica*), which, like the last, has a white or yellowish white coat when born, but when full grown is yellowish white with a characteristic black mark on the back from which it derives its second English name. It is this species, and not the common seal, which now forms the chief object of pursuit of the sealers who approach the Arctic regions from the Atlantic.

The third member of the group, the bearded seal (*P. barbata*), is by far the largest of the Arctic forms, old males attaining a length of 10 feet. It is further distinguished from its kindred by the broad muzzle, arched forehead, small teeth, and the long middle toe on the front flippers. Associating in large herds, this seal ranges as far south as Iceland and Labrador, and has been seen in the north of Great Britain. A very different animal is the crested or bladder-nosed seal (*Cystophora cristata*), which takes its name from the dilatable sac on the nose of the adult males, this sac communicating with the chamber of the nose. This species seldom ranges farther south than Newfoundland, and is rarely or never found on land, being essentially an ice-seal. The hooded seal is a migratory species. In summer the big herds are found along the south-east coast of Greenland, and in February and March these seals appear in countless numbers on the winter-formed ice-floes off the Labrador and Newfoundland coasts, both in the open Atlantic and in the Gulf of St. Lawrence. Sometimes large herds become imprisoned upon the floes, through long-continued winds in one direction which pack the ice and cut off their retreat. When this occurs and the seals are exposed to the rays of the sun, their skins burn and crack. They are then valueless, and the animals are not molested by the sealers.

This species is much fiercer and bolder than other seals, and will often defend itself with such courage that the Eskimos by whom it is hunted in their frail "kayaks" are exposed to considerable danger, especially since the males are protected from the clubs of their enemies by the inflated appendage on the head.

Walrus.

Those well-known Arctic animals, the walruses, are represented by two distinguishable forms, the one (*Odobæenus rosmarus*) inhabiting the North Atlantic and the other the North Pacific. Both are so nearly allied that it appears best to regard the latter merely as a local race of the former. The formidable upper tusks, which form one of the most conspicuous features of the walruses, are longer, thicker, and more inclined towards each other in the Pacific than in the Atlantic form. These weapons appear to be chiefly employed in raking up from the sea-bottom the bivalve molluscs on which these animals mainly subsist. The bivalves which supply most of the food are those known as *Mya truncata* and *Saxicava rugosa*, and for crushing their hard shells the blunt-crowned cheek-teeth of the walrus are admirably adapted. In addition to bivalves, walruses also consume fishes and crustaceans; and with their animal food they also swallow, perhaps unintentionally, large quantities of seaweed. Three centuries ago the Atlantic walrus occasionally wandered so far south as the

north of Scotland, and so far east as the Lena, but it is now restricted to the more remote parts of the Arctic regions, where it is yearly becoming scarcer.

When feeding on bivalves the walrus rejects the shells before the soft parts are swallowed ; and when taken from the stomach these soft parts, if recently swallowed, are quite uninjured, the siphons, lobes of the mantle, etc., being found in perfect preservation. This indicates that the molluscs cannot be ground up by the blunt cheek-teeth, as has been asserted, but that the shells are removed in some other way, probably by the action of the lips. Off Greenland, at any rate, walrus-like-



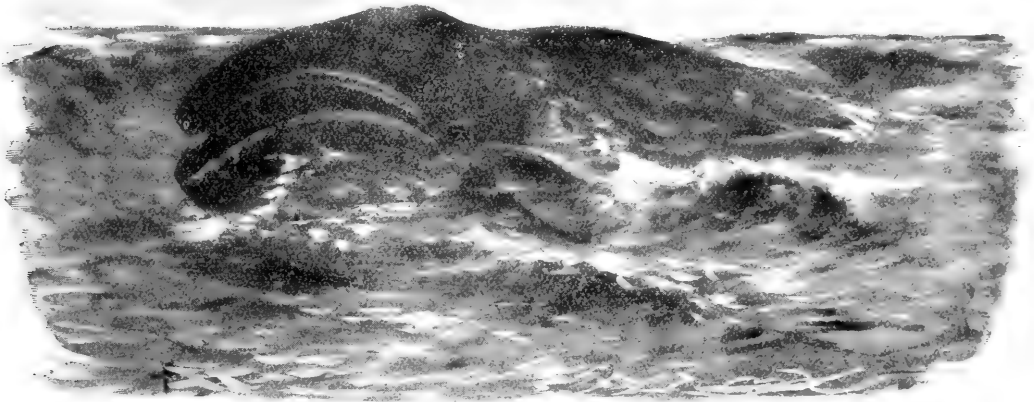
WALRUS.

wise consume large quantities of the small shrimp known as *Gammarus locusta*, of which the males are about an inch in length, while the females are still smaller. In this case also the shell is removed and rejected before the morsel is swallowed. How this is accomplished is difficult to imagine.

That the walrus catches and eats fish, the cod being the chief species preyed upon, appears to be little known. Equally noteworthy is the fact that numbers of eider-ducks and Arctic fulmars are seized and devoured by these animals. This, however, by no means exhausts the constituents of the diet, for, when a walrus comes across a dead whale, porpoise, or seal, it gorges itself with the flesh, and walrus-like will occasionally attack and kill live cetaceans and seals. How they accomplish this, or how they commence operations when about to devour a dead

whale, we are not told; and unless they employ their tusks for the purpose—which would be an unrecorded use for those weapons—it is extremely difficult to imagine how they manage to break up the carcase into portions small enough to be swallowed, as there are no incisors in the lower jaw, and those in the upper jaw are small and scarcely project above the level of the gum.

The Pacific walrus was never very widely distributed, although it ranged westwards to Cape Chelagskoi and eastwards to Point Barrow in North Alaska, and was particularly abundant in Bristol Bay north of the Alaskan Peninsula. The existence of walruses in the North Pacific became known about 1640; but, whaling being much more profitable, regular walrus-hunting was not engaged in before 1860, when, owing to the decrease of whales, the whalers turned their attention to the walrus with such vigour, that the animal, like its Atlantic relative, is rapidly becoming exterminated.



GREENLAND WHALE

Greenland Right-Whale. The Arctic Ocean is the home of three cetaceans, none of which ranges very far beyond its limits. By far the largest of these is the Greenland right-whale (*Balena mysticetus*), appropriately called the Arctic whale, since its distribution seems nearly circumpolar. This whale frequents the vicinity of the ice-floes, and, although in some cases found in the open sea during the summer, never apparently wanders beyond the southern boundary of the ice-field in winter. So soon, however, as the winter ice, which has compelled it to go south, breaks up, the whale once more travels north. In the North Atlantic the species is never found south of a line drawn through Lapland, Iceland, and Labrador. On the Pacific side its southernmost limit is 56° N. latitude in the Sea of Okhotsk. In colour this whale is usually black, with very little white, and in length it ranges from 50 to 60 feet or more. It is the most specialised member of the whole group, having the longest whalebone, the narrowest upper jaw, and the greatest lateral expansion of the lower jaw. The head occupies a third of the

total length, and the high roof formed by the upper jaw and the great lateral expansion of the two branches of the lower jaw make the capacity of the mouth enormous. This whale, in spite of its colossal dimensions, feeds on minute invertebrates, which it is compelled to swallow in immense quantities; hence the necessity for the great size of the mouth.

The second member of the exclusively Arctic triad of cetaceans

Narwhal. is the narwhal (*Monodon monoceros*), the males of which are characterised by the presence of one (generally the left) spear-like and spirally twisted tusk, projecting straight out from the upper jaw and reaching a length of 8 to 10 feet. Occasionally both tusks are developed, in which case each has the same spiral. The right tusk, as a rule, however, remains undeveloped, as is the case with both those of the female. The narwhal—that is to say the corpse-whale—takes its name from the pale grey colour of the skin, this grey tint passing into whitish on the under-parts. There is no back-fin, and the flippers are short and rounded. In distribution the species is circumpolar, and it is seldom seen south of the Arctic Circle. Narwhals go about in small parties, and feed on squids and cuttles, crustaceans, and fishes. The tusk is probably employed as a fighting weapon in combats between rival males.

The third member of the group is the white whale, or beluga

White Whale. (*Delphinapterus leucas*), distinguished from all its relatives by the glistening buffish white skin of the adult, the colour of the calves being light greyish brown. The head is rounded, like that of the narwhal, and, as in that species, the back-fin is represented merely by a slight ridge. The white whale is a purely Arctic species, although it occasionally wanders so far south as the Scottish coast. It is of fair commercial importance on account of its skin furnishing some of the leather sold under the name of porpoise-hide. Attaining a length of 16 feet, this cetacean is reported to feed chiefly on salmon. From the peculiar sound emitted as it rises to breathe, it is sometimes called by sailors the sea-canary.

The birds of the Arctic are chiefly those of swimming habit,

Brent-Goose. among them being the sea-geese which frequent the shores, and generally breed in one or other of the polar regions. In these birds the beak is shorter and deeper than in ordinary geese, the cutting edge of its lower half being straighter and the serrations on the upper half invisible externally. One of the most familiar members of the group is the brent-geese (*Branta bernicla*), which appears annually in large numbers on certain parts of the shores of the Baltic and North Sea in winter. This species inhabits the high north of Europe, Asia, and North America, and breeds within the Arctic Circle. It feeds by day, and seems to avoid the company of its cousin the bernicle goose, whose feeding-time is always the night. A well-grown brent-geese will measure about 22 inches in length. The species may be easily recognised by the jet-black head, and the presence of a white patch on each side of the neck.

The nearly allied bernicle goose (*B. leucopsis*) differs by

Bernicle Goose. having the head white, with a black crown and nape and a black stripe from the eye to the beak. Migrating in smaller flocks than the brent-geese,

this species appears to breed generally or always within the Arctic Circle, although comparatively little is known with regard to its nesting haunts



BERNICLE GEESE.

Red-breasted Goose. A third member of the group, the red-breasted goose (*B. ruficollis*), is characterised by the black head, with a white patch in front of the eye, and the deep chestnut of the throat and breast, the

colour of the upper-part of the body being mainly black, and that of the under-parts white.

This bird inhabits the Asiatic shores of the Arctic Ocean, whence it wanders to the Caspian Sea and surrounding steppes, where it feeds principally on saline plants. It is still a straggler to the British Isles, and in former days seems to have reached the valley of the Nile, since it appears in the old Egyptian paintings.

Of a totally different type was the now extinct Labrador pied duck (*Camptolæmus labradorius*), a species formerly abundant on the coast from which it takes its name, whence it migrated into the New England states, and perhaps still farther south. In colour this duck was chiefly black, with a white head, neck, and breast, a narrow black stripe down the middle of the head and a collar of the same round the neck. In the more soberly clad female the general tint was brownish, with a white wing-patch. The Labrador duck used to nest on rocky islets, where it was shot in such numbers during the breeding-season that it became exterminated some fifty years ago.

Steller's Eider.

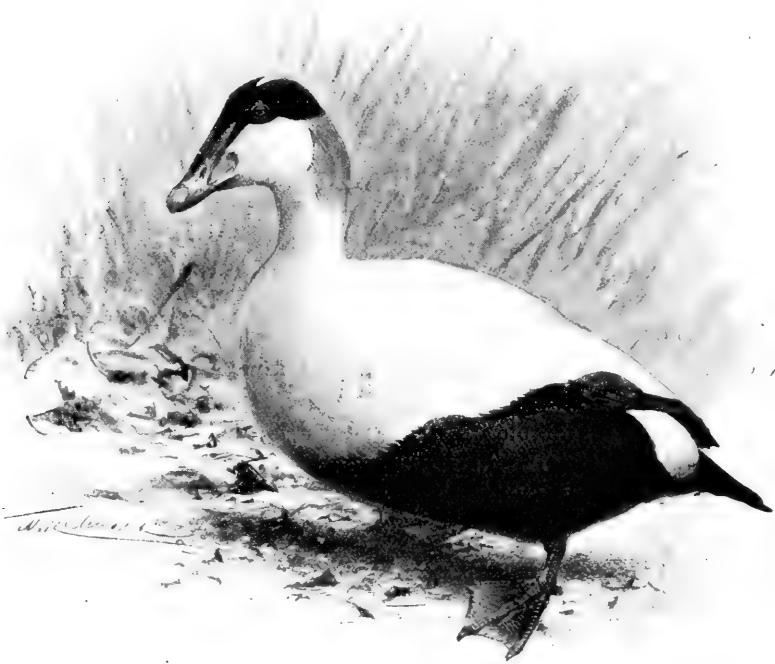
Another member of the group is Steller's eider (*Somateria stelleri*), remarkable for its narrow, vaulted beak, of which nearly the whole tip is occupied by the so-called nail. In colour the adult drake is bluish black, with much white on the wings, a violet wing-patch, a white head, a green area on the nape, and a chestnut breast. It nests on the Arctic coast between Alaska and the Taimyr Peninsula, in Russian Finland, and on Varanger Fjord, and in winter appears in the Baltic, straying occasionally as far south as the north of France.

Eider.

Better known is the common eider (*S. mollissima*), which has a black crown with the middle line of feathers on the beak extending only half-way to the nostrils. The drake is white above and black below, the white extending to the lower half of the breast, and the beak, nape, and legs being green. The eider nests in the British Islands, in the islands off the coast of Denmark and Norway, and northwards within the Arctic Circle all round the pole, although the north-east American form (*S. mollissima dresseri*) is often regarded as a separate species, and the one inhabiting Arctic America and Greenland (*S. m. borealis*) as a second.

Eiders are true sea-birds, always following the coast, and never crossing a peninsula to make a short cut. They fly well, and swim excellently, braving the wildest surf, although at the approach of a storm taking refuge on land. They are also expert divers, frequently remaining under water for two minutes, and going down 10 or 12 fathoms in search of the crabs and molluscs on which they chiefly subsist. Owing to the commercial value of their down, eiders are now protected in Europe, and are consequently no longer decreasing in numbers. The nest is a large structure of heather and other plants, including seaweed, grass, and moss, and lined with such a quantity of down, plucked from her own breast, that the female is not only completely concealed while sitting, but is able to cover the eggs when leaving the nest—a precaution never omitted. The first clutch of eggs consists of four, five, or sometimes from six to nine, but if there be more than ten in the nest, they are the product of two females, which either sit side by side or by turns. The male leaves his mate as soon as the eggs are laid, and goes out to sea to moult, returning when the female has finished her task.

The eider-down trade is of great importance to the inhabitants of the northern coasts. In Iceland the privilege of taking the nests and eggs of the eider and other sea-birds is usually vested in the landlords, by whom the ducks are encouraged to nest on certain small islands, where they become so tame as to incubate upon the houses, and allow the inhabitants to walk about among them as they sit. Unfortunately the people are so ignorant and greedy as to take not only the first clutch, but also the second and even the third, although there are only three eggs in the second clutch, and two, or sometimes only one, in the third clutch, the eggs of these clutches being smaller than those of the first. The result of this practice



EIDER DRAKE.

is to make the eiders abandon the places where they are thus treated; and more prudent proprietors prohibit the taking of any eggs save those of the first clutch, and otherwise do all in their power to protect the eiders. In Norway it is the practice to collect the young birds in baskets and carry them down to the sea; where they are followed by their screaming parents, which, on arrival, collect together as many as possible. Without this precaution, the young, which are comparatively safe on the sea, would suffer severely on their way down from the attacks of birds-of-prey, gulls, and other depredators.

The female eider plucks out so many of her feathers for the lining of the nest, that her breast is frequently quite bare, and there are none left for the second and third broods. In such cases it has been stated the male bird contributes his own down, which he permits the female to pluck, but this appears to be a myth.

Eider-down is most valuable if collected before incubation has commenced, since when this takes place it becomes mixed up with the other materials of the nest, such as grass and seaweed. When such a mixture has occurred the down is more easily freed from grass than from seaweed, so that grass-down is more valuable than seaweed-down. A pound of well-cleaned down is the yield from five to seven nests, and is worth about fifteen shillings. In colour the down is brownish, with whitish specks. So closely does it adhere that scarcely any is blown away by the wind, and yet it never felts into a mass, but remains light and elastic. The uses of the eider are many. The skins are worked up into warm underclothing; the eggs, which are gathered in large quantities in June and July, are used for domestic purposes, and the flesh is eaten, especially in Greenland, although said to have an oily flavour.

King-Eider. A much handsomer bird, the king-eider (*S. spectabilis*), like its relative, inhabits the American, Asiatic, and, more rarely, the European shores of the Arctic Ocean. In Greenland, where it is said to be as common as the eider, the king-eider breeds, as it does in Spitzbergen, Novaia Zemlia, and northern Siberia. It is still common on the Lofoten Islands, but is rarely found farther south than the north-western coast of Norway and the latitude of Iceland, although on the Pacific Coast it occasionally occurs so far south as California. Its breeding-area extends farther north than that of the eider. The down, which is as soft as that of the eider, is never collected, the inhabitants of the far north taking the skins of the birds, which, after the larger feathers have been removed, they sew together into garments, these being worn next the body with the downy side inward. King-eiders are captured by the Greenlanders during the moulting-season, when they are unable to fly, the flocks being surrounded, and their members forced to dive until exhausted, when they are easily overtaken and killed with spears or arrows. The king-eider is said to be able to remain under water longer than any other bird, although probably not more than a couple of minutes. Resembling the true eider in general characters, it is somewhat smaller, and distinguished by the grey crown and the orange tubercle on the beak, which is also orange with a black margin. The plumage of the female is chiefly russet brown.

Shag. Another familiar bird frequenting the Arctic coasts is the shag (*Phalacrocorax graculus*), which, although inhabiting the great Siberian lakes, is essentially a maritime species, nesting on cliffs or in caves, and never in trees or bushes. It breeds in the British Isles, and even so far south as Morocco, but is very rare in the Baltic and farther to the east, and does not range west of Iceland. From the ordinary cormorant the shag differs by the gracefully curved crest on the head, as well as by the absence of any white on the glossy green plumage, and the presence of only twelve, in place of fourteen, tail-feathers.

Common and Herring Gulls. Although they are not strictly Arctic in their distribution, certain members of the gull tribe may be conveniently mentioned in this place. Among them is the common gull (*Larus canus*), which breeds on the northern coasts of Europe and Asia down to about 53° N. latitude; and in winter wanders so far south as the Nile valley and the Persian Gulf. The grey back, the white spot on the brown primary quills, the yellow tip to the beak, and the greenish yellow legs are among the distinctive features of this gull. Much larger is its cousin the herring-



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SILVER GULL

gull, with a yellow beak and flesh-coloured legs, which is also a bird of the north, but not an Asiatic one, since it does not occur east of the White Sea. In America this gull (*L. argentatus*) breeds so far down as New Jersey on the Atlantic side, and California on the western coast. In summer the American birds appear in Mexico and the West Indies, while their European brethren wander to the shores of the Caspian, the Black Sea, and the Mediterranean.

Greater Black-Backed Gull. Its large size, coupled with the white head, the blackish back, and the flesh-coloured legs, serve to distinguish the great black-backed species (*L. marinus*), one of the boldest and strongest of its kind. This gull subsists largely on the prey it can steal from its relatives, as well as on their eggs and young. The breeding-area of this species extends into that of the truly Arctic gulls, and includes northern Europe, Iceland, Greenland, and Baffin Bay, while the winter migration takes these gulls to Egypt, the Canaries, and Florida.

Lesser Black-Backed Gull. From its larger namesake the lesser black-backed gull (*L. fuscus*) differs not only by its inferior bodily size, but by its bright yellow legs. This gull breeds from the northern coasts of Europe to the Mediterranean; and its range extends in winter down to the Bight of Benin, the Red Sea, and the Persian Gulf. In northern Asia and America this species is, however, unknown.

Greater White-Winged Gull. This gull (*L. hyperboreus*) is a truly Arctic species, breeding all round the pole, and ranging so far south as the Strait of Gibraltar, Florida, and Japan in winter. The largest of all the gulls, this species visits the British Isles, and is as omnivorous and rapacious as its black-backed relative, from which it differs in being wholly white with a slight pearly tinge, as well as by its shorter legs and wings. The nest is a conical heap of sand and seaweed, hollowed slightly at the apex, and frequently as much as a couple of feet in height.

Iceland Gull. The beautiful Iceland gull (*L. leucopterus*) is likewise a pearly white species, but only about two-thirds the size of the last, with much longer legs and wings and a shorter beak. Its breeding-area is circumpolar, and includes Jan Mayen, Iceland, Greenland, and Baffin Bay. In winter this gull occasionally straggles so far south as the British Isles on one side of the Atlantic and Boston on the other. An excellent diver, it feeds chiefly on live fish, and in pursuit of these it follows seals and other predaceous marine animals as they chase the shoals of small fish. The Iceland gull thus finds its food with little trouble, and at the same time indicates to sealers the whereabouts of their booty.

Sabine's Gull. Of the two kinds of fork-tailed gulls, the larger (*Xema furcatum*) is South American, ranging as far north as the Galapagos Islands. The smaller Sabine's gull (*X. sabinei*), on the other hand, is Arctic, with a circumpolar breeding-area. In winter it migrates to the North Sea, and in America, where it is much more abundant, to the Gulf of Mexico, and, not improbably, on the Pacific side across the equator so far south as Callao. In these gulls the head, back, and wings are grey, the head relieved by a black collar and the wings by black primary quills. The beak is black tipped with red in both kinds, but the larger species is distinguished by a white band at the base of the upper half.

Kittiwake.

The familiar kittiwake, or three-toed gull (*Rissa tridactyla*), is likewise circumpolar, with a breeding-area extending from the farthest north down to northern France, the Kurile Islands, and the Gulf of St. Lawrence. In colour this gull is slaty grey above with a white tail and grey wings, of which the outer primaries are tipped with black and the secondaries with white. The beak is greenish yellow, and the three toes characteristic of the genus are black. This gull is exclusively a sea-bird, frequenting high rocky shores, and breeding on lofty cliffs, where it dwells with razorbills above and guillemots below in such enormous numbers that the sky is darkened by their wings and the ears deafened with their cries. Kittiwakes are excellent swimmers, and the most graceful in flight of all the gulls. When in search of prey, they fly slowly and deliberately, but so soon as a fish is sighted, they dart through the crests of the waves in a downward curve, dive like a flash, and never rise without a fish in their beaks. If the fish be not too large, it is swallowed at once, but if of too great bulk for this, it is borne ashore to be devoured piecemeal.

Ivory-Gull.

The beautiful ivory-gull (*Pagophila eburnea*) takes its name from its ivory-white plumage, relieved by the black feet, greenish yellow beak passing into bluish grey at the base, and the red ring round the eye. Even in winter this lovely gull seldom strays farther south than the limits of the ice, and its northern summer range is perhaps greater than that of any of its kindred. Occasionally a straggler reaches the British Isles, or even the north of France, while on the American side the species has been seen in New Brunswick.

Wedge-Tailed Gull.

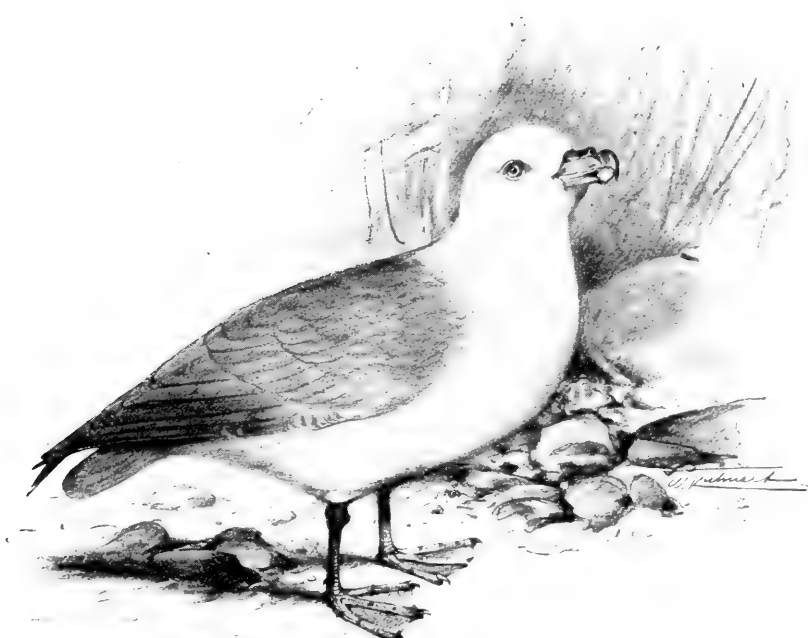
The wedge-tailed gull (*Rhodostethia rosea*), which is another of the Arctic members of the group, may be recognised by the grey back, rosy flanks, and the narrow black collar round the neck. The short beak is black, and the feet are red. This exclusively Arctic species, which was discovered by Sir James Ross on Melville Peninsula in 1823, has been seen to the north of Spitzbergen, in Franz Josef-land, in Bering Strait, and north of Siberia, so that it is regarded as circumpolar. Only a few stragglers have been met with beyond the Arctic Circle.

Great Skua.

The skuas, or pirate-gulls, are provided with long curved talons characteristic of predaceous birds, and, as a matter of fact, in general habits they are much more like frigate-birds than ordinary gulls. The group is noticeable on account of being common to the Arctic and the Antarctic region. The largest of the northern forms is the great skua (*Stercorarius catarrhactes*), whose colour is mottled brown above and pale chestnut below, with the outer primaries white at the base, and the hooked beak and feet black. This fierce bird feeds on animal substances of all kinds, whether alive or dead, but is specially fond of fish, which it occasionally captures for itself, but generally steals from other birds. With the quickness and strength of a hawk, a skua attacks any bird weaker than itself, which it kills by one bite in the skull, clutching the body in its strong claws and swallowing the flesh piecemeal. Skuas never breed in company with other birds, but in colonies of a hundred or more of their own kind, usually on some rocky shore, or upland moor, where there are springs or ponds, perhaps a quarter of a mile from the sea. They seldom breed very far within the Arctic Circle, their favourite haunts being just south of this, such as Iceland,

Greenland, and Baffin-land. In Europe the known breeding-places, of which the Shetlands are the most southerly, are yearly becoming fewer. Of late years, indeed, these birds have rapidly diminished in numbers, and they seem about to share the fate of the great auk. Like the rest of its tribe, the great skua takes its name from its monotonous cry of "skua-skua."

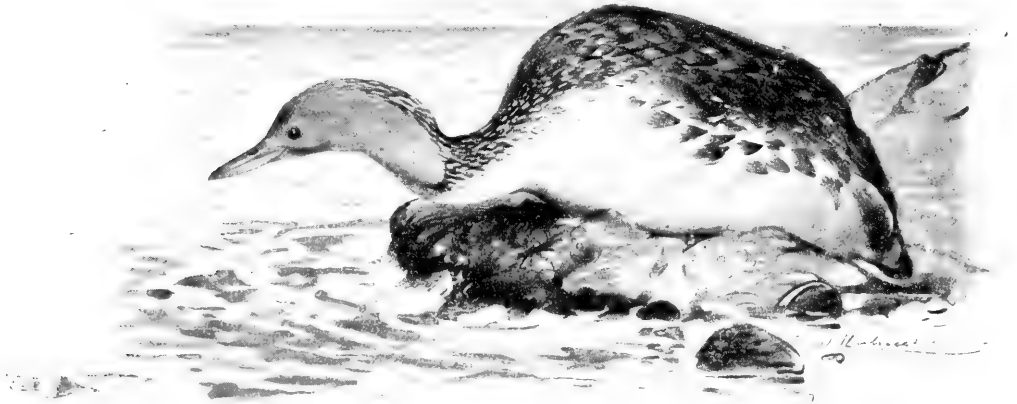
Temminck's Skua. The second Arctic representative of the group is Temminck's skua (*Stercorarius pomatorhinus*). Inferior in size to the last, it has the two middle tail-feathers much longer than the rest, and twisted vertically, being in this respect unlike its larger relative, in which these feathers exceed the others by less than an inch. This bird breeds in Arctic and sub-Arctic Europe, Asia, and America, and in winter ranges southwards as far as northern Australia, South Africa, and Peru.



FULMAR PETREL.

Long-Tailed Skua. Nearly allied is the long-tailed skua (*S. parasiticus*), a bird which, when driven inland by storms, takes readily to a country life, and often may be seen in meadows and fields (especially when freshly ploughed) seeking its food after the manner of a plover. Since fresh water is not much to its taste, it never remains long away from the sea, near which it makes its home among the marshes. Although migrating as far south as Gibraltar, it seldom breeds beyond the Arctic Circle, within which it is met with all round the pole. Of the approximate size of a jackdaw, this skua is distinguished by the middle tail-feathers gradually tapering until they are 9 inches longer than the others, as well as by the white shafts of the two outer primary quills. In colour it is dark grey above with the crown and nape blackish, and the throat, neck, and underparts white, shading into pale grey.

Fulmar Petrel. The group of petrels collectively known (from their typical representative) as fulmars differ from the shearwaters by the shorter beak and the vertical plates more or less distinctly developed on the sides of the palate. The true fulmar (*Fulmarus glacialis*) is an Arctic species, ranging from Baffin Bay to Franz Josef-land, and breeding as far south as St. Kilda. In winter it migrates as far as Massachusetts on one side of the Atlantic, and the north coast of Spain on the other. Thousands of these birds breed on steep cliffs, or rocky islands, the colonies usually consisting of this species alone, although above or below them are the zones occupied by razorbills, kittiwakes, and other birds. Towards the end of May, in a slight depression on the bare ground, is laid the large, white egg, which is incubated alternately by the male and female with such assiduity that the birds will often refuse to move till pelted with pebbles, and even then almost immediately return to their task, carefully putting the egg into proper



RED-THROATED DIVER.

position with their beaks, and sitting as persistently as before. When occupied in devouring a carcase, fulmars become so absorbed that they pay no heed to approaching boats, and may be easily killed with the oars. In such feasts the sharp claws enable the birds to obtain a firm hold on the slippery skin of whales and seals, in which large holes are torn by means of the hooked beak.

On the wing a fulmar looks much like a gull, to which it also approximates in coloration. When perching, or rather crouching, for it cannot stand long on its legs, it presents, however, a very different appearance, owing to its much stouter build.

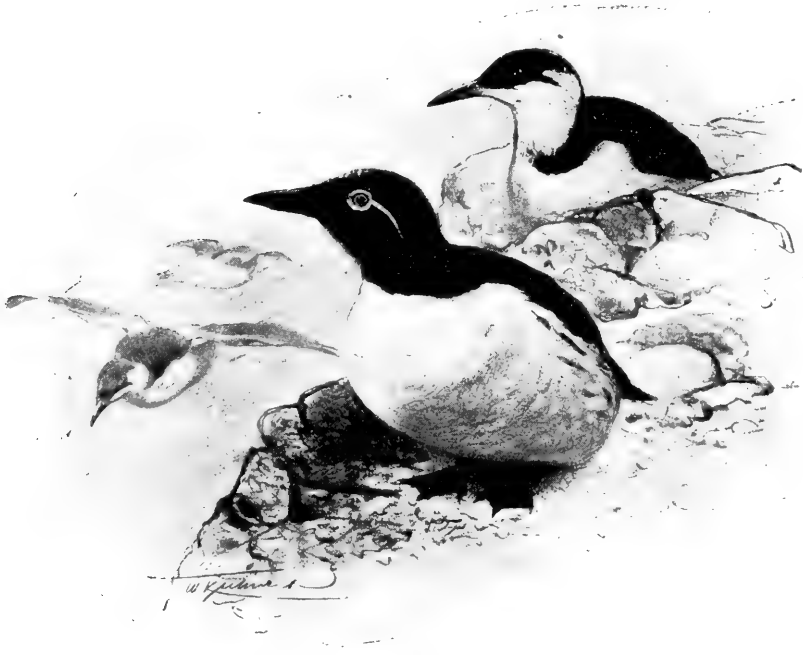
Divers. The group of divers are exclusively inhabitants of the colder portions of the Northern Hemisphere, and seldom leave the sea except to breed. They even preen themselves afloat, this being due to the circumstances that the position and structure of their legs prevent them from standing upright and even from walking in the generally accepted use of the term, their movements on land being mere shuffles or slides. Divers frequently nest near small fresh-water ponds, situated in quiet lonely spots, or high up among the

mountains, with low banks, or flat grassy islands, on which the nest can be placed so as to permit the parent birds to slide straight into the water. If the sheet of water be small, only a single pair of divers will nest, but on larger lakes each pair has its own defined area, from which all intruders are chased away. The members of a couple are devoted to one another, and always dive, swim, and fly in company, each being careless of its own safety when its mate is killed or injured. The young are able to dive long and perseveringly almost as soon as they leave the egg, and thereby escape many dangers. When in want of rest they climb on the backs of their parents, where they nestle close and hide among the feathers. A few days after leaving the shell they begin to catch their own food, which consists chiefly of fish. Small fish are swallowed whole, but larger ones are brought to the surface, where they are gradually pecked to pieces, the birds diving to recover the carcass as it from time to time sinks. By far the commonest of the four kinds is the red-throated *Colymbus septentrionalis*, a circumpolar species, breeding within the Arctic Circle and southwards as far as Scotland in the Atlantic, and somewhat lower still in the Pacific. On the winter migration it travels to the Gulf of Mexico in the one hemisphere and to the Mediterranean and Formosa in the other. The dark brown back, grey head, red throat, and black beak are characteristic features of this diver. Much larger is the great northern diver (*C. glacialis*), which attains some 33 inches in length, and is about as large as a goose. The back is ornamented with a kind of chessboard pattern of black and white squarish patches, while the throat is marked by two black and as many black and white rings streaked vertically. This stately bird inhabits the northern parts of Europe and America, but does not breed farther south than the Shetlands in European waters, or than Maine on the western side of the Atlantic. A third species, the black-throated *C. arcticus*, distinguished by its black throat and beak, is circumpolar, breeding in the north of Scotland and the Orkneys, though at present unknown in Iceland and Greenland. It also breeds in Scandinavia, Russia, north-eastern Germany, and right across Siberia to Kamchatka.

Guillemots.

Very characteristic of the shores of the colder portions of the Northern Hemisphere are the guillemots, whose movements on land are nearly as awkward and ungainly as those of the divers. Owing, however, to their powerful claws, guillemots are excellent climbers. The flight is recognisable by the quick, short movement of the wings, being low and in long downward or upward spirals especially when ascending or descending high cliffs. These birds are powerful swimmers and divers, sitting high on the water with the tail slightly raised, and the neck depressed between the shoulders. They dive noiselessly, opening the wings as they descend and using them as paddles. The length of the dive is sometimes as much as 10 fathoms, or even more, and when undisturbed the birds generally reappear close to where they went down. The common species, *Uria troile*, breeds as far south as the mouth of the Tagus, in Portugal, and is particularly numerous in the Faröes and Iceland, while northwards its breeding-range is known to extend to Bear Island, half-way between the North Cape and Spitzbergen. On the American side these birds breed as far down as Massachusetts. On the Pacific coast of the New World the typical form is replaced by the somewhat larger *U. troile californica*. At their breeding-places guillemots may be seen in

pairs, the members of which tenderly caress each other and rub their necks together as they sit side by side on the cliffs which have been inhabited by their ancestors for ages. Nest there is none, the egg being laid on the bare rock. Though always pear-shaped (to prevent them rolling off the ledges), the eggs vary in colour more perhaps than those of any other bird, even the ground-colour ranging from white through every shade of greenish blue. The so-called bridled guillemot (*U. ringvia*) differs from the typical form by a ring round the eye and a short white streak running from the latter across the temples; but this variation does not seem to entitle the birds to be regarded even as a distinct race, much less a species, since they are found everywhere among the ordinary



BRIDLED GUILLEMOTS.

form and have no special habitat of their own. On the other hand, the somewhat larger Brünnich's guillemot (*U. bruennichi*) is a perfectly well-defined species, easily recognised by the shortness of its beak. This bird is thoroughly Arctic in its distribution, being known only as a straggler outside the Arctic Circle. More distinct is the black guillemot (*U. grylle*), which lays two eggs instead of one, and is smaller than the other kinds, measuring only about 13 inches in length. In colour it is black with a white bar on the wing, and red feet. It also flies lower than other guillemots, rarely rising more than a foot or so above the water. It is likewise by far the best diver, its disappearance being instantaneous, and its speed beneath the surface nearly as rapid as through the air. This guillemot breeds on both sides of the Arctic Circle, but not farther south than Ireland and Denmark. It passes the winter on the sea, rarely visiting the land, and only occasionally strays far from its birthplace.

Marbled Guillemot.

The short-beaked guillemots are distinguished by their small size as well as by the short beak, which is strongly compressed at the sides. One species, the marbled guillemot (*Brachyramphus marmoratus*), inhabits the north-western coast of North America, and is blackish brown barred with rufous above, and white below.

Little Auk.

One of the smallest of all sea-birds is the little auk, or rotche (*Alle nigricans*), which breeds within the Arctic Circle nearly up to 79° N. latitude, and occasionally wanders as far south in winter as the Azores and Canaries. This bird appears during May in its breeding-places, of which it takes possession with much clamour, such breeding-places being always situated on low shores and never on cliffs. In June, when the snow has melted, the female lays her one greenish white egg, which is about the size of that of a dove, and thus comparatively large for so small a bird. The parents sit on the egg alternately with much assiduity; and, when sufficiently strong, the young are conducted by them to the sea. These birds remain on shore only during the breeding-season,



LITTLE AUK.

and never resort to fresh water from choice, being essentially sea-birds: they are, however, often driven inland by winter storms.

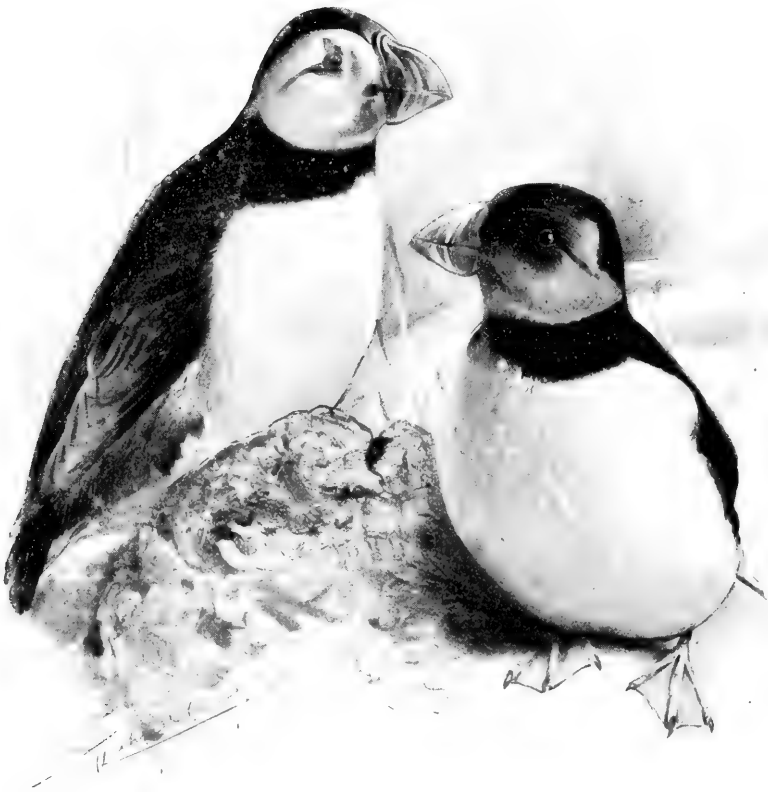
The last incursion of little auks into the British Isles occurred in January 1912, and was due to the stormy weather which prevailed in the early part of that month. The birds seem to have struck the coast in greatest numbers between Norfolk and the Firth of Forth, those reported from the western and midland counties having probably travelled from the east. Although the number of birds appears to have been fewer than in the visitation of 1895, they seem to have spread over a wider area of country.

Razorbill.

An allied bird breeding within the Arctic Circle, and likewise largely to the south of the same, is the razorbill (*Alca torda*), the breeding-area of this species including countries as remote from one another as Jan Mayen, Brittany, Greenland, and Maine. Young razorbills leave the cliffs on which they were hatched at the tender age of less than three weeks, when only half-fledged. Encouraged by the screaming and expressive gestures of the old birds, they leap down in the same manner as young guillemots, many of them falling on rocks instead of into the water, and thus perishing miserably. Normally

the female lays only one egg, but if this be lost a second is deposited, and if need be, even a third. As a breeding-site razorbills prefer bare beetling cliffs with numerous clefts and crannies in which the eggs are deposited, the open ledges favoured by guillemots not being to the liking of these birds.

Puffin. That grotesque bird the puffin, or sea-parrot (*Fratercula arctica*), is sufficiently characterised by its curiously shaped and brilliantly coloured beak. The plumage is pied, the head, back, and a collar round the neck



PUFFINS.

being deep black, and the under-parts pure white, while the feet and much of the beak, as well as the fleshy rosettes, are brilliant orange. The beak is indeed of most remarkable form, being high at the base, like that of a parrot, much compressed at the sides, and deeply grooved in front. Very powerful is this beak, which also serves as a pouch, owing to the presence of much loose skin at the base.



RAZORBILL.

In the receptacle formed by this skin are carried the small fishes brought home by the old birds for the support of their young. When a puffin is returning laden, the extremities of four or five fishes may project from each corner of the beak, giving to the bird the appearance of possessing a moustache. Puffins generally associate in vast flocks, which extend over wide stretches of rocky shores and islets, their gleaming white breasts giving the breeding-places the appearance of being covered with a snowy veil. On the east side of the Atlantic puffins breed so far south as the mouth of the Tagus; and in winter they visit the Mediterranean. On the western side the southernmost breeding-places are in Newfoundland, and winter stragglers reach the coast of New England.

Crested and Horn-billed Auks. With two very remarkable auks of small size this brief account of the birds of the Arctic may be brought to a close. The first of these is the crested auk (*Simorhynchus cristatellus*) of the North Pacific, easily recognised by the tuft of plumes curling over the forehead and the white bar on the ear-coverts. The second is the rhinoceros-billed auk (*Cerorhyncha monocerata*) of the shores of north-western America and northern Asia. In summer the beak develops a prominent horny knob between the nostrils, which disappears in winter, although the white plumes on each side of the head persist.



COD FISH.

CHAPTER V

THE FISHES OF THE NORTHERN SEAS

THE animal-life of the sea, like that of the land, depends largely on the nature of the local plant-life. Marine plants in the main belong to groups entirely different from all land or even fresh-water vegetation, although the marine flora is connected with that of fresh water by means of the brackish-water flora, which, however, is of very limited extent. Apart from the essential difference between marine and fresh-water vegetation, the local variations in aquatic floras, due to climatic conditions, are much less marked than are those of land floras, owing to the more equable temperature of water. Although in the sea the influence of warm and cold currents has to be largely taken into account, while in fresh water the amount of rainfall is an important factor, yet the depth of the water is all-important in regard to plant life. In addition, the amount of light received exercises a most important influence, the larger plants growing only near the surface, where the light is brightest, while the smaller and most lowly organised types alone inhabit the darkest depths. Moreover, the water has not only what may be called its basal flora, but likewise supports a vast development of plant-life which floats on its surface, this floating flora only being fully developed where the water is of great depth, although in the shallows on coasts and elsewhere it may be mingled with the basal flora.

The nature of aquatic floras depends much on that of the river or sea bottom, whether this be rocky, pebbly, muddy, or sandy. The basal flora in fresh water consists chiefly of such plants as thrive in mud, while that of the ocean is largely

composed of plants suited to grow on rocks or among stones. In fresh waters the temperature of the air exerts the maximum influence on plant-life, whereas in the deep sea that influence is imperceptible within a short distance of the surface. With the exception of a few sea-grasses (*Naiadaceæ*), the bulk of the ocean flora is made up of various seaweeds or Algæ, some of which possess a growth recalling that of the larger land-plants. The larger seaweeds and all the sea-grasses are confined to the zone within tide-range which extends into the line of surf, the necessary conditions to their existence being bright light and a constant change and movement of water and air. Such as are situated just above the limits of ebb tide, with almost the whole growth under water, are strong and healthy, whereas those placed higher up on the shore are in danger of becoming dried up and are therefore more stunted in growth. In the upper zone the seaweeds are chiefly green, in the middle zone they are brown, while in the lower zone they are mostly red, although brown forms may be found in the upper and green in the middle zones. Some kinds which grow at a considerable depth in the more brightly illumined portions of the ocean thrive also in darker situations near the surface. On coral-reefs many seaweeds are restricted to violently agitated water, while others are peculiar to the quieter spots; but those which grow on sandy or muddy bottoms are essentially still-water types.

On passing from the temperate to the tropical zones the ocean flora is less rich in variety of form than that of the temperate and frigid zones; but there are certain marine types of plants exclusively tropical, such as some of the sea-grasses and tree-seaweeds, while the red seaweeds are generally numerous and the brown kinds less abundant. Among the brown seaweeds is, however, the well-known yellow *Sargassum*, found in the tropics at some distance from land floating on the surface of the sea, particularly in the tropical Atlantic, where it forms the so-called Sargasso Sea. Other species of the same group occur in the tropics, although most of these also range into the adjacent temperate regions. The scanty flora of the bed of the tropical oceans is still very imperfectly known, especially when compared with those of temperate waters, some of which present peculiarities by no means easy of explanation. The flora of the Australasian seas, for example, is quite as singular and unique as are the fauna and flora of the mainland; while the seaweeds of the Red Sea differ *in toto* from those of the Mediterranean. As a good example of the flora of the warmer temperate waters, that of the Bay of Naples may be selected. Here at low-water mark the sea-bottom is muddy and sandy with a substratum of rocks and stones; and upon this flourish luxuriant forests of red and green seaweed, which in deeper waters become either wanting or but poorly developed. The deeper zones possess, however, a rich plant-growth of their own, the sea-bed off Capri at a depth of from 60 to 65 fathoms having a luxuriant vegetation, while a stretch lying at a depth of about 30 fathoms is covered with a regular meadow of sea-grass, whereas in from 40 to 58 fathoms of water vegetation is altogether lacking. Near the surface plant-growth is strongest in winter and spring, while in the depths it is fullest in summer and autumn. Localities, which in winter are covered with a luxuriant growth, in summer are bare, and during the latter season many plants which belong to the upper zone retreat to the depths, a few even differing somewhat in form at the two seasons.

The floras of the cool temperate waters of the North Sea and Baltic have also been well investigated, and, since they are somewhat dissimilar, they may be taken as two representative northern types. As in all cool temperate waters, the brown seaweeds are predominant in size and quantity in both areas, the well-known bladder-wrack (*Fucus vesiculosus*) being chiefly characteristic of the upper zone of the rocky coast region, while the allied *F. serrata*, together with several other species characterised by their broad leaves, grows in deeper water. There are a number of other brown algæ, the thread-like group being rich in variety of form, whereas the red seaweeds are less abundant and varied, as they are in some localities in the Mediterranean. Of the green seaweeds there are but few forms, while the sea-grasses are only represented by the common grass-wrack (*Zostera marina*). Wide stretches of the rocky bed of the Baltic are covered with bladder-wrack, the most varied and luxuriant growth being found in the lower zone. On the other hand, the sandy and muddy bottom of the quiet bays presents a somewhat monotonous picture, being covered with sea-grasses down to a depth of 5 fathoms. The scantiness of the Baltic flora is attributed to the small amount of saline matter contained in the water, this sterility being most pronounced in the west and east where the water is the least salt. In these shallow seas the general growth in winter is much weaker than in summer. In spring the chalky ridge lying off the north of Heligoland is covered with fresh green seaweed, and farther on, near the edge of the surf, with the yellowish brown leaves of the tangle (*Laminaria*). In May these seaweeds are replaced by a dark red species, which disappears entirely in July; and in August and September the rock is covered with a brown robe, only to become bare once more with the approach of winter.

In the cooler southern seas the most remarkable seaweed is the giant *Macrocystis pyrifera*, which grows to a length of 1000 feet and exceeds all other ocean plants in size. Although the northern species of bladder-wrack has not been observed in southern waters, the group is represented by a few species in the vicinity of the Auckland Islands, where there are none of the sea-grasses so common on the coasts of Australia and New Zealand. The Antarctic and Arctic Oceans far surpass all the rest in the rich development of their vegetation, the brown and red seaweeds predominating, while sea-grass is absent.

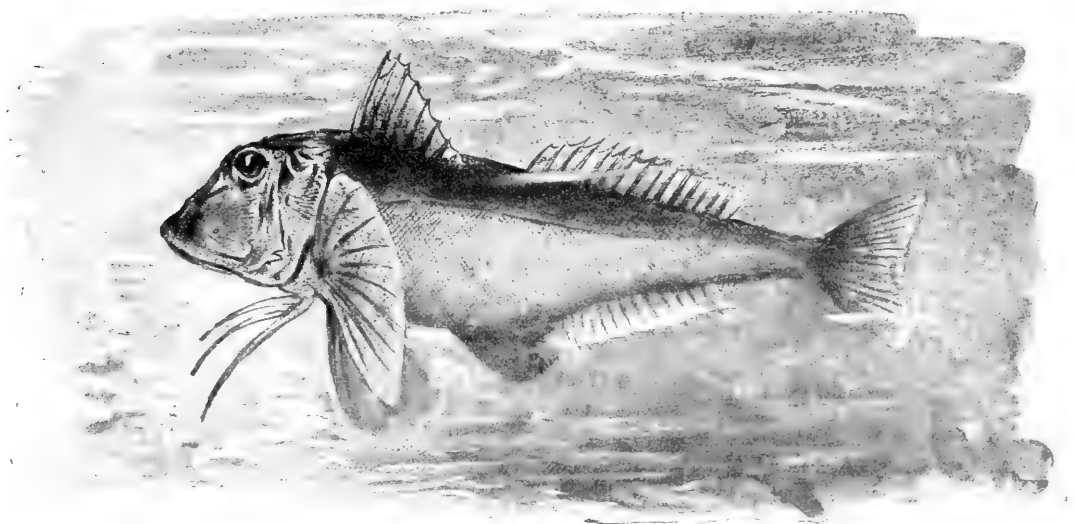
The pelagic, or floating flora of the ocean, consists mainly of microscopic organisms, most numerous within 100 fathoms of the surface. On the actual surface but few plants thrive, among these few being *Trichodesmium erythrum*, which by its abundance and red colour gives the name to the Red Sea.

**Bass and Sea-
Perches.**

Among the animal inhabitants of the ocean, fishes claim the most important position. In the sea dwell the greater number of the bony fishes, among which the first place is now generally assigned to the perch tribe. Closely allied to the true perches, which inhabit slightly salt as well as fresh water, are bass and sea-perches. Among these one of the most familiar is the common bass (*Labrax lupus*), which attains a length of 18 inches or more, and is fairly common in European seas. In appearance this fish is like a slender perch, slaty blue above and silvery below, with a dark spot on the gill-cover beneath the spines, while the paired fins are yellowish and the median fins grey. The group is confined to the North Atlantic and its branches and affluents; but the allied

genus *Serranus* is much more widely distributed, and its members, as a rule, are brighter in colour. The comber (*S. cabrilla*), for example, is orange-yellow with blue longitudinal stripes, while the dusky perch (*S. gigas*) is a rich reddish brown with two oblique stripes on the gill-covers running downwards and backwards. Both these species are British, the first being resident. A third species occasionally straying into British waters is *S. scriba*, of the Mediterranean, which is striped and streaked with blue and spotted with purple.

Belonging to another genus, with two species, is the stone-bass (*Polyprion cernium*), of which the colour is greyish yellow, marbled or blotched. Like *Serranus*, this genus has one dorsal fin in place of two, and the tail is not forked. The European species occurs in the Mediterranean and on the west coast of Europe, the other being found in the South Pacific. Another British fish of the perch tribe is the richly coloured *Dentex vulgaris*, gorgeous in a gold and silver and purple and blue



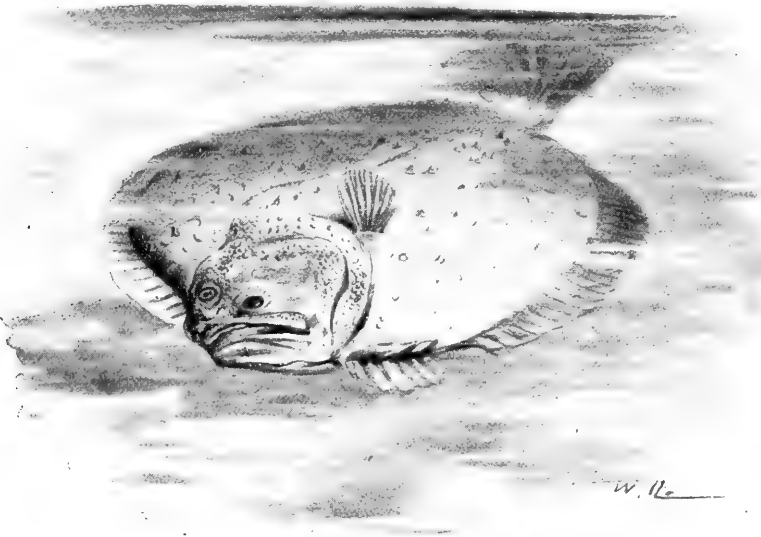
SAPPHIRINE GURNARD.

livery, and recognisable at a glance by the four front teeth in each jaw, of which the outer pair are much the larger. This is really the Mediterranean representative of a genus widely distributed in the Atlantic, Indian, and North Pacific Oceans, and especially numerous on the south coast of Africa.

Sea-Breams. The sea-breams (*Sparidae*) frequent the coasts of all tropical and temperate seas, conspicuous amongst them being the gilt-heads which take their name from the golden crescent between the eyes. Among several species, the silvery *Pagrus auratus* occasionally strays into British waters. All the sea-breams are deep and compressed fishes of brilliant coloration, many of them being scarlet or rose-coloured. In common with numerous other fishes, they retire in winter to the deeper parts of the sea, to return to shallow water as the weather becomes warmer and the spawning season commences.

Gurnards and Bullheads. The gurnards and their relatives the bullheads may be met with in all seas, generally near the coast and at the bottom. In the second genus the species known as *Cottus quadricornis* ranges from the British shores to

the Arctic Ocean, while the so-called "father lasher" (*C. scorpius*) has a nearly similar distribution. A third genus of the family, *Triglops*, is purely Arctic, and a fourth, *Bunocottus*, is Antarctic. The gurnards themselves are restricted to temperate and tropical seas, the two most familiar forms being the grey *Trigla gurnardus* and the sapphirine *T. hirundo*. The latter is a brilliantly coloured Mediterranean and north European fish, reddish brown above, reddish golden on the sides, and reddish white below, with large blue pectoral fins. All these fishes possess three free filaments at the base of the pectoral fins, which serve as organs of touch and also for walking on the sea-bottom; the broad pectorals likewise enabling their owners to spring some distance out of water.



TURBOT.

Flying Gurnards. In the flying gurnards (*Dactylopterus*), which belong to another family, the outstretched pectoral fins act almost as a parachute, so that these fish can skim the surface of the ocean in a manner similar to that characteristic of the true flying-fishes.

Dories. Grouped in another family consisting of two genera are the dories, the species most familiar to Europeans being the John Dory (*Zeus faber*), a flat and deep fish, with a row of bony plates along the bases of the dorsal and pelvic fins, and ragged filaments on the dorsal spines.

Flat-Fishes. In the valuable family of flat-fishes the adults of all are unsymmetrical, the head being so twisted as to bring the two eyes to the same side, which is always dark, whereas the blind side is normally white. All are carnivorous, and some members of the group abound on all muddy and sandy shores, where the colour of the dark side harmonises with that of the sea-bottom. They spawn in the first four or five months of the year, moving afterwards

in large shoals from deep water to the coast, where they remain in the shallows during the summer. The largest of the family is the halibut (*Hippoglossus vulgaris*), of which one example is recorded to have measured 20 feet in length. This is a North Atlantic species, unknown to the south of the Bay of Biscay. The smaller but more valuable turbot (*Rhombus maximus*) ranges into the Mediterranean, but does not occur on the American side of the Atlantic; its usual length is about 17 inches, although it occasionally reaches 28 inches. In place of scales, the body is sparsely covered with scattered bony tubercles. The brill (*R. lævis*) is a narrower fish, usually about 20 inches long, and covered with small smooth scales. In both the brill and the turbot the eyes are on the left side, whereas in the halibut they are on the right, as they also are in the plaice (*Pleuronectes platessa*), the type of the whole family. This species is common in British waters, whence it extends across the North Sea to the Baltic. It is specially characterised by the large reddish yellow spots on the dark side of the body and fins. To the same genus belongs the flounder (*P. flesus*), which has tubercles round the base of the fins, and is common in British seas and the Baltic, whence it ascends rivers for some distance. Perhaps the most highly esteemed member of the entire group is the sole (*Solea vulgaris*), in which the eyes are on the right side and the nostrils are equal-sized. Soles range all round the coasts of Europe, from the Mediterranean to the north of Scandinavia, where they frequent sandy or gravelly bottoms in rather shallow water. In the other species of this genus the nostrils are unequal.

Yet another family is typified by the greater weever (*Trachinus draco*), in which a long spine on the gill-cover is employed as a formidable defensive weapon. This species occurs throughout the Atlantic and also in the South Pacific off the coast of Peru.

The clumsy-looking lump-suckers are thus named from the presence of an adhesive disc on the under surface of the body formed by the coalesced and aborted pelvic fins. A well-known representative of the group is the common lump-fish (*Cyclopterus lumpus*), met with abundantly in the colder latitudes of the Northern Hemisphere, in which the males are generally red, the females blue, and the young green or yellow on the under surface.

The blennies, on the other hand, constitute a family (*Blenniidae*) by themselves, comprising about two hundred species distributed over the temperate and tropical seas, although some inhabit estuaries and fresh waters. The typical species is the viviparous blenny (*Zoarces viviparus*) of the eastern North Atlantic, which attains a length of 2 feet or more, and brings forth as many as two hundred young at a time. When born, these are more than an inch long, and able to take care of themselves. Belonging to the same family, but very different in appearance, is the eel-like butter-fish (*Centronotus gunnellus*), which derives its name from the slime on the body.

Another and much more ferocious representative, common to the temperate coasts of northern Europe and North America, is the ugly wolf-fish (*Anarrhichas lupus*), which grows to 6 feet or more in length, and possesses a formidable set of crushing teeth. Although these fishes are capable of defending themselves with ferocity, and will attack even human beings, they appear to have received their

specific title from an idea that they are as destructive to other members of their own tribe as sharks. As a matter of fact, their food consists almost entirely of shelled molluscs, crabs, and sea-urchins, for seizing and crushing which their armature of teeth is adapted. The misnomer is not restricted to the name wolf-fish and its Latin equivalent, for the name *Anarrhichas*, bestowed in 1560, refers to a notion that the wolf-fish is in the habit of climbing out of the water on to the rocks. Wolf-fish is not the only name for the species, for, in common with many other kinds, it is known as "cat-fish," or its Scandinavian equivalent *Halfkatten*, while in the Orkneys it is termed "swine-fish," on account of a pig-like movement of the nostrils. Wolf-fishes, of which there are several species in the colder seas of the northern hemisphere, live in deep water, where there is a complete absence of light, and only enter the shallows during the spawning season, when they remain quiescent during the day and are active only at night. The voracity of these fishes is exemplified by the fact that at least five quarts of sea-urchins were taken from the stomach of an American specimen; while in that of a second was found an equal quantity of sea-urchins and whelks, the shells of many of the latter being merely cracked. In other instances the contents of the stomach have included scallops, crabs, hermit-crabs, and brittle-stars, so that the nature of the food seems to depend on local conditions. A remarkable habit, apparently connected with feeding, was recorded in 1886 in connection with the Alaskan wolf-fish (*A. lepturus*). Attention was directed to a mass of turf floating in the sea and undergoing strange movements. A native stated that these movements were due to a wolf-fish, and when a canoe was brought close to the sods this was found to be true, the fish being seen tearing at the grass, and not desisting till driven off with a paddle. So well is this habit known to the natives that they are accustomed to catch wolf-fish by means of hooks baited with grass roots. Such attacks on floating masses of vegetable matter are for the purpose of obtaining crabs and molluscs that may be lurking in these sods rather than for the sake of eating the grass.

To another group belong the well-known sticklebacks, all of which can exist in the ocean, although the majority prefer fresh water. The exception is the fifteen-spined species (*Gasterosteus spinachia*), which never leaves salt or brackish water. This species is restricted to European seas, where it ranges northwards from the Bay of Biscay. Indeed the whole group is either arctic or temperate in distribution. Sticklebacks, as mentioned in an earlier chapter, build nests, which are guarded by the males.

A most important group is the cod tribe (*Gadidæ*), in which the soft, dorsal fins (varying in number from one to three) extend along the greater part of the back, and the pelvic pair, which are situated far forwards, may include several rays or be reduced to mere filaments.

The common cod (*Gadus morrhua*), though varying much in colour and size, may always be distinguished by the white lateral line. Like all the other species of its genus, it has three dorsal and two anal fins. Next in importance as a food-fish is the haddock (*G. aeglefinus*), characterised by the lateral line being black. Both kinds inhabit the North Atlantic above the fortieth degree of latitude. The whiting (*G. merlangus*) differs from both the preceding by the absence of barbels, and is also lighter in colour than the cod, with the under-parts white and

a black spot at the base of each pectoral fin. Of inferior quality is the coal-fish (*G. virens*), so named on account of the blackness of the upper-parts. In this fish, which has more than fifty English popular names, the lower jaw projects beyond the upper, thus affording an easy means of distinction from the three preceding species. It is further characterised by carrying a small barbel, and by the straightness of the lateral line, which is white. In habitat it is a North Atlantic species, occurring commonly as far north as latitude 80°, but only singly in the Mediterranean and Baltic. In America this fish is miscalled the pollack, although the fish (*G. pollachius*) properly entitled to that name is confined to the west coast of Europe, and is a much handsomer species, showing golden and silvery tints on the sides.

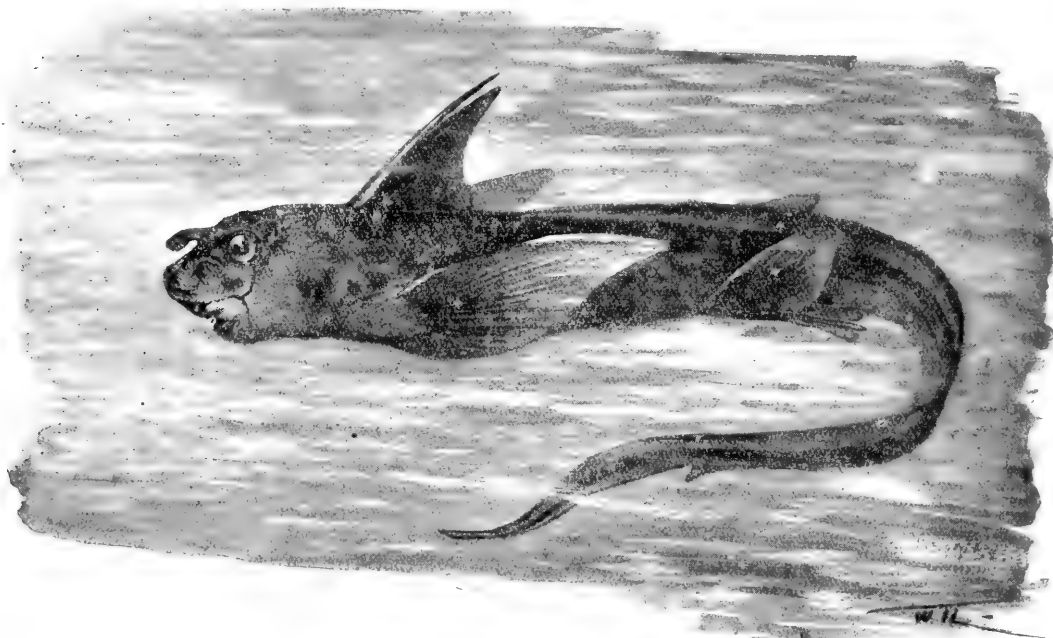
The other members of the group, all characterised by the presence of one anal and two dorsal fins, include the hakes, among which the European *Merluccius vulgaris* is a small-scaled fish of elongated form with large, pointed teeth and no barbels. In colour it is brownish grey speckled with black above and silvery white beneath. From this species the ling (*Molva vulgaris*) differs by possessing a barbel, while the lower teeth are alone large, and the median fins bordered with white. Another genus of the group with a much more extensive distributional area is the one which includes the rocklings (*Motella*). In these fish both dorsal and anal fins are single, the front portion of the former being reduced to a mere fringe with the first ray long and spiny. In the allied genus *Raniceps*, on the other hand, the dorsal fin is double, although the first is rudimentary and includes but three rays. In British seas this group is represented by the lesser hake (*R. raninus*). Another British cod, the torsk (*Brosmius brosme*), which possesses but one dorsal fin extending along the greater part of the back, is a deep-water fish, ranging southwards from the Arctic seas, and frequently found in company with ling, both being well-known food-fishes in the north of Europe. In these fishes the anal fin commences near the throat, but in the allied sand-eels it is placed much farther back.

Sand-Eels. Of the not very numerous species, the larger sand-eel (*Ammodytes lanceolatus*) occurs commonly on the eastern coasts of the North Atlantic, and in the Baltic, as well as in the Mediterranean, where it burrows in the sand, and subsists on worms and other invertebrates. Owing to its silvery skin, it is much used as bait by fishermen. The lesser sand-eel (*A. tobianus*), which has similar habits and much the same distribution, is distinguished by the fins being curved in outline instead of straight.

Salmon Tribe. The great salmon family includes both marine and fresh-water forms, and although some are restricted to the deep sea, those most familiarly known are either in the habit of ascending rivers to spawn, or spend the whole of their time in the latter. The carps, being exclusively fresh-water, need no mention here.

Herring Tribe. The herrings, on the other hand, are as characteristically marine fishes, but are seldom found far from shore, although they range throughout the temperate and tropical zones. The first group includes the numerous kinds of anchovy, among which the common *Engraulis encrasicolus* is confined to the European side of the North Atlantic, ranging from Norway to the

Mediterranean, where it is most abundant. Of true herrings there are over sixty species, the most important being the common *Clupea harengus*, which occurs in the North Pacific as well as in the North Atlantic, and contributes so largely to the food-supply of Britain and other European countries. From its larger relative, the common sprat (*C. sprattus*) differs by having the dorsal fin nearer the tail, that of the herring commencing half-way between the muzzle and the base of the tail. It is also distinguishable by the sharp spines on the keeled abdomen. Sprats are generally said to be confined to the North Atlantic, but an apparently similar fish is also met with off the coasts of Tasmania. The fry of sprats, together with those of the herring, constitute "whitebait." In that very distinct fish the pilchard (*C. pilchardus*) the dorsal fin is nearer the head than the tail; while, in common



THE CHIMERA.

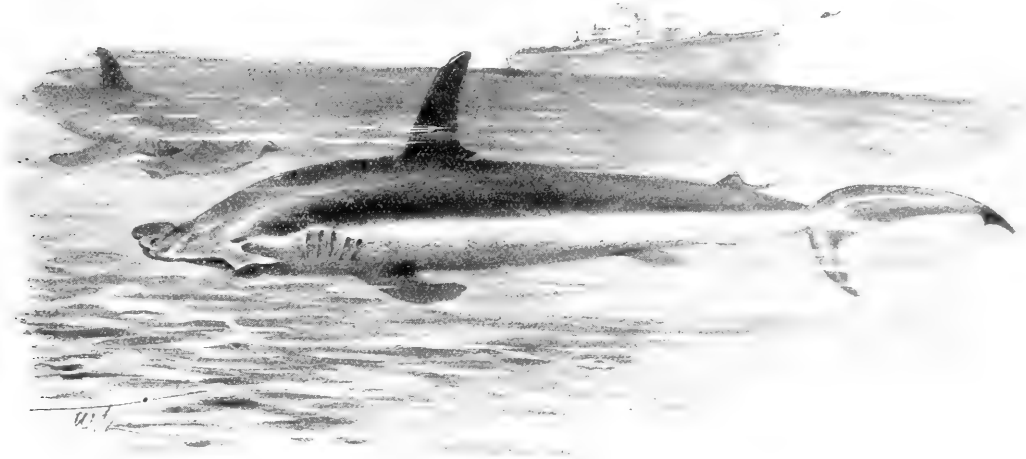
with the other members of the genus, the upper jaw does not, as in the anchovy, project beyond the lower. In the immature condition these fish are known as sardines. Pilchards inhabit the North Atlantic, the Mediterranean, and the North Sea, but do not enter the Baltic or range across to America. In the British Isles they are most abundant off the Cornish coast. Of the two other important European species of *Clupea*, the shads, the twait-shad (*C. finta*), ascends the Nile.

Eels.

Eels are represented in almost every temperate and tropical sea and river, where the numerous species are not confined to any particular depth, some thriving in the shallowest water, while others live in the open ocean hundreds of miles from land. Conger eels (*Conger*) live permanently in the sea, but true eels (*Anguilla*) descend from fresh water to the ocean,

whence they never return. The fry are transparent creatures known as *Leptocephali*. Apparently the breeding-resort of the eels of northern Europe is in deep water outside the 500-fathom line to the south-west of Ireland, where their *Leptocephali* have been taken in abundance. It by no means follows that all north European eels which reach the sea arrive at the breeding-area, and possibly Finnish eels never breed at all. If this be so, it is practically certain that young eels, or elvers—unlike young salmon—do not return to the rivers from which their parents started; this being improbable, seeing that eels are hatched in the sea.

Naturalists are still in ignorance with regard to the age of the youngest *Leptocephalus* larva at present known, namely, specimens of about 7 cm. in



HAMMER-HEADED SHARK.

length, it being uncertain whether these are six or eighteen months old. Of younger larvæ and the eggs nothing is known, and we are also ignorant as to the interval which elapses between the arrival of eels in the sea and their spawning. Neither is it known what becomes of eels subsequent to spawning; possibly they die soon after this event, although they may live for a considerable period. All that is definitely known is that after having once entered the sea they never return to fresh water.

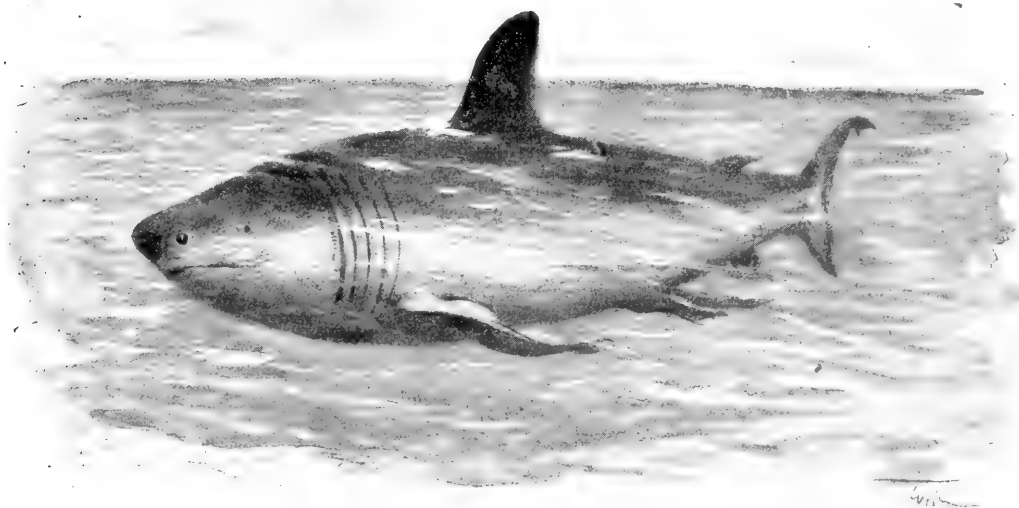
In Sweden, as the result of recent investigations it has been found that the great majority of the five-year-old eels collect at the mouths of the rivers discharging into the Gottland and Botten lakes, where they remain in a barren condition from five to seven years, after which they make their way, as ten- to twelve-year-old fishes, by the Kattegat, the Skagerak, and the North Sea to the Atlantic for the purpose of spawning.

Chimæra.

All the foregoing groups are included in the class of bony fishes. That strange fish the sea-cat, or chimæra (*Chimæra monstrosa*), represents, on the other hand, a totally distinct section—the Holocephali. This fish, which ranges throughout the Atlantic and North Pacific, bears on its head the curious crown-like structure from which it derives its popular title of “king of the herrings.”

Sharks.

A third, and at the present day far more important, section of the class—the Elasmobranchii—includes the predaceous sharks and rays. Although sharks are most numerous within the tropics, many of them range into temperate seas. Among those which occasionally put in an appearance in



BASKING SHARK.

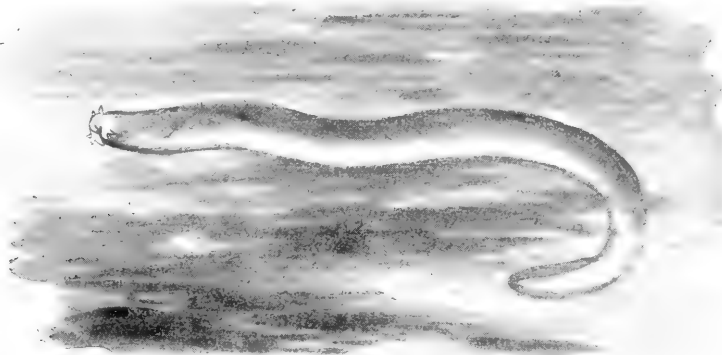
British waters, the most striking is the great blue shark (*Carcharias glaucus*), which reaches a length of 25 feet and is found in both the Atlantic and the Pacific. The tope (*Galeus vulgaris*), which belongs to the same family and has nearly the same distribution, is much smaller, rarely exceeding a length of 7 feet. The strange-looking hammer-head (*Zygæna malleus*) is a cosmopolitan species, whose chief peculiarity is sufficiently indicated by its name. Of more normal form is the smooth hound (*Mustelus vulgaris*), which measures from 3 to 6 feet in length, and differs from the tope by having the second dorsal fin much smaller than the first. It is less common in British waters than its cousin the tope.

The largest shark of the North Atlantic is the basking species (*Cetorhinus maximus*), a fish with a huge mouth but very small teeth. This shark is quite harmless to the larger denizens of the sea, except when attacked, and subsists on

invertebrates or fishes. It is much hunted for the sake of its oil, of which a specimen 31½ feet in length yielded no less than 198 gallons. A commoner species, the rough hound (*Scyllium canicula*), which sometimes reaches just over 40 inches in length, but is generally smaller, preys upon small fishes and marine worms, digging for the latter in the sand. Its range extends from the Mediterranean all round the coasts of Europe. In colour this shark is reddish blotched with brown. Its relative the nurse-hound (*S. catulus*) does not range so far north, but attains larger dimensions, being known to reach a length of 4 feet. It may be distinguished by the circumstance that the oval fin terminates below the second dorsal instead of between the two dorsals.

Rays.

The electric rays are so called on account of the presence of an electric organ between the head and the pectoral fin. Of the half-dozen members of the group (all of which can give a powerful shock) the common torpedo (*Torpedo nobiliana*) reaches about 4 feet in length, and inhabits the Mediterranean and the Atlantic as far south as Madeira. More familiarly known



HAG-FISH

are the true rays, or skates, among which the common skate (*Raia batis*) is largely used as a food-fish on the European coast of the Atlantic. This species also ranges into the Mediterranean, the North Sea, and the Baltic.

Another well-known representative of the group is the thornback skate (*R. clavata*), the skin of which is protected by spines and tubercles, irregularly dotted all over the back. Even more formidable is the sting-ray (*Trygon pastinaca*), whose body is pear-shaped, while the long tail, in lieu of fins, is armed with a serrated spine capable of inflicting a dangerous wound. This species is found in both the North Atlantic and North Pacific, where it is most abundant in the warmer zones. Of the whip-rays, so called from their whip-like tails, the most notable are the ox-ray (*Dicerobatis giornæ*) of the Mediterranean, and the devil-fish (*D. diabolus*) of the West Indies, the latter attaining a length of 10 feet, with a diameter of 18 feet.

Lampreys and

Hag-Fishes. Following after the true fishes come the lampreys and hag-fishes, which are included by naturalists in a class by themselves. Both prey on fishes, but whereas lampreys attach themselves to the outside, hag-fishes

bore deeply into the tissues of their victims. The sea-lamprey (*Petromyzon marinus*), like the rest of its kind, is a native of the North Atlantic, but the other generic groups are restricted to the Southern Hemisphere. Hag-fishes have the same distribution as the cod family, in the bodies of whose members they so frequently take up their abode. The European *Myxine glutinosa* is confined to the North Atlantic, where it is most common in the fiords of the Norwegian coast.

Lancelets. The tiny, transparent fish-like creatures commonly known as lancelets belong to a group standing on the borderland between vertebrates and invertebrates. In the common lancelet (*Branchiostoma lanceolatum*), which is between 2 and 3 inches in length, the body is laterally compressed and pointed at the two ends. There are no paired fins, but the back carries a long dorsal, supported at the ends by gelatinous rays, and there is also a tail-fin; the lower part is similarly strengthened. Lancelets often bury themselves in sand, but also swim in long chains composed of numerous individuals united together by their heads and tails.



THE LANCELET.



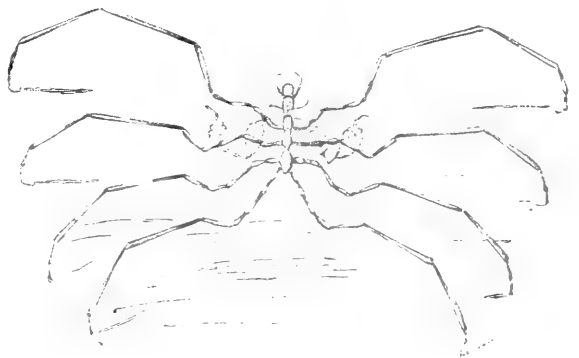
EDIBLE CRAB.

CHAPTER VI

LOWER FORMS OF MARINE LIFE

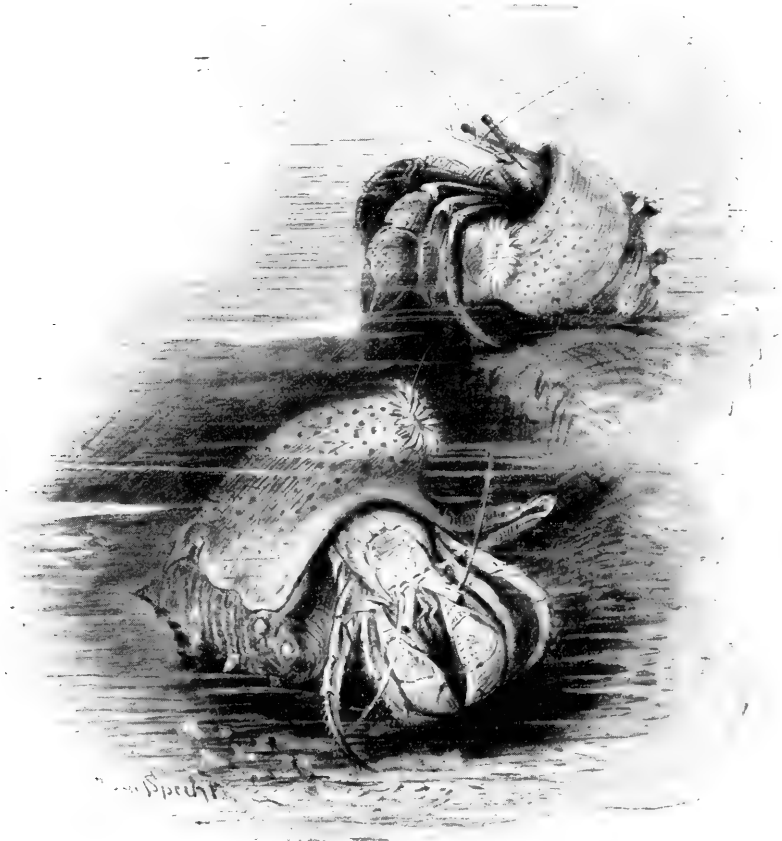
Sea-Spiders. OF the many forms of invertebrate life inhabiting the northern seas, none are more noteworthy than the curious sea-spiders, some of which live in the ocean-depths, while others are found within the tide-range, where they move about slowly, creeping or climbing over plants and stones. Of the latter section of the group a not uncommon representative is the slender sea-spider (*Nymphon gracile*).

Crabs, Lobsters, Shrimps, etc. The crabs, lobsters, shrimps, and their allies, constituting the Crustacea, abound in all seas.



SLENDER SEA-SPIDER.

Among the short-tailed group, the common edible crab (*Cancer pagurus*) is to be met with in large numbers at low water on the coasts of Europe, while still more abundant is the familiar shore-crab (*Carcinus mœnas*), which is eaten in Italy and elsewhere. The thornback crab (*Maia squinado*) is easily recognisable by the peculiar form of the shell, which is broad behind and narrow in front, where it terminates in a spine between the eyes. This crab is common in European seas, especially the Mediterranean. In this species the upper surface is thickly overgrown with seaweeds, but that of the woolly crab (*Dromia vulgaris*) is



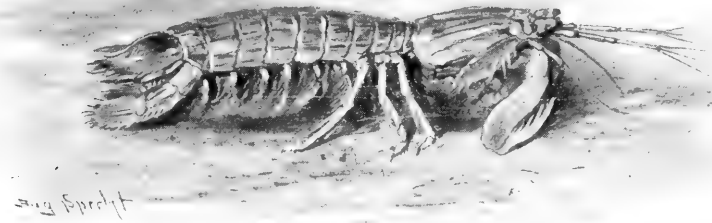
PRIDEAUX'S HERMIT CRAB.

generally covered with sponges, which are held in position by the hind-legs, and carried about as a means of concealment. Of the long-tailed group, the hermit-crabs form a remarkable section distinguished by the soft-skinned abdomen, which is protected within the empty shell of some univalve mollusc. One species, Prideaux's hermit-crab (*Eupagurus prideauxi*), sometimes met with in European seas, almost without exception carries on the annexed shell a sea-anemone (*Adamsia palliata*). How the crab selects the particular kind of anemone, or the anemone the particular kind of crab, is quite unknown.

The crayfish, as exemplified by the common *Palinurus vulgaris*, are specially

characterised by the length and stoutness of the feelers or antennæ, and the small size of the claws. In the lobsters, on the other hand, of which *Astacus gammarus* is the familiar representative, the antennæ are shorter and more slender, and the claws of the first pair of limbs are much larger and more powerful. The Norwegian lobster (*Nephrops norvegicus*) has the large claws longer, more slender, and covered with tubercles. Prawns (*Palæmon*) differ from lobsters in having the first pair of limbs no larger than the three hinder pairs, while it is the second pair which is the largest, although, like the latter, the first pair is armed with pincers. In the brown shrimps of the genus *Crangon* the last joint of the first pair of limbs is capable of being folded back on the next joint, and there is no long spine on the head extending beyond the middle pair of antennæ.

To another group of crustaceans belong the mantis-shrimps, so called on account of the resemblance of their enlarged pair of limbs to those of the mantises or praying-insects. The common *Squilla mantis* of the Mediterranean, occasionally met with in British waters, measures about 7 inches, and in some countries is used



MANTIS-SHRIMP.

as food. As a well-known representative of another group, the rattle-spider (*Idotea tricuspidata*), the sheep-worm of the Baltic fishermen, may be briefly mentioned. This species is specially remarkable on account of the variability of its markings, and the changes of colour it exhibits within extremely restricted areas. Sometimes it is pale yellow, and at others pale brown, green, or red, while in other cases it is spotted or striped longitudinally or transversely. Those individuals which live near together, are, however, invariably alike, and in colour and markings are perfectly adapted to their environment. On green seaweeds they are green, while if the seaweeds are brown or red the rattle-spiders are coloured to match, as they also are when living upon decaying vegetable matter.

Barnacles.

Omitting mention of the smaller forms of crustaceans, a short space may be devoted to barnacles, which in the adult state are so unlike ordinary crustaceans that few persons will believe that they belong to the same class. When, however, the valves are open, the delicate organs from which they derive their name of cirrhipeds will be seen to correspond to the limbs of crustaceans, and in the young state they are free-swimming. They attach themselves head downwards to rocks, piles, ships' bottoms, seaweeds, or the shells or bodies of

animals; some affixing themselves to mussels, others to corals or crabs, and a few to the bodies of whales. Of the commoner kinds, the stalked barnacle (*Lepas anatifera*), which has the body compressed laterally, is furnished with a long naked stalk, upon the extremity of which are carried the several shelly valves.

Acorn-barnacles (*Balanus*), which live within tide-range, have no stalk to the shell but resemble the stalked forms in general structure, although the base of the shell is welded into a solid cone resembling a miniature volcano, at the summit of which are the movable valves. These barnacles affix themselves to rocks, piles, snells, or seaweed, but never to coral-reefs. They are widely distributed, their range extending from latitude 74° 18' N. to Cape Horn, although they are rather more abundant in temperate waters than elsewhere. Such of the allied forms as attach themselves to floating objects are frequently modified to suit the special conditions; the whale-barnacles of the genus *Coronula* having, for example, flattened crown-shaped shells.

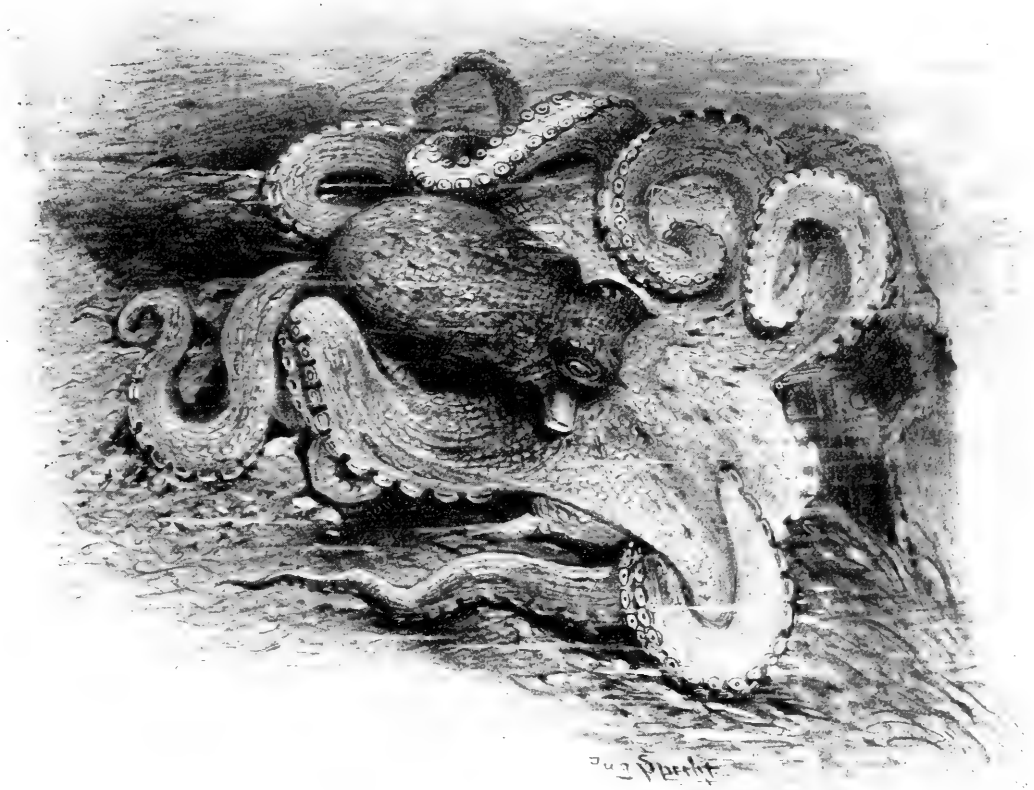
Cuttlies and Squids. No group of animals is more abundantly represented in the ocean than that of the shell-fish, or molluscs, and in none is the distribution more dependent on depth and temperature, while in none are different regional marine faunas more clearly differentiated. Of the four main divisions, the one which includes the cuttlies and squids is exclusively marine. One of the most familiar in this group is the octopus or kraken (*Polypus vulgaris*), of the Mediterranean and west European seas, where it lurks in rocky clefts or other hiding-places, and feeds voraciously and indiscriminately on all kinds of animal substances. To the same section belongs the paper-nautilus, the females of which exhibit the peculiarity of secreting the well-known delicate shell as a protection for their eggs, this shell being unattached to the body and capable of being discarded. Of the four kinds of paper-nautilus, which are found in all the warmer seas, the common *Argonauta argo* is Mediterranean, while *A. tuberculata*, distinguished by the knotted ribs and tubercles on the shell, inhabits the Indian Ocean.

In a second section of the group, distinguished by the presence of ten, in place of eight, tentacles around the mouth and the horny nature of the internal skeleton, or pen, mention may first be made of the genus *Ommastrephes*, in which the body is cylindrical and pointed behind, and furnished with two terminal fins. These short-armed gregarious cuttlies, which swim very fast and follow shoals of young mackerel, form the principal food of several kinds of dolphins. One of the most abundant species (*O. sagittatus*) inhabits the Mediterranean and Atlantic, and is largely used as bait in Newfoundland, where it is occasionally eaten as food.

The giant cuttlies (*Architeuthis*), which belong to the same family, attain a length of from 40 to 50 feet, and are occasionally met with on the coasts of Ireland, Japan, New Zealand, and Newfoundland. The calamaries are also long in shape, but the pen, instead of being narrow with a hollow cone at the hind-end, is broadly lanceolated and pointed in front, with the shaft keeled on the lower side. These calamaries are cosmopolitan in distribution, the best known being perhaps the common squid (*Loligo vulgaris*), so abundant in the Mediterranean and Atlantic. In these squids the pen is as long as the body, whereas in the allied *Sepioida* it is but half this length and proportionately narrower. In the Mediterranean and Atlantic the latter group is represented by Rondelet's calamary (*Sepioida rondeleti*).

Belonging to the same family (*Sepiolidae*) is another British genus, *Rossia*, which differs in having the dorsal surface of the investing "mantle" strengthened by a ridge instead of being united with the head by a band.

In the true cuttles of the family *Sepiidae* the pen is replaced by the so-called "cuttle-bone," which has a thin horny margin, is oval in shape, thick in front with the hind-end hollow and furnished with a spine. The common cuttle (*Sepia officinalis*) of European seas is notable on account of the unusual beauty of its



THE OCTOPUS.

coloration, the back being generally brownish spotted with white, while the under-parts are paler and the sides violet, with the arms or tentacles greenish.

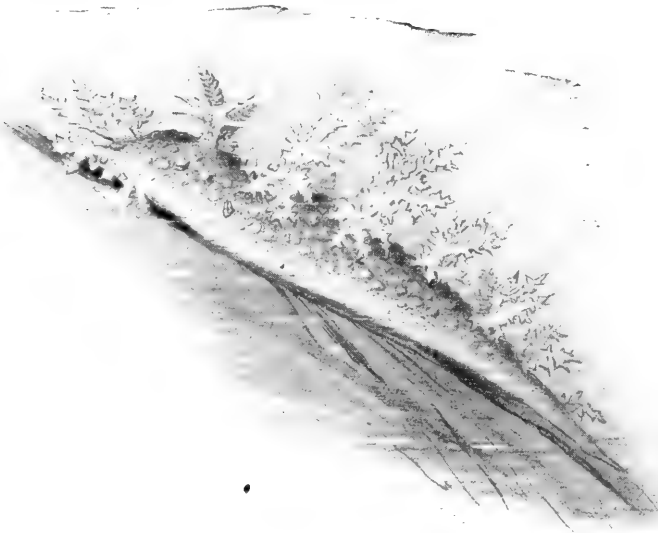
Gastropods. In the northern seas, as elsewhere, the gastropods or univalves are more numerous represented than any other class of the Mollusca, but a mere list of their genera would occupy so many pages that we must restrict our remarks to a few of the more familiar or those of interest from our special point of view. The common whelk (*Buccinum undatum*), for instance, ranges from the coast of Norway to the east coast of the United States north of Cape Cod Bay. The family (*Buccinidae*) is widely dispersed in the northern and Antarctic seas, and one representative, *Euthria cornea*, affords a striking instance of discon-

tinuous distribution, being found in the Mediterranean and on the coast of New Caledonia.

The red whelk or buckie (*Fusus antiquus*), the largest of the British univalves, ranges through the North Atlantic, North Pacific, and Arctic Oceans, the family (*Fasciolaridae*) occurring in every sea. Another common British gastropod, the dog-whelk (*Nassa reticulata*), resembles the last in belonging to a widely spread genus ranging from the Arctic to the Antarctic in both hemispheres. In the same group are included the murices (*Muricidae*), of which the wide-mouthed *Purpura patula* is a well-known Mediterranean representative; in this the ovate, blackish brown diagonally furrowed shell is about 3 inches long. From its name it might be supposed that the famous Tyrian purple was a product of this species, but this is not the case, the dye being yielded by two species of the typical genus *Murex*.

One of these is the fire-horn (*M. brandaris*), of the shells of which there is a vast accumulation on the site of the ancient dye-works at Taranto in Italy. In length this shell measures about $3\frac{1}{2}$ inches, and the colour is pale ashy grey.

The iridescent ear-shells or ormers of the family *Haliotidae* are the representatives of a group of uni-



A NAKED-GILLED GASTROPOD.

valves distinguished from all the foregoing by the structure of the heart. Ear-shells, which take their name from their enormous apertures, are iridescent only on the inside, the outer side being rough so as to harmonise with the rocks to which they cling after the manner of limpets, from which they may be distinguished by their form and the row of perforations in the shell. The common ormer (*Haliotis tuberculata*), of the Channel Islands and the Mediterranean, is offered for sale in the Italian fish-markets. Equally edible, but far larger, is the giant ear-shell (*H. tubifera*) of the eastern Asiatic and Australian coasts, the wrinkled shell of which is 6 inches or more in diameter and of a reddish colour externally. Even more widely distributed are the limpets (*Patellidae*), which are found on the coasts of northern Europe, where ormers are unknown. The simple unperforated conical form of the limpet-shell is sufficient to distinguish the group, the members of which live between tide-marks and have one particular spot to which they return daily after their wanderings in search of food.

Quite different from all other gastropods are the chitons (*Chitonidæ*), which have the habits of limpets, but in external appearance look more like huge woodlice. the shell consisting of a number of movable transverse plates, and the animal having the power of rolling itself up into a ball. Ranging in size from half an-inch to 6 inches, they are found in all seas, generally near the shore but sometimes at great depths. They are never very abundant, although there are no less than eleven species on the British coasts, the largest of these being *Chiton discrepans*, in which the length of the shell is about $1\frac{1}{4}$ inches.

An important group of gastropods characterised by the backward position of the gills have the shell either wanting or more or less completely enveloped in the body. Among the latter section of the group are the so-called bubble-shells, typified by *Bulla ampulla* of the Atlantic and Indian Oceans. In this species the shell is smooth and globose, marked with brown specklings upon a yellowish ground. Another type is presented by the globe-shell (*Acera bullata*) of European seas, which swims by means of the side-lobes which envelop the rounded shell. A second section, in which the shell is small or occasionally absent, includes the miscalled sea-hare (*Aplysia depilans*) of the Mediterranean, in which the shell is arched and flat and measures no more than a couple of inches, although the length of the entire animal is 9 or 10 inches. The naked-gilled gastropods, which include some seventeen families, have no shells in the adult state and differ in many other respects from the foregoing. One of the most striking forms is *Dendronotus arborescens*, of the seas of northern Europe, which is covered with such a mass of tentacles as to resemble a moving bunch of seaweed, this structure being intended for its protection.

Among the pelagic molluscan fauna of the sea—that is to say the free-swimming forms found on its surface—none are more important than the pteropods, so called from the pair of fin-like structures into which the lateral portions of the foot have been modified. By their aid these small molluscs, which often occur in countless millions, rise at the approach of night from the ocean depths to the surface, where they swim about for several hours in search of food. When satisfied they again sink to the depths, contracting their fins and withdrawing the body into the shell or mantle. Pteropods inhabit every sea, not even excepting the Arctic Ocean; and in many regions the ocean floor is strewn with their empty shells for acres. One of the northern forms constitutes a large proportion of the food of the Greenland whale. In one group the shell persists throughout life, whereas in a second it disappears before maturity is attained. The members of the shelled group subsist on algæ and animalcules, and themselves yield the chief food-supply of their naked relatives.

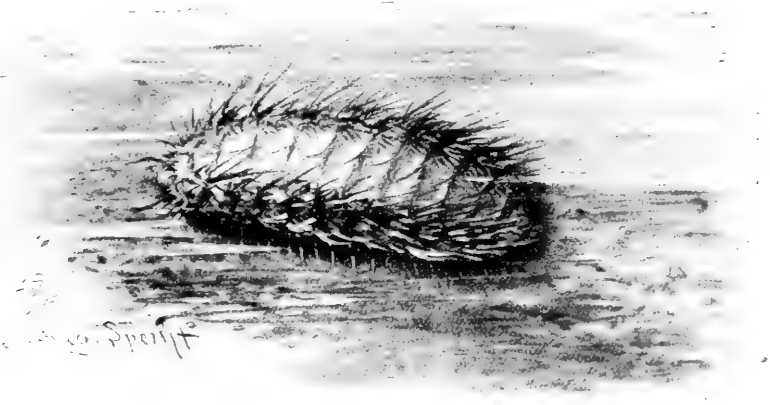
Far more numerous, and therefore of more importance to the student of distribution, are the bivalve molluscs, or Pelecypoda, among which are included certain modified forms, like the so-called ship-worms, whose shell, although starting with two valves, eventually assumes a tubular form. These ship-worms (*Teredinidæ*) bore only in wood, where their tunnels take all sorts of directions. In the common European *Teredo navalis* the pair of long siphons, which when at rest are included in the tube, do not exceed 8 inches in length, whereas in *T. arenaria*, of the Indian Ocean, they may grow to a couple of feet. In the piddocks or pholases, on the other hand, as typified by the common

European *Pholas dactylus* (which is also South African), the two valves remain separate throughout life, and are supplemented by additional valves. Piddocks form vertical tunnels in rocks varying in hardness from mud to limestone. The common European gaper (*Mya arenaria*) typifies another group of boring bivalves, which dig a foot or so deep into sandy or muddy sea-bottoms. The shell, which is ovate and inequivalve, gapes at both ends, and the siphons are long and united. Four other genera are included in the *Myidæ*, but the common European rock-borer (*Saxicava rugosa*) typifies a second family, whose members range down to a depth of 550 fathoms and bore only in soft stone. In the European species the shell does not exceed $1\frac{1}{2}$ inches in length, and is abruptly truncated at the hinder end. Between this family and the one previously mentioned come the razor-shells (*Solenidæ*), which bore vertically into sand, and have shells resembling a scabbard, either curved or straight, open at the two ends, and united for a part of one side by a horny ligament. *Ensis siliqua* is a well-known species common to Europe and North America. The tellins (*Tellinidæ*) are distinguished by having the shell compressed, with the valves equal and the ligament external. In the European *Tellina balthica* the shell is pointed at the hinder end, with the margin rounded in front and the hinge-line curved, the colour being reddish or yellowish banded with white. Two of the North Atlantic tellins, *T. fabula* and *T. tenuis*, are also found in South African waters. In the Venus-shells (*Veneridæ*) the hinge has usually three long diverging teeth, the ligament is external, while the muscular scars in the interior are oval and distinct, and the impression formed by the margin of the lobes of mantle is curved. A well-known form is the clam (*Venus mercenaria*) of the west shore of the North Atlantic, whose heart-shaped, straw-coloured shell is spotted internally with violet. Clam-shell discs strung together were formerly used by the Indians for currency and other purposes, under the name of wampum.

The scallop-shells (*Pecten*) as a rule swim freely and strongly by flapping the valves of their shells together. They have a more or less circular equilateral shell, with prominent ears, and when the valves are not equal rest on the bottom with the flatter one uppermost. Two of the common British species—*P. maximus*, the scallop, and *P. opercularis*, the quin—are edible. The pilgrim-shell, *P. jacobæus*, famous as having been worn in the hats of the pilgrims to the Holy Land, resembles *P. maximus* generally, but has the ribs of the lower valve angulated instead of rounded. The file-shells (*Lima*) form a closely related family, in which the valves are equal and compressed and the shell is obliquely oval with the anterior side straight and gaping. It is nearly always white. Some of the species build nests of broken shells and other fragments in which they become enclosed and anchor themselves by the byssus; but other species are free. The commonest British species (*L. hians*) is conspicuous for the bright orange colour of its mantle lobes.

In the next family (*Spondylidæ*) there is no byssus, but the foot has an appendage, the shell is usually spinose, and there are two cardinal teeth in each valve. The red oyster of the Mediterranean (*Spondylus gæderopus*) is perhaps the best known representative of the family. The oyster-family also belongs to this order; one of the most familiar species in Europe being the common oyster (*Ostrea edulis*), which is confined to the eastern side of the North Atlantic and most numerous in the North Sea, though there are about seventy other species distributed through-

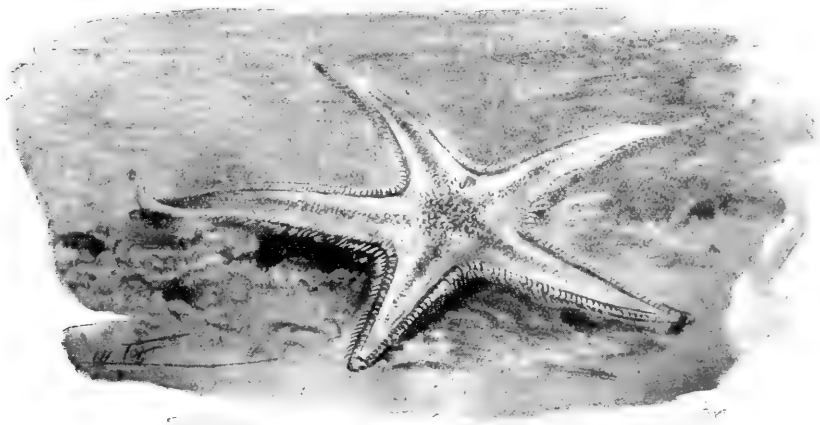
out the tropical and temperate seas. In *O. edulis* the sexes are united in one individual, but in another European species, *O. angulata*, as in the American oyster, *O. virginia*, they are separate. Two other Atlantic species of the American coast, *O. concophila* and *O. lurida*, are both edible; and the edible species of the Pacific are all different in widely separated localities.



HERMIONE HYSTRIX.

Worms.

In the large group of worms or annelids the members of the many-bristled section are exclusively marine. Conspicuous among these is the sea-mouse (*Aphrodite aculeata*), whose body is covered with iridescent, fringe-like bristles glittering like gold. In this form the fifteen pairs of so-called

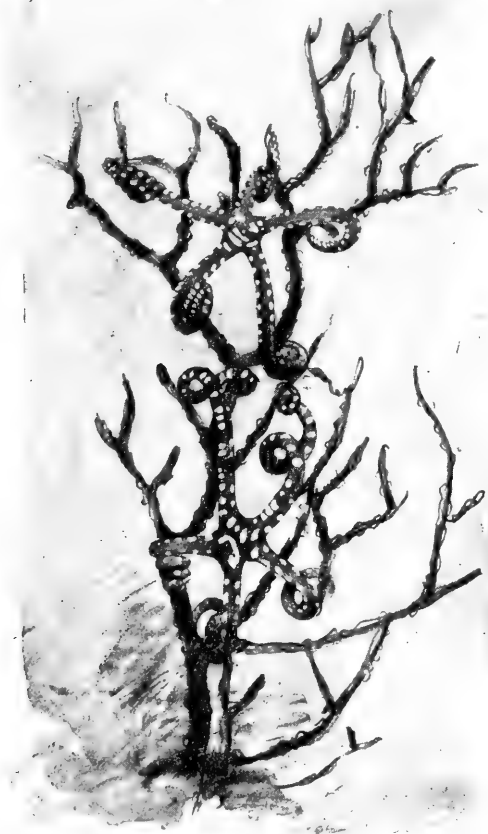


ORANGE COMB-STAR.

elytra are hidden beneath a felting of hairs; but in the allied *Hermione*, which is also European, the felting is absent and the elytra are exposed. In another group of bristle-bearing annelids, which live in tubes and burrows, is included the lug-worm (*Arenicola marina*) so common on the flat sandy shores of Europe between

tide-marks. Nearly allied are the sabellas and serpulæ, the former of which make tubes of sand and fragments of shell aggregated into rock-like masses, while the latter secrete stony tubes, from the summits of which are protruded clusters of graceful tentacles. One of the most beautiful is Spallanzani's tube-worm (*Spirographis spallanzanii*), of the Channel Islands and the Mediterranean, which has an upright spiral tube and unsymmetrical white, violet, or brown gill-plumes.

Another is the common tube-worm (*Serpula vermicularis*) so abundant on oyster, scallop, and other shells. A third type, which lives on seaweed as well as on shells, is *Spirorbis*, in which the tube is coiled into a flat spiral one-eighth of an inch or less in diameter.



PUSTULE STAR.

of from 10 to 100 fathoms in the Mediterranean, and all around the British Isles, from which the preceding species is absent, is the orange comb-star (*Astropecten aurantiacus*), which on both sides of its five arms has a row of upper and under edge plates and also has flat spines. Its food-canals terminate blindly.

The brittle stars (Ophiuroidea) differ from the sea-stars chiefly in the possession of a central disc, sharply defined from the arms, and in other features. They crawl chiefly by means of their arms, which wind about in so snaky a fashion that the animals are frequently called snake-stars in consequence. In many species they can be turned upwards, and are very strong and branched, as is the case with the tree-shaped Medusa's head *Gorgonocephalus arborescens* of the

Grouped in another sub-kingdom, the Echinodermata, are the starfishes, sea-urchins and their allies. The starfishes of the present day, of which there are at least five hundred species, are cosmopolitan. Among those which inhabit the North Atlantic is the red starfish (*Asterias rubens*), found from within the tide-range to a depth of 50 fathoms. It has five rays, averages about 6 inches in diameter, occasionally exceeding 9, and in colour is generally reddish, yellowish, or brownish. As it is destructive to oysters, it is caught in great numbers on the west coast of France, where it is used as manure. A starfish distinguished by its size, which sometimes approaches 18 inches in diameter, and by living at a depth

Mediterranean. Among those having unbranched arms is the pustule star (*Hemieuryale pustulata*), which lives on corals, and clasps its arms round the branches as shown in the illustration. It is remarkable for the fact that its arms resemble coral-branches in form and colour, a similarity which undoubtedly protects it from many enemies, and is a striking instance of mimicry.

The feather-stars resemble the starfish and brittle stars in having arms, but differ from them in being permanently or temporarily attached to a jointed stalk. Moseley's sea-lily (*Metacrinus moseleyi*) may be taken as an example, and has forty arms which are all studded with small feelers, instead of tiny feet. The comatulids differ from the other feather-stars in discarding their stalk after a time and thenceforth leading a free life. One of the best known species of this very numerous family is the rosy species of the Mediterranean and Atlantic coasts of Europe (*Antedon rosaceus*), which has a diameter of about 6 inches, and lives at a depth of 30 fathoms, where it is very common, clinging to coral-branches, worm-tubes, and the like.



MOSELEY'S SEA-LILY.

The sea-urchins (Echinoidea) have prickly bodies and no arms, and move by means of their long tube-feet or their spines. Their size may have given rise to

the belief that they live upon large animals, but their food consists partly of small organisms and partly of animal and vegetable matter. A common species of the



SEA-PORCUPINE.

European seas is the edible urchin (*Echinus esculentus*), which is about 6 inches across, and has a scarlet or brownish shell, and short spines, which range in colour from white to purple. Its shape is almost circular, but that of many other species is oval. Another noteworthy species is the sea-porcupine (*Echinothrix calamaris*), so called from the alternately light and dark rings on its long spines.

Cœlenterates.

The vast majority of cœlenterates inhabit the sea, those restricted to fresh water being very few. There are three classes in the sub-kingdom, and an excellent example of the first is afforded by *Syncoryne sarsi*, which in its free state is known as *Sarsia tubulosa*, one of the Hydromedusæ. In shape



SAILING JELLY-FISH.

this resembles a club with from twelve to sixteen tentacles, and is about half an inch high. It grows in colonies which fasten themselves to wood-work, seaweed, and the like, in the North Sea and Baltic, at a depth of from 2 to 8 fathoms, and the free form buds forth from the club-shaped body. This attains a breadth across

the bell of three-eighths of an inch, which has four long tentacles on the margin set at equal distances.

Representing the Siphonophora we have the sailing jelly-fish (*Velutella*) with a flat disc-shaped body, on the upper side of which is an upright crest, acting as a sail, and on the under side a large polyp, surrounded by circles of smaller ones, those near the edge having tentacles. One of the best known species is *V. spirans*, often met with far from land, driven along by the wind acting on the sail-like crest.

Of the Scyphomedusæ a common representative is *Aurelia aurita* of the European seas, which often appears in swarms, and is well known on the shores of the North Sea and the Baltic.

In colour it is blue, but another common species, *Cyanea capillata*, is yellowish brown, or yellow, and sometimes a yard wide, the filamentary tentacles being over 2 yards in length. A third species (*C. arctica*) is

the largest of all known jelly-fish, its disc exceeding 6 feet in diameter and its filaments extending for 120 feet or more. To the same group belongs the Mediterranean *Cotylorhiza tuberculata*, which has tentacles in the shape of long



ACTINIA EQUINA.

suckers, the prevailing colour being yellowish often spotted with white on the disc, amber on the arms, and violet or blue on the suckers. Another curious form also frequent in the Mediterranean is *Charybdea marsupialis*, one of the Conomedusæ with well-developed eyes.

In the stationary group the best known is *Lucernaria quadricornis*, which measures nearly 3 inches across and is greyish or yellowish brown in colour, and generally found on red seaweed in the North Atlantic, the North Sea, and the Baltic. It connects the free jelly-fish with the anemones and corals.

The sea-anemones and corals belong entirely to the sea, and reach their greatest development and variety of form in the warmer waters, where they are generally attached to rocks or other substances, including the shells of living crustaceans.

Among the anemones is the red *Actinia equina*, which occurs in European seas in great variety of colour. It lives at depths varying from tide-range to 20 fathoms, and attains a breadth of $2\frac{3}{4}$ inches. Another abundant European species, *Actinoloba dianthus*, attains 6 inches in height and nearly 3 inches in breadth, and lives at a depth of from 1 to 16 fathoms.

The reef-building corals of the warmer seas are included in the same group as the anemones, though their tentacles are not always in sixes. To the other group, in which the tentacles invariably number eight, belongs the red coral of commerce (*Corallium rubrum*). In this the stock, which may reach a height of 12 inches, is of a branching type, and has a rose-coloured or more or less whitish, calcareous skeleton and a red or orange crust in which are the small white polyps. This coral lives in the Mediterranean, and in the Atlantic along the north-west coast of Africa, and the coasts of the Cape Verde Islands, being generally found at a depth of from 40 to 100 fathoms attached to the under side of overhanging rocks.



RED CORAL.

AMERICA







MUSK-OX.

CHAPTER I

THE ANIMALS OF ARCTIC AMERICA AND CANADA

THE extreme north of America—the Western Arctic province—much resembles the tundra of Siberia in its physical features and the types of animal life by which it is inhabited. Among the mammals this area has, however, several forms now unrepresented in the Old World, as well as distinct local races of Asiatic or European species.

**Barren-Ground
and Greenland
Reindeer.**

The reindeer or caribou of the so-called Barren-Grounds of Arctic America (*Rangifer tarandus arcticus*), and also the one inhabiting Greenland (*R. t. grænlændicus*), are markedly distinct from the typical Scandinavian animal, as they are from the woodland reindeer of lower American latitudes. A feature of the antlers of both the Barren-Ground and Greenland races of the species, is the great length of the main beam and the excessive development of one of the brow-antlers, which terminates in a paddle-like expansion. In size the Barren-Ground reindeer is much inferior to the woodland race, although its antlers are absolutely larger. In Newfoundland, the group is represented by the light-coloured *R. t. terræ novæ*.

Musk-Ox.

Unlike the reindeer, the musk-ox (*Ovibos moschatus*), which takes the first half of its name from its musky smell, is no longer represented in the Old World. Although called the musk-ox, this animal has no intimate connection with the true oxen, nor, for that matter, with the sheep. Standing about 40 inches at the shoulder, it is a very short-tailed and broad-headed animal, with small pointed ears and a long shaggy coat of a woolly nature. The profile of the face is decidedly sheep-like, but the broad muzzle is hairy. In old bulls the peculiarly bent and fibrous horns are very broad and flat at the bases, where they almost meet on the forehead. Below this they curve at first downwards, then sharply forwards and upwards, tapering gradually throughout their length until the twisted tips terminate in front of the eyes. At the base they are yellowish brown and very rough, becoming gradually smoother and darker until at the points they are quite black. In the cows and young bulls, the horns are much smaller and widely separated at the bases. The legs are short and sturdy, the feet being particularly worthy of notice, as the outer half of the hoof is rounded and the inner half pointed, while between the two hoofs a growth of hair prevents the foot slipping on the ice. The coat of the musk-ox is very thick, and causes the animal to appear larger than is really the case. The dark brown hair—which is lighter in the spring—is long and close, curly and matted on the back, straight on the throat and sides, and hanging half-way down the legs; the paler underfur is soft and woolly, and the two coats afford an efficient protection against the bitter winter cold of the home of this Arctic ruminant, where even in summer the ground hardly thaws on the surface. The typical race inhabits the mainland between 60° and 80° N. latitude, as far east as the Mackenzie River. Greenland is the home of a second race of the species (*O. moschatus wardi*), distinguished by the partially white face and the narrower horns of the bulls; and other races have been named. In past times the musk-ox inhabited the greater portion of North America and northern Asia, as well as Europe as far south as the Alps and the Pyrenees; but as the climate became milder it seems to have withdrawn to the north, although it is difficult to account for its total disappearance from Europe and Asia. At any rate, it is evident that cold is necessary to its existence, for it does not migrate in winter towards the south, and it has been met with in Grinnell-land in 83° N. latitude in the month of March, when the cold is most severe and the snow deepest, while it lives in Greenland the whole year round. These animals know well how to protect themselves from the cold by huddling together; and this herding in masses is also advantageous to them when attacked by their one savage enemy, the northern wolf, at whose approach they betake themselves to the nearest elevated spot, where, with their heads turned towards the foe, they form a single line, which instantly becomes a ring should the attack be delivered on several sides at once. Of late years a considerable number of the calves of the Greenland race have been brought alive to Europe.

**Other Arctic
Mammals.**

Another type of mammal characteristic of Arctic America is the polar hare (*Lepus arcticus*), of which several local races extending as far south as Nova Scotia are recognised. On account of its more protruding incisor teeth and certain peculiarities in the skull, the Greenland hare has been referred to a distinct genus, under the name of *Boreolepus groenlandicus*. The

polar species becomes white in winter, and remains active during the whole year, living chiefly on arbutus and the bark of dwarf willows.

Like the reindeer, the lemming of the Old World has a representative in Arctic America known as *Lemmus trimucronatus*; in addition to this being *Dicrostonyx hudsonianus*. There are also representatives of the stoat or ermine, the glutton or wolverine, the wolf, and the Arctic fox. In the wolverine and fox no racial distinction appears to exist between the Old and the New World forms.

Arctic Birds.

The birds of Arctic America belong in great part to the generic types characteristic of the Siberian tundra, and therefore need no special reference in this place. There are, however, of course a certain number of species or races peculiar to the western tract. A notable fact is the occurrence in this tract of such familiar European types as the raven and the grey stone-chat.

Woodland Reindeer.

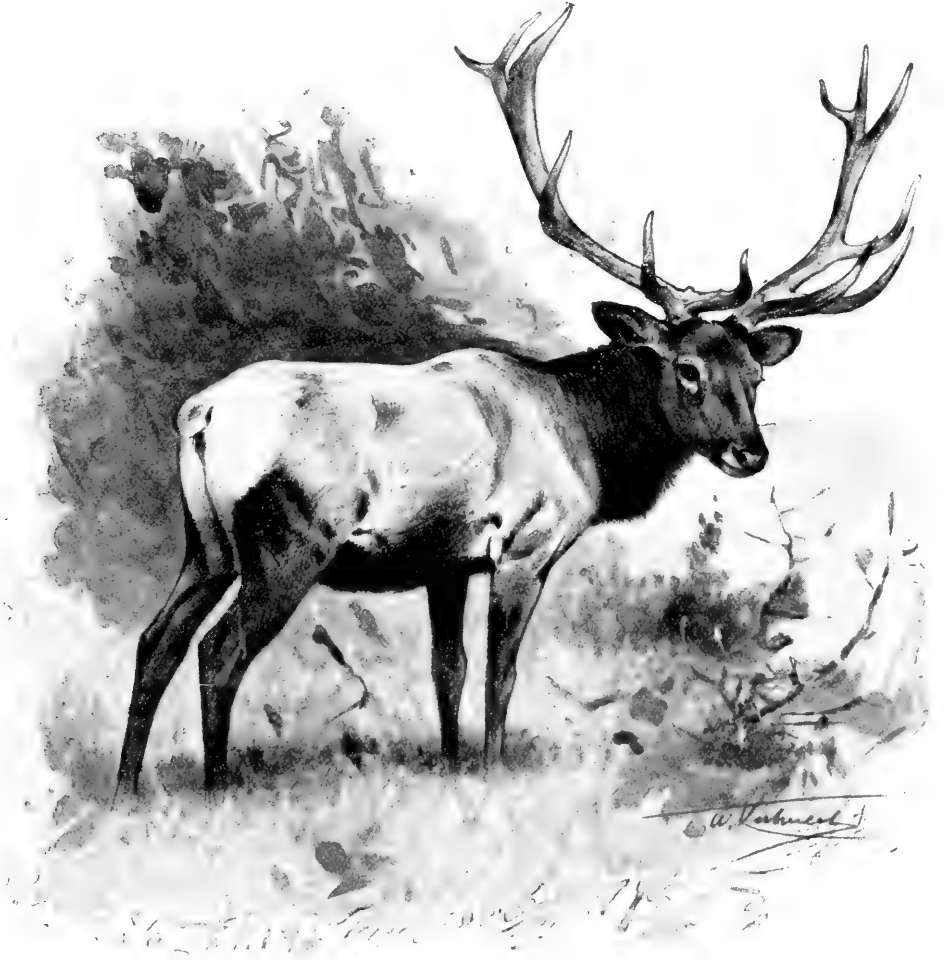
Leaving the animals of Arctic America with the foregoing brief mention, we pass on to those of the Canadian province of North America, where we still find a number of local representatives of Old World types. Foremost among these is the woodland reindeer or caribou (*Rangifer tarandus caribou*), which attains a height of 55 or 56 inches at the withers, and inhabits the forest-zone from Labrador and northern Canada southwards to the northern part of the State of Maine, being met with on both banks of the St. Lawrence, whence it ranges west as far as Lake Superior. In this race the antlers are of a much shorter and more massive type than in the Barren-Ground reindeer. The pairing-season of this race takes place in September, and the one or two young are born in the following May. In December the stags cast their antlers, but those of the hinds are retained till the spring. In winter the woodland reindeer retires to the upper forest-tracts, whence it migrates south in herds of sometimes 500 head. Other local forms of reindeer have received separate names.

American Elk.

The North American elk or moose (*Alces machlis americanus*) differs so slightly from the typical Old World representative of the species, that it is doubtful whether it is really entitled to rank as a race apart. Its colour is, however, slightly different, and there are said to be characters by which the antlers of the Old and New World forms can be distinguished. Elk, as a rule, are not found beyond the northern limit of forest, although they have been met with north of the Mackenzie, while southwards their range extends as far as Ohio. The largest elk in the world are found in Alaska, and on this account they are reckoned to form a distinct race (*A. machlis gigas*). In that district elk are still comparatively common; but from many districts where they were formerly abundant, they have now almost entirely disappeared.

The favourite summer haunts of the American elk are the marshy lands in the vicinity of rivers or lakes, where there is plenty of long grass. In winter these animals seek higher ground, amid the primeval forest, where they collect in parties, often consisting only of an old bull and cow and the young born in the two preceding years. In such situations they make a so-called moose-yard in some spot where young saplings of birch, poplar, ash, maple, and juniper grow in sufficient profusion to afford them nourishment. Very old bulls appear to have a "yard" to themselves, where during the winter they remain entirely alone. In January the

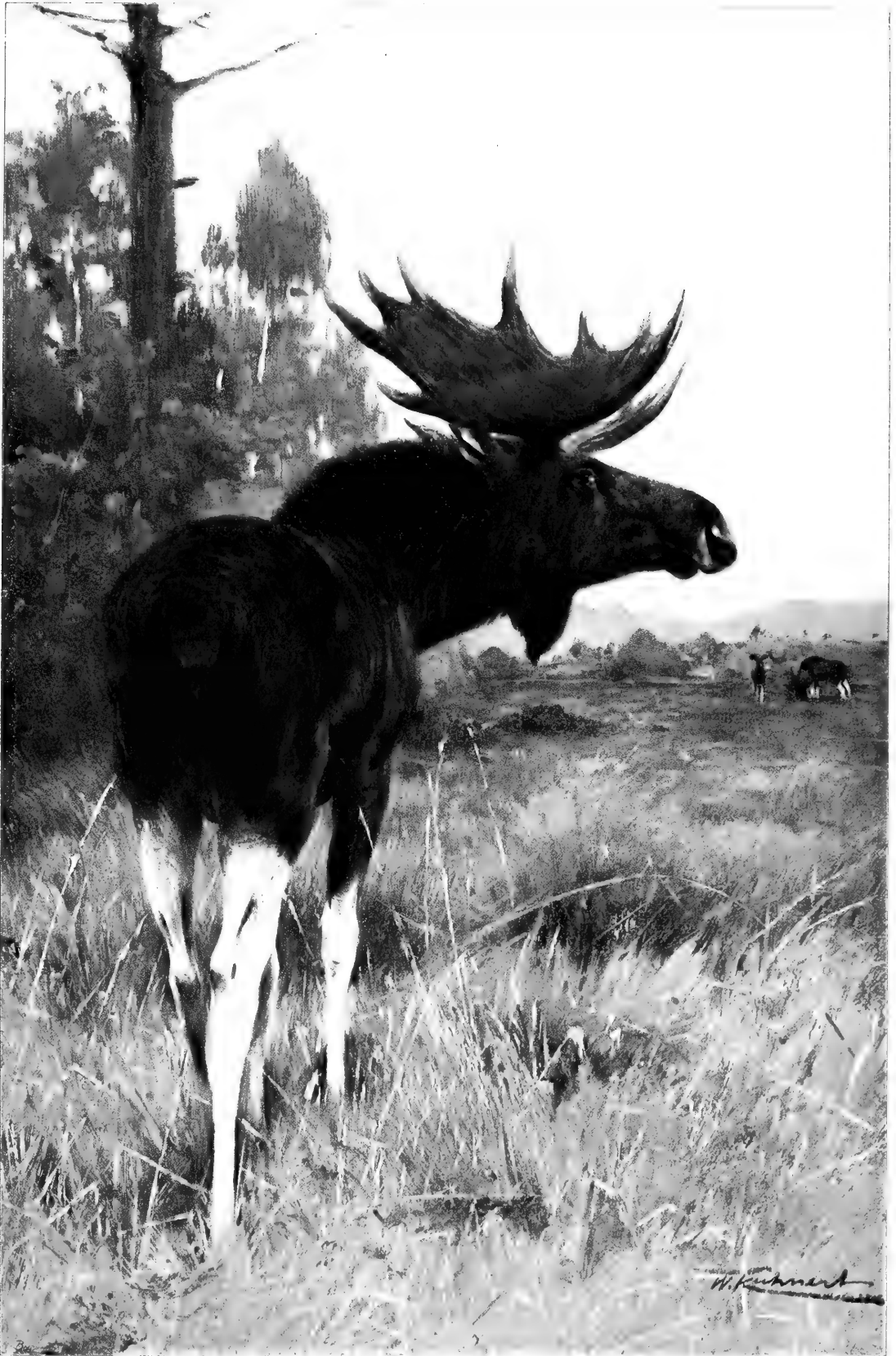
adult elks cast their antlers, which are fully developed by the month of August. While the antlers are covered with velvet the bulls spend most of their time in marshes and bogs, where they feed on the leaves of the yellow water-lily, and stand up to their necks in water as a protection from the bites of insects. In October begins the pairing-season, when, and during the following month, resounds the long-drawn whistle or bellowing call uttered by the old males. During the same



WAPITI.

periods combats for the possession of the females are common among the old bulls, which in this respect resemble the majority of the deer tribe. Before the birth of the calves, the cows withdraw to some convenient spot, either an island in a lake or river, or a swamp or a prairie occasionally flooded, where they are likely to be little subject to the attacks of wolves and bears.

A third type of circumpolar deer found in America is the wapiti (*Cervus canadensis*), unfortunately miscalled elk in the land of its birth. Although the wapiti is essentially an Old World form, it is only compara-

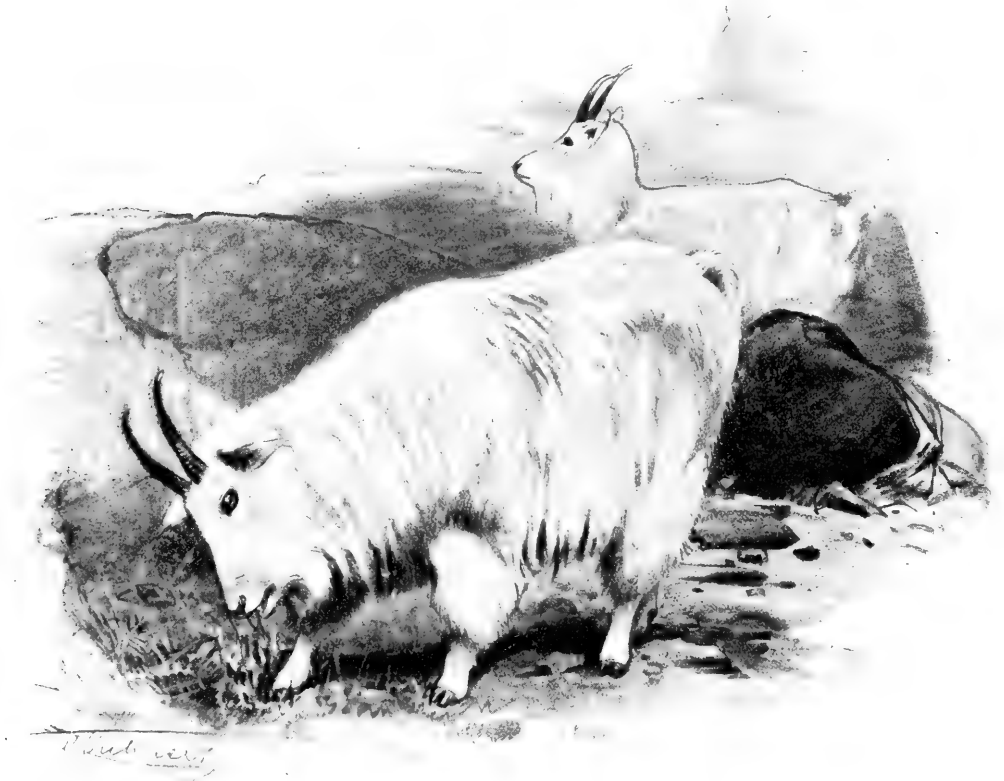


ELK OR MOOSE.

tively recently that its Asiatic representatives have been recognised, and the American animal is the type of the species. Next to the elk, the various races of the wapiti are the largest representatives of the deer tribe now living. The antlers are of the same general type as those of the red deer, from which they are distinguished by their greater flatness and smoothness, and, above all, by the great relative size of the fourth tine, and the circumstance that this tine and the ones above it are placed in the plane of the face. Wapiti have a large straw-coloured patch on the rump, which embraces the whole of the very short tail, and are dark brown on the under-parts and much lighter coloured on the back. Indeed, after the storms of winter the coat on the back of a wapiti becomes bleached nearly white. Wapiti were formerly distributed over British America south of the 60th degree of N. latitude, and almost all the United States as far as Mexico; they have, however, been exterminated from many districts by the advance of civilisation, and are now found only in the forests of Canada and some of the mountain districts west of the Missouri. The habits of wapiti much resemble those of red deer, although these animals differ from the majority of deer in that they never feed by night. At the end of December or beginning of January, the old stags cast their antlers, and in March or April the new ones begin to grow. In May the wapiti living in the mountain regions withdraw to the higher districts, without leaving the forest-zone, but approaching as nearly as possible to the snow-limits. At this time the hinds leave the herd to give birth to their young in the most secluded thickets, the mothers defending their fawns—usually one, but occasionally two—with great courage from the attacks of pumas, bears, and wolves. Very often at such times a hind may be heard calling for help, when all the members of the herd in the neighbourhood will at once hasten to her assistance and unite in driving off the enemy. In the middle of August, when the new antlers are completely developed, the old stags—which during the greater part of the year live by themselves, and during the pairing-season collect around them a herd of hinds—commence to utter their call, which is a long-drawn whistle, quite unlike the cry of the red deer. Combats between rival stags take place almost daily during the pairing-season, but as a rule do not prove fatal, although they result in the loss of portions of the antlers and very often in serious wounds.

Bighorn Sheep. A fourth circumpolar type of ruminant—this time belonging to the hollow-horned group or *Bovidae*—is typically represented by the Rocky Mountain bighorn sheep (*Ovis canadensis*), an animal somewhat inferior in size to the Asiatic argali, with horns of a smoother and more sharply angulated type. The typical bighorn is a fawn-coloured sheep, with a white rump-patch, fair-sized ears, and somewhat stout horns, of which the tips are nearly always broken. The coat in winter is thick and close, with a woolly under-fur at the base. On the Stickine River the typical form is represented by a much darker race—the north-western bighorn, or so-called black sheep (*O. canadensis stonei*), in which the ears are smaller and the horns are more slender, with their tips usually unbroken. Still farther north, in Alaska, this race is replaced by a third form, the beautiful white Alaskan bighorn (*O. canadensis dalli*), whose structural characters are very similar to those of the north-western race; these two being connected by an intermediate grey race of the species (*O. canadensis fannini*).

In the old World the species is represented by the Kamchatkan bighorn (*O. canadensis nivicola*) of Kamchatka and Clifton's bighorn (*O. c. borealis*) of north-eastern Siberia, which are closely allied to the Alaskan sheep, although dark-coloured. It should be added that the Mexican and Sonoran bighorns form other local races of this variable and wide-spread species, distinguished by their unusually large ears. Inclusive of the above variations, the bighorn ranges in America from Mexico in the south to Alaska in the north, and from the valleys of the Missouri and Yellowstone to the Pacific, though in many localities within these limits it has never been known.



ROCKY MOUNTAIN GOAT

With the white or Rocky Mountain goat (*Oreamnus americanus*), we come to an exclusively North American type of hollow-horned ruminant, of which four local races have been named. The range of this animal extends from about latitude 36° in California to Alaska, British Columbia being perhaps the country in which it is most common. Probably the white goat is related to the Asiatic serows rather than to the true wild goats. It has pointed ears, and black horns from 6 to 10 inches long which curve slightly backwards and are ringed to about half-way up and smooth towards the tips. In size it is about the equal of ordinary sheep, but with the shoulders much elevated. The body is covered with long hair, nearly straight and pendent on the sides and

legs, but erect along the line of the back, making the animal appear as if it had two humps. It is one of the few ruminants whose thick woolly coat is white all the year round, and it is consequently almost invisible in the snow-covered regions it inhabits, though conspicuous enough among dark rocks and green mountain meadows. The white goat lives a solitary life, and is only social in winter and at the pairing-season, which takes place in November. Sometimes when driven by stress of hunger it will descend to the woods, but it rarely comes down to the sea-level, though it has been seen swimming across rivers or their estuaries.

Squirrels.

Throughout Canada, as in the rest of North America, rodent mammals literally abound, both in individuals and species. Among the squirrel tribe a familiar form in the country is the chickari (*Sciurus hudsonianus*), which is generally of a grey colour, with a more or less yellowish or reddish tinge, and white below, with dusky markings on the back and sometimes on the under-parts. It is small and short-tailed, and in winter develops short tufts of hair on the ears. By no means sensitive to cold, it does not hibernate, but is active all through the severest weather, burrowing at times into the loose snow so that it entirely disappears for some distance, and when again visible shaking itself and frisking away with the same appearance of pleasure as if it had taken a refreshing bath in the heat of the summer. The chickari differs in many respects from the common European squirrel in its habits, spending most of its time on the ground and not leading an arboreal life. It in fact makes its home frequently in holes in the earth, where it can find a safe refuge; although it has a partiality for timber-heaps, the stumps of trees, and piles of brushwood, over which it climbs with activity.

One of the most familiar representatives of the pretty little striped ground-squirrels is the common chipmunk (*Tamias striatus*), whose range (inclusive of its subspecies) extends from Canada and Manitoba to Georgia and western Missouri. Numerous species of chipmunks are now recognised by American naturalists, of which, for the most part, the southern are paler in colour than those from the north. The ground-colour of the common chipmunk is much the same as that of its European relative, which this animal resembles in most points; but the American species has on each side of the body a white, black-bordered stripe, and a black white-bordered stripe on each side of the head, with a black stripe down the back. This chipmunk prefers hiding-places from which it can watch the passers-by, and consequently installs itself among piles of rubbish and brushwood, or in the stumps of old trees, or burrows in the ground.

Susliks.

The susliks form another genus of the squirrel family common to the two hemispheres, and are represented by a large number of North American forms. Of these latter may be mentioned the striped suslik or striped gopher (*Spermophilus tridecemlineatus*), whose range extends through central North America from Texas to the Saskatchewan plains of Canada. Another northern member of the group, found in the vicinity of Bering Strait and Hudson Bay, is Parry's suslik (*S. empetra*). The habits of these animals are, for the most part, at any rate, very similar to those of their European relatives, all the members of the group being sociable species which consort in colonies. The generic name *Citellus* is now generally adopted for these rodents.

Flying-Squirrels. Of the three American representatives of the smaller flying-squirrels perhaps the best known is *Sciuropterus volans*, which is greyish brown above and yellowish white below, and, like the rest of its kind, strictly nocturnal. These elegant little creatures glide so lightly, gracefully, and swiftly through the air, that even persons not generally observant of the habits of animals are moved to admiration. They live in the woods, and when moving from place to place first ascend a tree, and then sail from the summit to the base of a neighbouring tree, performing alternately these repeated climbs and leaps, and always gliding upwards at the end of the flight so as to rest not on the ground but on the stem. As mentioned in an earlier chapter, these flying-squirrels have a European representative.



AMERICAN FLYING-SQUIRREL.

Beaver.

The American beaver (*Castor canadensis*) differs chiefly from its European cousin by the form and relations of the bones of the fore-part of the skull. In habits the two animals are very much alike, but the American species generally chooses well-wooded districts watered by small streams, where its dams cause the formation of large pools. In these pools the beavers build their lodges, which attain a considerable size, and in former times lay so close together that they occupied a wide extent of land, as at Montreal, where the greater portion of the city is built over a so-called beaver-meadow. At the time of the discovery of America the beaver had a wider distribution north of the equator than any other American animal except the puma. Although it did not occur on the prairies and desert regions of the interior of the continent, it ranged in the

north from Hudson Bay to Alaska, and southwards to Florida, Mexico, and California. But the beaver is being steadily exterminated, and is now only fairly numerous in the country along the watershed between the Hudson Bay rivers and the St. Lawrence, in the upper courses of the Frazer and the Peace Rivers, and in the Canadian portion of the Rocky Mountains.

Jumping-Mice.

Another widely distributed group of North American rodents are the jumping-mice, which have one Asiatic representative, and in the Western Hemisphere range through British North America from the Atlantic to the Pacific, and from Hudson Bay and the Great Slave Lake in the north to Arizona and Mexico in the south, although in the last-named districts apparently confined to the mountains. The typical representative of the group is the Hudson Bay jumping-mouse (*Zapus hudsonianus*), which in its summer dress is brown above, yellow on the flanks, and white beneath. In appearance it is like a long-legged mouse, with a long tufted tail. When in active movement it leaps along so quickly that its hind-legs seem scarcely to touch the ground, and if suddenly disturbed will spring a length of from 8 to 10 feet, although the length of its bounds soon decreases to 4 feet or less. This jumping-mouse is by no means a strictly nocturnal animal, being generally seen abroad early in the evening, and occasionally even during the day. In this respect, as well as in its preference for damp wooded situations, it differs from most other jumping-mice.

Voles and

Musquash.

Voles of the European genera *Microtus* and *Eutamias* abound in North America, a well-known northern form being the meadow-vole (*Microtus pennsylvanicus*), a species, with several local races, worthy of notice on account of its habit of forsaking its burrow in winter to build a nest on the ground. An essentially American type is the musk-rat, or musquash (*Fiber zibethicus*), another member of the vole group, ranging across the continent from the Barren Grounds in the extreme north to as far south as the Rio Grande. This rodent, whose body measures nearly a foot in length, is the largest of the tribe, and has a soft velvety coat of a dark brown colour, shading to grey on the muzzle and under surface, with a number of long stiff hairs on the back and sides. As in the typical voles, which it resembles in the structure of its teeth and skull, the body is similar to that of a rat, but the head is broad with comparatively small eyes, the ears are hardly seen among the growth of hair, and the muzzle is entirely covered with hair save for a small spot round the nostrils. The legs of the musquash are short, the first toe of the fore-foot being rudimentary, and the toes being connected by a membrane which is not quite perfect. The soles are quite bare, and the scaly tail, which is much compressed at the sides, has ridges of hairs on the upper and lower edges, and only a few sparse hairs elsewhere. Like the beaver, the musquash has a habit of striking the surface of the water with its tail; it is an excellent diver, and consumes a considerable number of fishes and mussels, although its chief nutriment consists of the roots of grasses and water-plants. These industrious little rodents make for themselves dwelling-places from roots and bog-grasses, mixed with mud and sticks, sometimes heaped carelessly together, but at others assuming the form of flattened mounds. Where the water is deep these domiciles are sometimes placed on dry ground, but when possible they are built in the water. Sometimes they are of great size, and are generally

high enough to leave room for an air-chamber, usually connected with one or more of the outlets which serve as exits for the owners when in search of food. To a great extent these structures are used more as store-rooms than as dwelling-places, but at times they contain the nest, though, as a rule, this is placed in a burrow. Generally this burrow includes a single chamber, reached by a passage of a few yards in length, which opens under water.

Pocket-Gophers. A distinctive group of North American rodents is formed by the so-called pocket-gophers, whose range southwards does not extend farther than Central America. They take their name from the presence of a pair of cheek-pouches, which open outside the mouth on the lower edges of the cheeks. Two well-known northern representatives of the group are the Hudson



CANADIAN PORCUPINE.

Bay pocket-gopher (*Thomomys talpoides*), ranging through Canada to the Missouri district, and the common pocket-gopher (*Geomys bursarius*), whose habitat extends from the Canadian border southwards to Kansas, Missouri, and Illinois. In general form these gophers resemble ordinary mice and rats. There are, however, other allied American rodents commonly known as kangaroo-rats, which also have pouches, but hop on their hind-legs after the manner of the rat-kangaroos and jerboas. Scientifically these are known as *Dipodomys*, *Perodipus*, *Heteromys*, etc.

Canadian Porcupine. According to modern ideas of classification, another exclusively American family of rodents is typified by the Canadian porcupine (*Erethizon dorsatus*), which is widely distributed in North America, ranging as far northwards as the limit of trees. On the eastern side of the continent it reaches as

far south as Virginia, while on the western side it is met with from Alaska to Arizona and New Mexico. It is true that American naturalists regard the western form as specifically distinct, but this is a matter of little moment for our present purpose. When excited, this rodent looks much larger than it really is, the quills being then carried erect. These quills, which are attached loosely to the skin, and are slightly barbed at the points, are very different in length, some measuring as much as 4 inches, while others do not exceed an inch. The short spines, which are white tipped with brown, are nearly hidden by the long brown hair of the body. For the purpose of climbing, the Canadian porcupine is provided with long powerful claws; it spends most of its life in the trees, many of which it completely strips of their foliage. Although it appears difficult for such a large, awkward animal to reach the outer leaves, this is effected by the creature distributing its weight upon several boughs and bending the twigs with its claws until it can draw them through its mouth. It is but seldom that these rodents can be observed thus occupied, since they lead a partially nocturnal life, and in daylight are so noiseless in movement that they have often been mistaken for a bird's nest.

Lynx.

The Canadian lynx (*Felis lynx canadensis*) may be looked upon as a local race of the European lynx, to which it is very similar. In length it measures about 30 inches, exclusive of the short tail, which is only 5 inches long. In colour it varies according to the district it inhabits, being sometimes almost white, but usually dark grey tinged with chestnut, the legs being darker, the tips of the hair white, and the back and upper portion of the outside of the legs spotted with indistinct dark patches. The lynx of Alaska has been separated as a distinct form (*F. l. mollipilosa*). The Canadian lynx is a forest-dwelling animal, which rarely ventures near the abodes of man, although it will kill pigs and lambs when opportunity offers, and attacks fawns, hares, and other small mammals as well as game-birds. It moves in a series of bounds, alighting after each on all four feet at once. The range of this and the allied races in America extends from the Mackenzie River in 66° N. latitude to Pennsylvania and California. This is the loup-cervier of the French Canadians; the chat-cervier is the red lynx (*F. rufa*), which is not met with very far north of the Canadian boundary, whose range extends into Mexico.

Wolves.

The North American representatives of the wolf, whose range extends from Mexico to the far north, so much resemble the typical European form that they may be regarded as local races of that species, with the names of *Canis lupus occidentalis* and *C. l. nubilus*. In colour the former race varies from all white through different shades of grey to all black, the majority of individuals being grey and white tinged with brown. Its range extends through western North America northwards to Greenland and south to Mexico, Idaho forming its limits on the east. The second, or eastern race, extends from the Great Slave Lake to Idaho, and southwards to perhaps California. It is locally known as the timber-wolf.

Foxes.

The North American representatives of the common fox (*C. vulpes*) may likewise be regarded as local races of that species, presenting considerable variation in colour. They range from Alaska, Hudson Bay, and Labrador to Mexico. The largest is the Kadiak Island fox (*C. v.*

harrimani) of Alaska, but the common form is known as *C. v. fulvus*, or the red fox. The black or silver fox is, however, only a melanistic phase of the last, which occurs in the north, and especially in the upper basin of the Mississippi, and north-west of the Missouri. This beautiful animal, so much valued on account of its fur, which, with the exception of the white tip of the tail, is nearly or entirely black, derives its name from the grey rings on the black hair of the head, hinder-parts, and thighs, which give it a silvery appearance.

Quite distinct is the kit fox (*C. velox*), which varies much in colour and is of small size, the body measuring only 24 inches. It is characterised by short, stout legs, and a short bushy tail, which, without the hair, measures about 9 inches, by its comparatively small thickly-haired ears, and the great length and abundance of the under-fur which is often visible externally, as well as by the long hair on the soles of the feet. Typically from Nebraska, this species originally extended from that state and Colorado northwards to the plains of the Saskatchewan and Assiniboia, but it is now chiefly restricted to western Canada in the area under consideration.

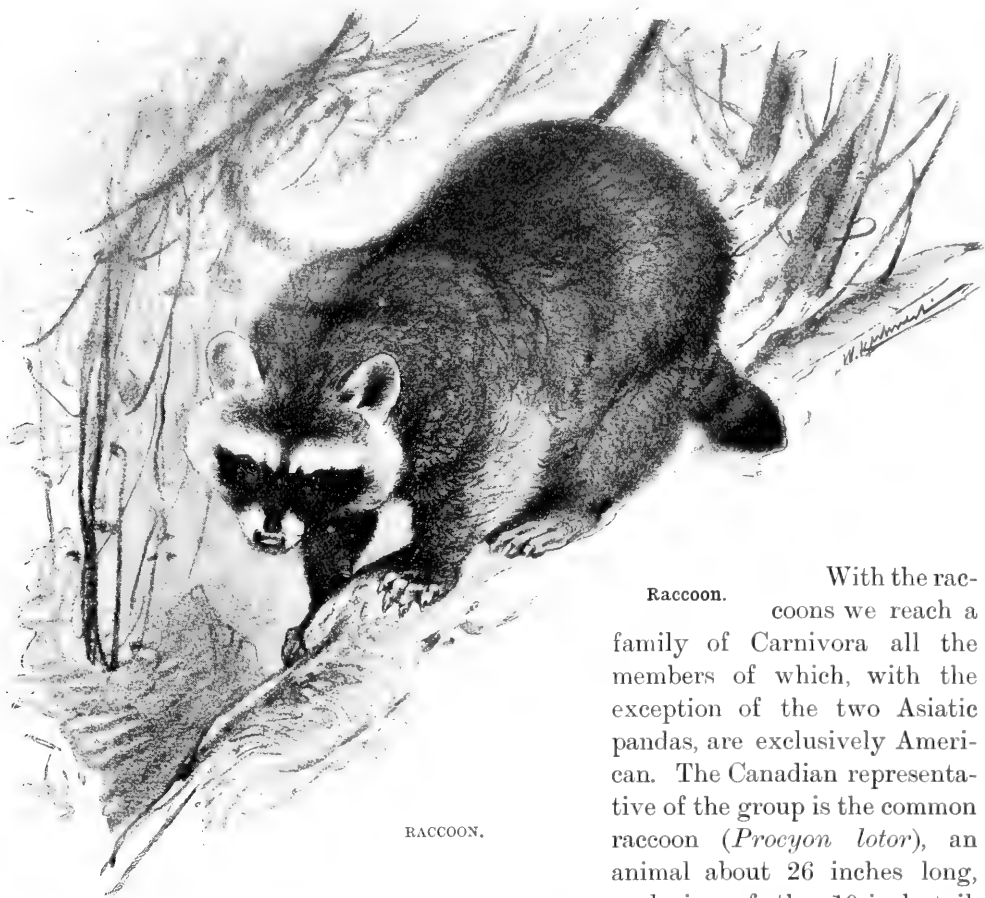
Martens. The American marten, or sable (*Mustela americana*), so closely resembles the European pine-marten and the Asiatic sable, that it is doubtful if all these are anything more than local varieties of one and the same specific type. In colour the American form is generally brown, with a yellow patch on the breast, and a whitish or greyish head and ears. This marten ranges from Labrador to Alaska, and is met with as far south as the Adirondack Mountains.

A second species of marten, commonly known as the pekan (*M. pennanti*), is characterised by its large size, and stout build, attaining in some cases a length of 30 inches. It is distributed over the greater portion of the continent west of the Mississippi from Texas to the Great Slave Lake and Alaska.

Otter. The Canadian otter (*Lutra canadensis*), of which several local forms are recognised, is distributed all over North America, extending nearly to the Arctic Ocean. It is distinguished from the European species by the much larger extent of the naked patch on the tip of the muzzle, which is not confined to the space between the nostrils entirely. As a rule, the colour is purplish above, and paler on the under-parts; specimens have been recorded measuring 4 feet and over in length. In habits this otter resembles the European species; and like the latter at times amuses itself by sliding down steep, smooth banks covered with mud or snow. It seems to be as partial to crayfish as to fish, and in the Adirondacks the number of those crustaceans killed by otters is considerable. Large numbers of otters are killed for the sake of their fur, which is one of the most valuable in North America, but on account of their acute sense of smell and sight the traps, which are of steel, are never baited.

Bears. Several forms of brown and greyish bears are met with in North America, ranging from Alaska southwards to Mexico, several of which may be regarded as local races of the brown bear (*Ursus arctus*) of Europe, although some forms depart more widely from the latter than is the case with others. The largest races are the Kadiak Island and the South Alaskan brown bears (*U. a. middendorffi*, and *U. a. dalli*), which approximate very closely to the great brown bear of Kamchatka. The Rocky Mountain grisly bear

(*U. horribilis*) appears, however, to be a distinct species, characterised by its comparatively straight and whitish fore-claws, and the generally grey colour of the fur. It is now nearly exterminated. An allied type is the Barren Ground bear (*U. h. richardsoni*). Gribble Island, off the coast of British Columbia, is the home of a white, or rather cream-coloured, bear (*U. kermodei*), allied to the American black bear noticed in the next chapter.



RACCOON.

Raccoon. With the raccoons we reach a family of Carnivora all the members of which, with the exception of the two Asiatic pandas, are exclusively American. The Canadian representative of the group is the common raccoon (*Procyon lotor*), an animal about 26 inches long, exclusive of the 10-inch tail,

which is whitish with five black rings and a black tip. The general colour of the coat is dark brownish grey, but it varies considerably in different localities. Such local variations have afforded grounds for dividing the species into several races. Inclusive of these local phases, the range of the species extends from Canada through the United States to California on the west and Florida on the east. The northern Pacific form, inhabiting the Cascade Mountains of Washington and Oregon, is distinguished as *P. l. pacificus*, and the pale form from the Colorado desert of California as *P. l. pallidus*. During the day raccoons for the most part lie asleep in the hollows of trees, and it is not till the shades of evening begin to fall that they descend from such shelter to the ground in search of food. Their

favourite hunting-grounds are on the banks of pools and narrow water-courses. Fish forms the favourite food of these animals, but only such as have drifted ashore or have been left in shallow pools are devoured, for although good swimmers raccoons are unable to dive. Besides fish, molluses, and crabs, raccoons eat insects, frogs, fresh-water tortoises and their eggs, birds' eggs, and birds, especially domesticated fowls. They also catch and kill mice, while their vegetable food includes nuts, fruit, and corn.

Bats.

Among other Canadian mammals, apart from those more characteristic of the United States, a few bats deserve mention. One of these, the silver-haired bat (*Lasionycteris noctivagans*), is brown above with silvery white tips to the hairs of the back, and has a white spot at the base of each ear. This bat ranges from California to Hudson Bay in the north, and from the Atlantic to the Pacific coast, while it extends farther north than any other American representative of the order. In habits it is specially distinguished by its predilection for the neighbourhood of large sheets of water; and in some districts keeps so exclusively over water, that of hundreds flying about perhaps only two or three are seen beyond the limits of the lake or pool. Occasionally, however, these bats are encountered in thick forest, busily hunting for insects in all directions. The silver-haired bat is a migratory species, as is likewise the hoary bat (*L. cinerea*), whose range extends from Nova Scotia to Chile.

Perching Birds.

The birds of the Canadian province belong partly to genera represented in the north of Asia and Europe and partly to distinctive American types, many of the species being more characteristic of the United States, and therefore better referred to in a subsequent chapter. Among noteworthy types, the ruby-crest or ruby-crown (*Regulus calendula*) breeds in the forests of Arctic America as well as in those of the mountains of Arizona and Colorado, and is famous for its song, which is said to equal that of the canary in fulness of sound and to surpass it in variety and sweetness. The horned lark, a bird likewise common to the Eastern Hemisphere, and inhabiting the higher mountains, probably ranges as far south as the ruby-crest, although chiefly found in more northern latitudes. The same is the case with two other birds of the Old World, namely, the snow-bunting and the Lapland bunting, both of which extend farther south on the eastern side of the Rocky Mountains. The white-winged cross-bill (*Loxia leucoptera*) does not range quite so far north as its Old World relative, from which it is distinguished by darker plumage and the broader white bands on the wings. An Old World compatriot of the banded cross-bill, the pine grosbeak, also belongs to the breeding-birds of North America. The Canadian linnets, like the grosbeak, are identical with the European and Siberian species; but the American siskins are distinct. Of the latter, the pine-siskin (*Chrysomitris pinus*) resembles the females of the European species. Another American finch, inhabiting the higher north, is the shore-finch (*Leucosticte littoralis*), which belongs to a genus comprising about half a dozen species, and also represented in the north of Asia. The nutcrackers, again, are represented in the Eastern as well as in the Western Hemisphere, their American representative, the so-called Clarke's crow (*Nucifraga columbiana*), inhabiting the west side of North America, where it frequents the

pine-forests of the higher mountains. From its relative of the Old World it is distinguished by its less numerous spots.

Woodpeckers. The three-toed woodpeckers are another group common to the Old World on the one hand and the Canadian province and the Rocky Mountains on the other.

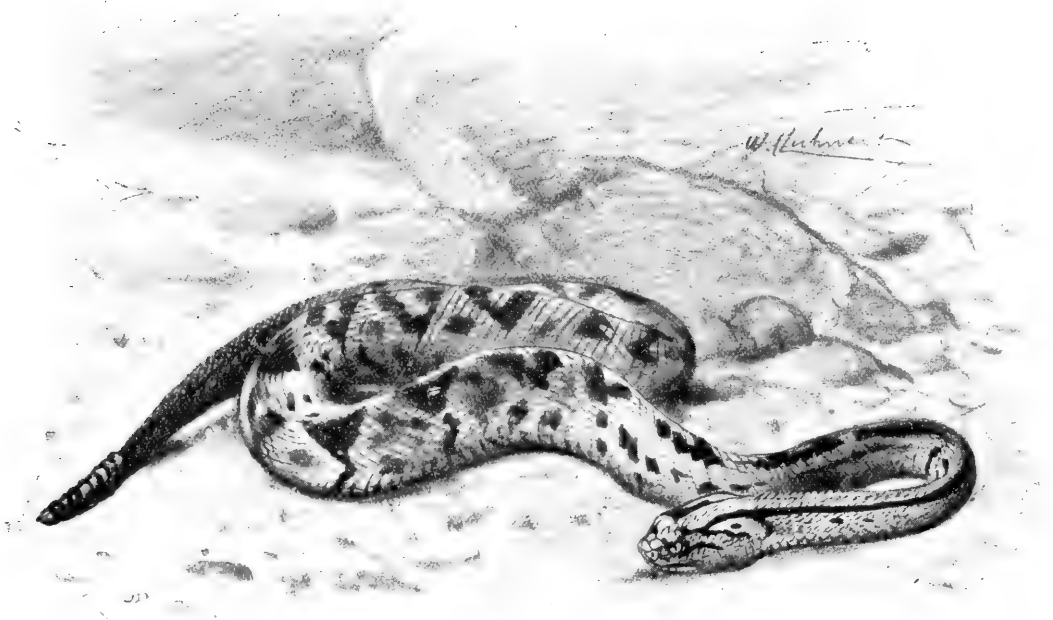
Owls. Among the wood-owls, Tengmalm's owl of Europe is represented in Canada by a local race (*Nyctala tengmalmi richardsoni*), and farther south by the nearly allied Acadian owl (*N. acadica*), which is only 9 inches long, and differs from Tengmalm's in having a spotted forehead and five white bars on the tail. It is a remarkable fact that the Acadian owl, which feeds chiefly on insects, sometimes lives in company with the chickari, or Canadian squirrel, in the same hole in a tree. The great snowy-owl (*Nyctea scandiaca*), of the north of Europe and Asia, is also common in North America. On the other hand the European and Siberian Ural owl (*Syrnium aluco*) has a specifically distinct Canadian representative in the form of *S. nebulosum*. Another North American member of the group is the widely distributed short-eared owl (*Asio accipitrinus*) of the Old World.

Birds-of-Prey. Of birds-of-prey, the Greenland falcon is found in the north-east of Arctic America, but the rough-legged buzzard is represented by St. John's buzzard (*Archibuteo sancti-johannis*).

Game-Birds. Passing on to the game-birds, we find the willow-grouse, or ripa, of the Old World among the members of a family particularly well represented in North America. Another member of the same group is the sharp-tailed grouse (*Pediocetes phasianellus*), a bird of dark plumage almost entirely Canadian in its distribution, its range extending east to Hudson Bay and west to the Rocky Mountains and no farther south than Lakes Superior and Winnipeg. Other species are noticed in the next chapter.

Water Birds. Finally, among a totally different assemblage of birds, reference may be made to the trumpeter-swan (*Cygnus buccinator*), distinguished by its wholly black beak and twenty-four tail feathers. Although nearly related to the European whooper, it is larger and faster on the wing, being indeed the swiftest of all the swans. Many other kinds of European water-birds are either common to North America or represented there by closely allied forms.

The cold-blooded vertebrates and invertebrates of the Canadian province either do not differ from those of the corresponding latitudes of the Old World or else belong to species more numerous represented in the United States.



RATTLE-SNAKE.

CHAPTER II

THE ANIMALS OF THE UNITED STATES

THE United States area, bordered by Canada on the north and by the acute angle of the Mexican highlands on the south, may be divided into four zones succeeding each other from east to west. In the first or Atlantic zone there is a copious rainfall at all seasons and the moist climate produces extensive forests. The second zone, which occupies the area between the first and the foot of the Rocky Mountains, has dry winters and moist summers, vast plains being clothed with grass in consequence of the moderate rainfall, while the cold winter with its northerly winds and sharp frosts prevents the growth of trees. This zone, which includes the prairies, is followed by the table-land between the Rocky Mountains and the Sierra Nevada, which has very little rain at all seasons and least of all in summer, and thus is largely desert, with a corresponding type of vegetation. The fourth zone is formed by the Pacific slope of the Sierra Nevada and comprises the States of Washington, Oregon, and California. The rains, which are abundant in summer in the north, decrease in quantity as we pass from north to south, the southern part of California being very poor in moisture. Accordingly, in central California we find hard-leaved trees characteristic of a climate with moderate moisture, while the abundant rains of the north give rise to rich forests of deciduous trees.

Corresponding to the more varied nature of its physical conditions, the area of the United States has a richer fauna than that of Canada, and its animals bear a decidedly American stamp.

Bison. The largest mammal is the American bison (*Bos bison*) universally known in America by the erroneous name of buffalo. It is less well proportioned than its European relative, the hind-quarters being very weak in comparison with the magnificent shoulders and the massive head. Two varieties are recognised by American naturalists, the typical prairie race and the wood buffalo (*B. bison athabascæ*) of the north-west. Before the days of railways bison existed in vast herds over quite a third of North America, but, with the exception of some herds of the woodland race in the north-west, and those preserved in the Yellowstone Park, the species has been practically exterminated in the wild state.

White-Tailed Deer. With the exception of the little pudu of South America, the whole of the true American deer (that is to say those other than the elk, wapiti, and reindeer, which are circumpolar types) may be included in the single genus *Mazama*, of which there are no Old World representatives. The members of this group are distinguished by the uniform colouring of the adults, by the narrow bare muzzle, the presence of a gland on the inside of the hock, but above all by the nature of their antlers. In those forms in which they are branched, these latter differ from those of the typical deer of the Old World by branching in a characteristic forked manner.

The most characteristic of all American deer is perhaps the white-tail (*Mazama* [*Odocoileus*] *americana*), of which there are many races, the Virginian race being the typical form. The antlers are characterised by the great development of the front branch of the main fork, which carries several upright tines, and by the presence of a conspicuous sub-basal snag. More characteristic still is the long, bushy tail, coloured like the back above, but wholly white beneath. At all seasons the Virginian white-tail (which is a comparatively large animal) has a white throat, a white band above the muzzle, and white rings round the eyes, the inner sides of the legs and under-parts, like the lower side of the tail, and buttocks, being also white. There is a small circular white-rimmed gland on the lower part of the outer side of the hind-leg. The general colour in summer is reddish fawn on the upper-parts, but in winter bluish grey.

The various local races of this widely spread species differ not only in details of colour and marking, but also in the form of the antlers and in bodily size from this typical form. The largest races, like the Virginian and the western *M. americana macrura*, inhabit the north, but towards the south the forms become smaller and smaller, and have simpler and simpler antlers, until in the neighbourhood of the Gulf of Mexico and in Central America they become so small that it is difficult to believe they belong to the same species. Nevertheless the transition from the larger to the smaller is so gradual that, although an actual gradation does not take place, it is evident that they are all modifications of one variable type. This is true even of the little Acapulco white-tail (*M. americana tolteca*) of Yucatan, in which even the white-ringed gland on the outer side of the hind-leg is absent.

Mule-Deer. An allied but very distinct type is represented by the mule-deer (*M. [O.] hemionus*), which takes its popular title from the enormous size of its ears. This species, of which there are likewise several local races, is further distinguished by the form of its antlers, in which the sub-basal snag is

feebly developed, by the dark brown patch on the forehead, and above all by the form and colour of the gland on the outer side of the hind-leg. In place of being



VIRGINIAN DEER.

circular, with a ring of white hairs, this gland is elongated and extends up the greater portion of the lower segment of the leg, with which it agrees in colour. Another distinctive feature is afforded by the tail, which is short with a black tip. Although the mule-deer rivals the Virginian white-tail in height, the body is more

compact and the legs are proportionately shorter. The progress of cultivation has not yet diminished the distributional area of the mule-deer to the same degree as that of many other animals, probably on account of the wilder nature of its home, which is mainly the tract between the Missouri and the Sierra Nevada. The survival of the species is also doubtless owing to the fact that it accommodates itself more readily to the vicinity of human habitations than do other deer.

Black-Tailed Deer. The black-tailed deer (*M. [O.] columbiana*), which accords in the form of its antlers very closely with the mule-deer, is not only of smaller stature than the latter, but has much smaller ears. Its name is derived from the black upper surface of the moderately long tail, of which the lower side is white. The gland on the outer side of the lower surface of the leg is of the same type as that of the mule-deer but shorter. In winter the general colour of the coat of this deer is brownish grey speckled with black on the upper-parts and white below, but in summer the shade changes to yellowish red. British Columbia is the home of the typical race of this species (for there are several), which is unknown east of the Sierra Nevada. This deer seldom leaves the pine-forests of its native hills in the neighbourhood of the Columbia River and the Pacific Ocean, although when disturbed it will descend to the sea-shore to feed upon seaweed.

Prongbuck. North America possesses one very remarkable mammal, the sole representative of its family, in the prongbuck (*Antilocapra americana*), a ruminant resembling an antelope in general appearance, but with an altogether peculiar type of horn. In addition to this feature it is remarkable for its small hoofs, without any vestiges of the lateral hoofs possessed by most of the ruminants. The hair, which on the hinder part of the neck is lengthened into a mane, is chiefly bright chestnut-brown in colour, but becomes dark brown on the face, while the chin, some bars on the throat, cheeks, the inside of the ears, and under-parts are white. The horns of the bucks (for the females are generally hornless) are black in colour and laterally compressed, with a well-marked fork about the middle of their length. They differ from those of other hollow-horned ruminants not only by this forking but likewise by being annually shed and renewed, the new horn growing up inside the old sheath, which it gradually replaces.

Although the prongbuck seems never to have ranged east of the Mississippi, in former times it inhabited all the country now within the boundaries of the United States west of that river, except the forests and the higher mountains.

Grey Squirrel. Among the squirrels of the United States mention may be made of the grey squirrel (*Sciurus carolinensis*), which seems to resemble the European squirrel in its habits more than does the chickari. Typically an inhabitant of the eastern United States, this squirrel, inclusive of its numerous local races, ranges from Canada to Guatemala. It is almost entirely confined to thick forests, where it lays up provision-stores beneath the surface for winter use. Occasionally dark olive-brown above and grey below, it is generally pale grey above, marked by a pale fulvous line on each flank. It is distinguished from the chickari by the absence of ear-tufts, as well as by the longer tail, and its larger bodily size. At least nine other species of squirrels are recognised in North America, while there are many more in Central and South America, among which

the fox-squirrel (*S. rufiventer*) of the United States may be specially mentioned on account of its large size. The length is about 23 inches.

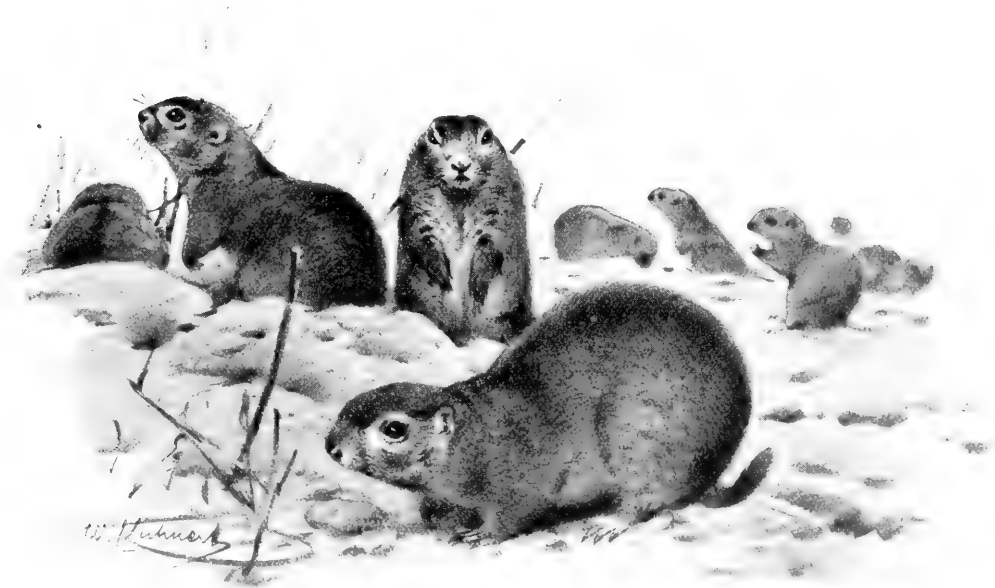
Marmots. The marmots are represented by five North American species, the largest of which has a total length of about 2 feet, and much resembles the Alpine species. This is the hoary marmot (*Arctomys pruinosus*), so named from its coloration. The second species, the yellow-breasted marmot (*A. flaviventer*), is a smaller and longer-tailed animal, whose range extends from western Texas, New Mexico, and Arizona northwards to about the 49th parallel.



PRONGBUCK.

This species lives to a certain extent in colonies, like the marmots of the Old World. A third kind, the woodchuck (*A. monax*), like the yellow-breasted marmot, has a tail half as long as the body, but only attains a total length of some 14 inches. The colour of the back is a mixture of grey, reddish brown, and black, while the lower-parts are yellowish or brownish, some specimens being, however, almost quite black. This marmot, inclusive of its local races, ranges from Newfoundland, Labrador, and Bering Strait southwards to Georgia, and from New York westward to Dakota. It is remarkable for its habits, which are not unlike those of chipmunks.

In summer woodchucks live on open plains, in the Adirondack Mountains chiefly in meadows or slopes of rocky hills close to cultivated country, where they make their burrows in order to graze on the grass and clover. They feed by day and night and at any hour of the day, according to the season, the weather, and their feeling of security. In cultivated districts they appear abroad in summer generally only in the early mornings, late in the afternoons, and on moonlight nights. In autumn they venture out only in fine weather, and even then only during the warmest hours of the day. About the 21st of September, woodchucks regularly retire into their holes, unaffected by the warmth or other conditions of the weather, or even the quantity of their food; and in the middle or the second half of March they leave them again, even though the ground be still covered with snow.



PRAIRIE-MARMOTS.

Susliks.

The susliks or gophers of the United States all belong to the long-tailed group. One of these, the long-eared gopher (*Spermophilus grammurus*), which, inclusive of its subspecies, ranges from Colorado to California, is not only distinguished by its long bushy tail, but also by its long hairy ears. The most familiar American species is, however, the striped gopher (*S. tridecemlineatus*), mentioned on p. 321, which, with its local races, ranges from Canada to Texas, and is distinguished by its small ears and remarkable colouring. The back of this gopher is dark rufous brown with from six to eight light stripes running along it, and alternating with from five to seven rows of light spots, the yellowish brown lower-parts being edged by a narrow yellow-edged black stripe.

Prairie-Marmots.

Another group of the squirrel family is formed by the prairie-marmots, or prairie-dogs, which are common to North America and Asia and intermediate between marmots and susliks in size, with small ears,

moderately long tails, and much narrower cheek-pouches than susliks. The common species is the typical prairie-marmot (*Cynomys ludovicianus*), which is reddish brown with a grey tinge above, and yellowish or brownish white below, with the tip of the tail brownish black. This species is an inhabitant of open plains, and confined to the drier districts east of the Rocky Mountains, ranging from western Texas to the 49th parallel, and from western Kansas to the eastern base of the Rockies. The Mexican prairie-marmot (*C. mexicanus*) is distinguished from its relative by its larger size, and much longer tail with more black at the tip. Other species found in the United States are Gunnison's prairie-marmot (*C. gunnisoni*) of Arizona and New Mexico, which is smaller than the type species. Lewis's prairie-marmot (*C. lewisi*) of Wyoming and the adjacent territories, and the Arizona prairie-marmot (*C. arizonensis*) of southern Arizona. These rodents, which associate in large colonies, live in separate holes, each having a small heap of earth in front of the entrance. There are generally three or four entrances all belonging to the same burrow, each burrow having perhaps ten or twelve inhabitants. The common prairie-marmot is distinguished from some of the other species by forming funnel-shaped entrances to its domicile from the earth thrown out in burrowing, which is heaped up with the fore-feet, and pressed down in damp weather with the nose.

Sewellels.

North America is the sole home of a family of remarkable rodents, the sewellels, whose members are in habits half-beavers and half-squirrels. They owe their scientific name (*Haplodontide*) to the structure of their cheek-teeth, which are without roots, and the first pair of which in the upper jaws are extremely small. Speaking generally, sewellels are stoutly built rodents, with a head somewhat recalling that of a pug-dog, the body cylindrical, and the tail a mere stump. The Californian representative of the genus, the so-called mountain-beaver (*Haplodon rufus*), is a fairly large rodent of about 16 inches in length, typically inhabiting the cascades of the Columbia River, but represented by varieties in California and Washington. This rodent resembles a squirrel in its climbing propensities, but in other respects is more like a beaver, since it inhabits wet ground with plenty of running water, where it forms small colonies and makes its burrows on sloping ground in such a manner that water can pass through them.

Mouse Tribe.

Although the mouse tribe is abundantly represented in the continent of America from one extremity to the other, there are no members of the true rats and mice indigenous to the New World. Their place is taken by voles generically identical with the European forms and by a vast number of forms more or less nearly allied to the hamsters of Europe and Asia. Many of these cricetines are distinguished by white feet, and are therefore called white-footed mice, but in shape and in the length of tail the group varies greatly. Some, for instance, have long tails and resemble common mice; others look like dormice; others again have short hamster-like tails and bodies like voles, and one species is distinguished by spines growing among its hair. It is now the fashion to refer these cricetines to quite a number of genera, of which the following are represented in the United States: namely, *Onychomys*, *Peromyscus*, *Sigmodon*, *Oryzomys*, and *Rhithrodontomys*. One of the most familiar species is the common deer-mouse

(*Peromyscus americanus*), which in some cases inhabits open fields, although it apparently prefers forest, and does not, like the European hamster, hibernate. On the contrary, it is often seen running about in the snow, on which its long tail leaves a characteristic track. In the north of its habitat it nests in cavities of trees, fallen trunks, or holes in the ground, while in the south it hangs its nest of moss, grass, and leaves on a horizontal twig, this nest being always provided with an entrance-hole below. Not only the natural gracefulness and vivacity of its movements, but also its fine colouring make this mouse one of the most beautiful of the smaller inhabitants of the North American forests. When very young this species is of a dull grey, but later on it becomes of a bright fawn-colour, its snow-white feet and under-parts being in strong contrast to the rest of its body. With its pearl-like eyes, large ears, and long tail, this mouse in general appearance is not unlike the European house-mouse, which it also resembles in size. To mention in detail any other members of the group would be impossible in our space, but it may be observed that the species of the genus *Rhithrodontomys* take their name from their grooved front-teeth. An allied sub-group is represented by the Florida wood-rat (*Neotoma floridana*), an agile climber found both in forests and on rocky ground, which produces from three to six young twice a year. These, like certain young opossums, cling to the sides and back of their mother, even when she is walking. This species has a thin scaly tail, but the bushy-tailed wood-rat (*N. cinerea*), which is confined to the north-western and western States, has a tail more like that of a dormouse. Wood-rats have grooved upper incisors. The true voles are represented in the United States by species belonging to the European genera *Microtus* and *Evotomys*, as well as by others assigned to peculiar genera under the names of *Phenacomys* and *Synaptomys*. The musquash (*Fiber*) has been already mentioned in the chapter on the Canadian fauna, as have likewise the lemmings of the genera *Lemmus* and *Dicrostonyx*.

Pocket-Gophers. Of the exclusively American family *Geomyidæ*, to which allusion has also been made in the chapter just referred to, the common pocket-gopher (*Geomys bursarius*), which inhabits the basin of the Mississippi, whence it ranges as far north as the Canadian border, is about 8 inches long and has a soft mole-like coat of a reddish brown colour above, and greyish beneath, the feet and generally the tail being white. In habits it resembles a mole, but feeds on roots, nuts, seeds, etc., and in cultivated districts on potatoes, which it is said to carry away to its provision-stores in its pouches. The provision-chamber is connected by a passage with the living habitation, which is generally situated beneath the roots of a large tree, about 5 feet below the ground, and lined with grass. When this chamber is inhabited by a female, it is generally connected with a circular, horizontal passage resembling that of a mole's burrow, which probably serves as a refuge.

Kangaroo-Rats. The kangaroo-rats agree with the pocket-gophers in the possession of external cheek-pouches, as well as by their internal structure, but are distinguished by their long hind-legs, long tail, large eyes, and well-developed external ears, as well, moreover, as by their habits. They represent in America the jerboas of Asia and Africa and the jerboa-rats of Australia, inhabiting the very driest regions, where they live in holes dug by themselves

beneath rocks and stones. Apparently they drink nothing but the dew which gathers on the cactuses, almost the only plants of their native home, and feed on the roots, seeds, and leaves of the grass growing sparsely between the cactuses. The common kangaroo-rat (*Dipodomys phillipsi*), which inhabits the deserts east of the Rocky Mountains, is distinguished by four toes on the hind-feet, is mouse-brown above, and tan-coloured on the flanks, with the under-parts, the tip of the tail, and a spot over each eye whitish.

Hares.

North America is the home of several kinds of hares, some of which are locally known as "cotton-tails" and others as "Jack-rabbits." The most northern of these, such as the polar hare, have been mentioned in the last chapter. Of the others, two, namely the large prairie-hare (*L. campestris*) and the smaller varying hare (*L. americanus*), turn white in winter; the former having long ears and the whole tail white, whereas in the latter the ears are shorter and the upper surface of the tail is dark. Among those which do not change colour, the wood-hare, grey rabbit, or cotton-tail (*L. sylvaticus*) is a very variable southern form, with numerous local races. Nearly allied to the prairie-hare, or white-tailed Jack-rabbit, are several species distinguished by having a more or less distinct black stripe on the upper surface of the tail. These include a buff-bellied species found in California, Northern Mexico and South-western Oregon (*L. californicus*), a large, long-legged hare from Southern Arizona and Sonora (*L. alleni*), the Texan Jack-rabbit (*L. texianus*), and the black-eared hare (*L. melanotis*) of the Great Plains, which differs from the third only by its shorter ears and richer coloration.

The wood-hare and its relatives, forming the subgenus *Sylvilagus*, resemble the rabbit to a certain degree in habits, since they often establish their abodes in hollow trunks of trees, or in burrows abandoned by other mammals, while the females, which produce from four to six blind and naked young three times a year, scratch shallow holes in the ground, and line them with leaves, grass, and their own fur. When leaving the nest, they cover their young so well that they are completely hidden. The wood-hare does not occur farther north than the State of New York.

Red Lynx.

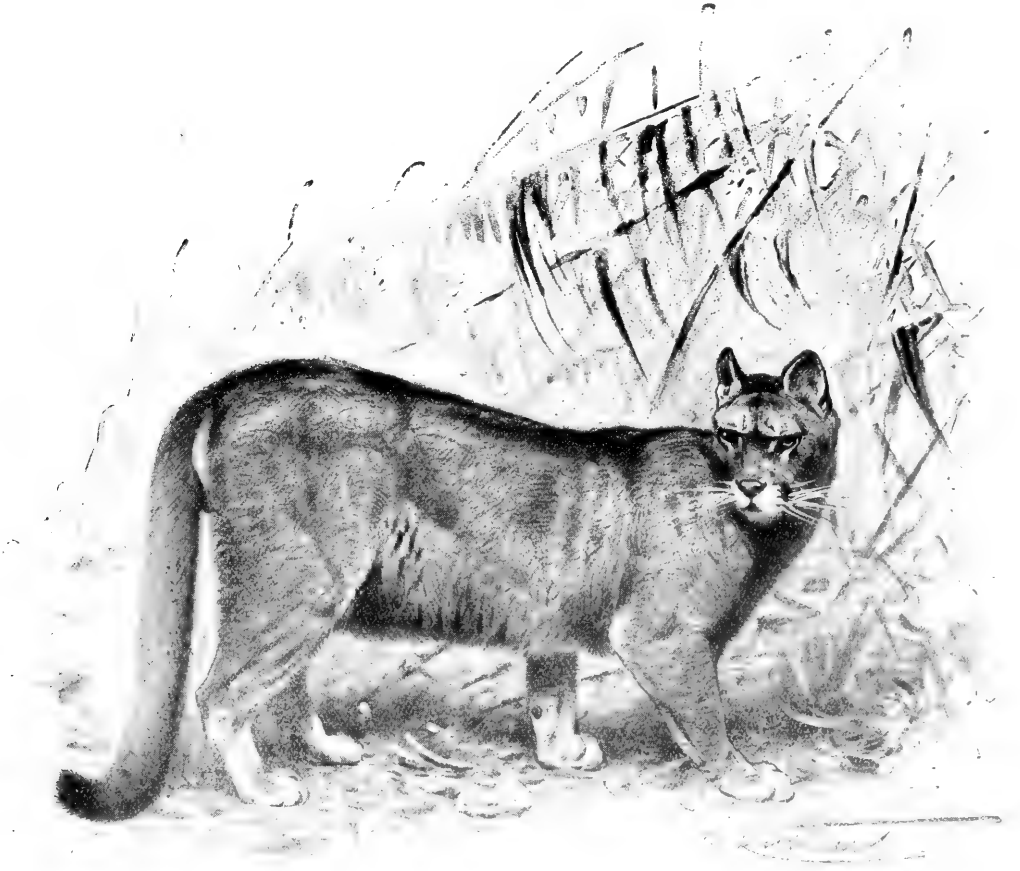
The American "wild cat," or red lynx (*Felis rufa*), apparently represents in the United States the European southern lynx. This lynx is somewhat smaller than its Canadian relative, and has shorter and thinner hair, and a more bushy tail. In many districts it is of a uniform reddish brown, but in Texas and southern California it is represented by the handsomer spotted variety (*F. r. maculata*), while in Washington and Oregon there is a striped phase (*F. r. fasciata*) distinguished by dark cross-bars. Numerous other local modifications have been described. Inclusive of these varieties, the range of the red lynx extends into Canada. The species is generally confined to rocky districts, and differs from the Canadian lynx in having three, and sometimes four, instead of only a pair of cubs.

Puma.

The range of the largest North American cat, the puma (*F. concolor*), is perhaps more extensive than that of any other mammal, extending from Alaska to the extreme south of Patagonia, if not to Tierra del Fuego. It is true, indeed, that by modern American naturalists the puma (of

which the type locality is Brazil) has been split up into a number of so-called species; but it is from every point of view far preferable to regard such forms as local modifications of one species, which from the extent of its range must necessarily display a considerable amount of variation. These remarks will apply with equal force to the case of the coyote, which comes later on in this chapter.

Apparently the largest known specimen of this animal was one killed in



PUMA.

Texas in 1846, which had a total length of over 8 feet, with a tail of about 3 feet. The puma is a slender animal with a long body and short legs. In colour it is a uniform reddish or brownish grey above and whitish below, with an indistinct dark line running along the back, and the tail ending in a dark brown tip, while the black outer sides of the ears are marked by a whitish spot in the middle, and the white upper lip shows a black spot in front. It is distinguished from other large cats by flesh-coloured nostrils, and is said in North America to be redder in summer and greyer in winter; but some of the races are yellowish

grey, some dark brown, and others grey, or even whitish; while, as an individual variation, black pumas are met with in the tropical forest regions. A light-hued race from Patagonia is characterised by the backs of the ears being pale-coloured instead of black. Young and old animals are very different in colouring, newly born pumas showing rows of large, oblong, blackish brown spots along the body, and rings of the same colour round the tail. This marking remains distinct for the first six months, and traces of it may be detected even in full-grown animals, especially when seen in certain lights, and a few individuals retain this spotting throughout life.

In South America the puma is found on the grassy, treeless pampas of Argentina, as well as in the primeval forests on the Amazons; and not only at the level of the sea, but even up to heights of 10,000 feet, as is the case in the Cordilleras of Chile. In the Peruvian highlands, where it inhabits the highest forests, the puma is occasionally found up to the snow-line, and in the mountain-forests of Central America it generally ascends to heights of 8000 or 9000 feet. In the northern portions of its range the puma has to endure very severe winters, and find its food in the snow; but it is equally at home in the hot swamps and reed-beds fringing the banks of the large rivers in the south. In the Rocky Mountains it is said to range up to the heights inhabited by the bighorn sheep, and on Mount Persephone in California it has been observed at a height of 3000 feet above the sea. In Mexico it dwells in the most isolated spots among impenetrable thickets or in caves, while in the pampas it probably hides among the high grass or on the banks of the rivers. Here it feeds chiefly on the larger animals such as guanaco, deer, tapirs, peccaries, and rheas. The number of guanaco which fall a victim to the puma is evident from the skeletons of these animals found on the pampas with the necks broken.

In North America, among the animals which the puma chooses for its prey, deer are the largest; but these form by no means its principal article of food in other districts. In the forests of the Amazons and the Orinoco, for instance, the puma is said to have accommodated itself to a more or less arboreal life, like so many other mammals indigenous to these latitudes. It is stated to jump from branch to branch, and from tree to tree, in pursuit of monkeys on which in those parts it probably chiefly preys. The North American puma is, however, said to disdain scarcely anything, and to devour mammals from the size of a deer to that of a mouse, as well as fishes and even snails. Instead of the rhea, or American ostrich, which it pursues in South America, in New Mexico and Arizona the puma stalks the wild turkey. South American pumas are so partial to horse-flesh that in some parts of Patagonia the breeding of horses is impossible, on account of all the colts being devoured by these marauders. To some extent this also holds good for the half-wild horses of South America. Not only colts, but also fully grown horses fall victims to the voracity of the puma; and, although calves are taken by preference, cows are also killed and eaten. Pumas are likewise particularly fond of sheep, which in many districts form their chief food. They generally wander forth at night or in the morning and evening twilight, like other large cats, and stalk their prey in the same stealthy manner. They slink up close to deer, and when near enough advance in a series of leaps, if not able to reach them by a single

bound from some elevation. If the attack fails after several attempts, pumas let their victims escape, in spite of their wonderful leaping powers, which are such as to enable them to jump on to branches 18 to 20 feet from the ground. In deep snow pumas follow their prey much farther than at other times, and they have then been seen chasing deer for considerable distances. When they overtake their victims, pumas jump on the shoulders, and break the vertebræ of the neck with their fore-feet. In South America the puma is said sometimes to jump on the back of the jaguar, when it inflicts terrible wounds with its claws. And the same story is told in North America with regard to the puma and the grisly bear. In proportion to its size, the puma is undoubtedly one of the fiercest and most courageous beasts-of-prey, and it is therefore all the more remarkable that it should be such a coward in the presence of man. This appears to be especially noticeable in South America, where for many years it has been known that pumas never attack grown-up persons, children, or any sleeping human beings.

Coyote.

Among the members of the dog tribe inhabiting the United States, the most characteristic is the coyote (*Canis latrans*), which ranges from Manitoba to Costa Rica, and is particularly common in Texas and the north of Mexico, as well as on the prairies. This species, which has been subdivided into a number of races (species of American naturalists), is easily distinguished from the true wolves of North America, to which allusion has been made in an earlier chapter, by its inferior stature and more bushy tail, as well as by the closer and longer fur.

Compared with the various modifications of the wolf, the coyote is a slender, lithe, graceful, and smaller animal. Except in the pallid desert forms, in which the fulvous tints are replaced by buff, the muzzle, back of the ears, outer sides, and in some cases the whole, of the limbs, and the terminal half of the lower side of the tail are fulvous. The ground-colour of the back varies from buff, or even from buffish white, in the desert forms, to dull fulvous in the South Mexican race; the relative preponderance of black-tipped hairs being usually dependent upon the intensity of the ground-colour. The upper surface of the tail is coloured like the back, but shows at about one-third the length from the root an elongated black spot, marking the position of the gland situated here in all members of the dog tribe. The tail-tip is always black, although occasionally it may contain a tuft of white hair. The male coyote is superior in size to the female.

Red and Cross

Fox.

The red fox (*C. vulpes fulvus*), representing the common fox of Europe, inhabits the eastern States. In the same area occurs the so-called cross-fox, which is a mere individual variety, not even entitled to rank as a distinct race. Of a very different type is the Virginian or grey fox (*C. cinereo-argenteus*), whose range, inclusive of the numerous local races, extends from the United States to Central America. It is much smaller in size than the red fox, and seems to be a transitional form between the latter and the fox-like dogs of South America. Hence it is separated generically, under the name of *Urocyon*, by those naturalists who refer to the true foxes as *Vulpes*. The typical race of the species inhabits eastern North America from Georgia northwards to New England and westwards to the valley of the Mississippi. Its habits are unlike those of the common fox.

American Black Bear. The American black bear (*Ursus americanus*), of which several local forms have been described, is much smaller than the Alaskan brown bears, and even inferior in size to the brown bear of Europe.

Originally this bear ranged from Labrador to the Gulf of Mexico and from the Atlantic to the Pacific. Now, however, it is mainly restricted to a few of the mountain-ranges in the south of the St. Lawrence basin, to the neighbourhood of the great lakes, and to some unsettled districts in the east of the Mississippi basin.

The habitat of the typical race extends over the forest-covered districts of North America to the northward of Florida, Louisiana, and Texas. Normally the



AMERICAN BADGER.

fur of this race is uniformly black throughout, except on the muzzle, where it is tawny yellow. It is a comparatively small bear, with a short and wide skull, of which the frontal region is usually moderately elevated, and with relatively small cheek-teeth. The cinnamon-bear (*U. cinnamomus*) of Audubon and Bachman was based on an animal from the northern Rocky Mountains with small molars like the common black bear of the United States, of which it would seem to be a light-coloured phase. These bears are not only good swimmers but also excellent climbers, and though avoiding the tree-tops, and thin branches which will not bear their weight, climb even smooth and vertical stems to get at bees and honey. They devour large quantities of ants and their so-called eggs, as well as various kinds of fruits, leaves, and roots. They likewise catch fishes, frogs, tortoises, and small mammals, although they prefer domesticated calves and

sheep, and are particularly partial to pigs. The white Gribble Island bear is referred to in the preceding chapter.

**American
Badger.**

The American badger (*Taxidea americana*), the only representative of its genus, is characterised by the great width of the hind part of the skull, the depressed body, which measures about 2 feet in length, and the short tail, with a length of barely 6 inches. The cheek-teeth differ from those of the typical badgers of the Old World by the large size of the flesh-tooth in the upper jaw, and the long heel of the corresponding lower tooth. The fore-feet are disproportionately large, the eyes are very small, the blunt and somewhat crooked muzzle is haired down to the nostrils, and the short, broad, and rounded ears are remarkable for the size of their apertures. In colour the American badger, of which three local races are recognised, is hoary brown or greyish above, with the under-parts and legs blackish brown. The head, which is a little darker than the rest of the body, is marked with a white line down the middle, and a white patch on each cheek, divided by a dark stripe. This badger ranges from Canada into Mexico, where it is represented by a race (*T. a. borlandieri*) characterised by a white stripe on the back.

Like its relative in Europe, the American badger is an exclusively nocturnal animal, seldom seen in the daytime; on the upper Missouri and its tributaries it is so common that large tracts are undermined by its burrows, which may be distinguished from those of the equally numerous prairie-marmots by the absence of the small mounds surrounding the entrances. The badger kills and devours numbers of these marmots, as well as other small mammals, insects, snails, birds, eggs, and honey. In the colder parts of its habitat this badger hibernates from October till April.

Skunks.

Allied to the badgers are the skunks, a group confined to America, and distinguished by the large bushy tail, generally carried over the back, and by the black-and-white coloration, in which the white is confined to longitudinal bands of variable width on the back. The members of this noisome group are split up into three genera, in the two first of which there are thirty-four teeth. The typical representative of the group, the common skunk (*Mephitis mephitis*), inhabits North and Central America from Hudson Bay to Louisiana and Virginia, the Hudson Bay and the Mississippi forms being regarded as distinct local races. Other forms, recognised as species, carry the genus as far south as Guatemala. An ordinary skunk is about the size of a short-legged Persian cat, and is a strongly built, small-headed animal, with a bushy tail almost as long as the body, if the hairs at the tip be included. The long-tailed skunk (*M. macrura*) of Mexico is distinguished by a longer and bushier tail, which in all cases equals the body in length. The lesser skunks, as typified by *Spilogale putorius*, are very different animals, inhabiting the southern United States and Central America, and not exceeding a foot in length. Typically the tail is shorter than the body, and the back marked with white spots and four interrupted white stripes, while the tail ends in a white tip.

Unlike the typical skunks, which are ground-animals, the lesser skunks are active climbers. All skunks have the habit, when attacked or irritated in any way, of ejecting an evil-smelling fluid secreted by two glands beneath their tail. Few

animals ever attack skunks, for their pernicious habits appear to be well known to every species, and their striking coloration and waving tails render them extremely conspicuous at a distance. They behave, indeed, as if they were perfectly aware of the power they possess, and were quite indifferent to other creatures. They move about in a slow, deliberate manner, occasionally breaking into a kind of trot, but never seem to really hurry themselves.

Shrews.

There are only two families of the Insectivora represented in North America, namely, the shrews and the moles. In the former group the short-tailed shrews are easily distinguished from other shrews not only by their stumpy tails, but also by their ears looking as if the tips had been cut off. The common *Blarina brevicauda*, of which there are several races, ranges over a considerable portion of North America, extending as far south as Florida and



THE SKUNK.

California. Like others of its kind, this shrew seeks its food both by day and night; and spends the greater part of its life below the ground, or at least beneath fallen wood and leaves, and under roots and trunks of trees. It may be seen in daylight burrowing in the snow to reach tree-stumps in search apparently of grubs. In addition to the latter, its food includes beech-nuts.

The Rocky Mountains are the home of the marsh-shrew (*Sorex palustris*), which, like another member of the same group inhabiting the Aleutian Islands, *S. hydrodromus*, is distinguished from other shrews by leading a partly aquatic life, having long fringes on the feet to assist swimming. On account of these and other differences these species are often regarded as representing a distinct genus, *Neosorex*. The large Bendire's shrew (*S. bendirei*), again, is referred by American naturalists to another genus *Atopohyrax*; while the small *S. hoyi* is made the type of the genus *Microsorex*. Other North American shrews agree, however, closely with the typical European members of the group.

Moles.

The American moles are all generically distinct from the typical European representative of the group, and, except in one case, do not belong to Old World genera. The common North American mole (*Scalops aquaticus*) is distinguished from its relatives in the United States by the presence of a web between the toes of the hind-feet, as well as by its dentition. On account of these webbed feet, it was formerly regarded as an aquatic animal, but it really swims only in case of need, and instead of living near water, frequents dry places. Like the European mole, it spends its life below ground, where it finds its food, chiefly consisting of earth-worms, insects, and grubs.

Another well-marked type, the hairy-tailed mole (*Scapanus townsendi*), resembles the common mole in external appearance, but has forty-four teeth like the star-nosed mole. Several allied species are known in North America; but *Scalops breweri* is now separated generically by American naturalists as *Parascalops*. The curious star-nosed mole (*Condylura cristata*) derives its name from the presence of appendages arranged in the shape of a star round the nostrils; while it is also distinguished from other moles by the length of its tail. This mole, which is only 5 inches long, exclusive of the tail, lives entirely on worms and insects, and resembles in habits the other American moles, but does not apparently dig such long passages, although it throws up larger hills. A very noteworthy type is Gibbs's shrew-mole (*Neurotrichus gibbsi*), belonging to a group represented elsewhere only by a single Japanese species. Some writers, however, regard the American species as referable to the same genus (*Urotrichus*) as the Japanese species.

Bats.

The bats of North America are for the most part allied to species inhabiting Europe and northern Asia. The European long-eared bat, for instance, is replaced in the States by the closely allied *Plecotus* (or *Corynorhinus*) *macrotis*, distinguished by the presence on the forehead of a thick ridge ending in a club-shaped enlargement between the eye and the nostril. The Californian cave-bat (*Antrozous pallidus*), although referred to a distinct genus, is allied to the European barbastelle, from which it differs by the separation of the bases of the ears. The spotted bat (*Euderma maculata*) is another peculiar North American generic type. There are several representatives of the European genus *Myotis*; and in the pipistrelle group the silver-haired bat (*Lasionycteris noctivagans*) is notable on account of its high northern range, while the typical pipistrelles (*Pipistrellus*) have two representatives. The genus *Vespertilio* is represented by the large brown bat (*V. fuscus*), which used to be regarded as nothing more than a local race of the European serotine; but a very distinct type is presented by the New York bat (*Lasiurus borealis*). Many other representatives of the typical bats (*Vespertilionidæ*) occur in the States; in addition to which there are a few representatives of the vampire-family (*Phyllostomatidæ*) whose true home is Central and South America. Horseshoe-bats (*Rhinolophidæ*) are, however, entirely absent.

Opossums.

America is the only continent except Australia in which there are marsupials, but the American species are few and included in two families. Although the very distinct Australian phalangers have locally usurped their name, opossums (which, it need scarcely be said, are marsupials) are

restricted to America, although they are nearly related to the Australian family *Dasyuridae*. Opossums are distinguished by a clawless opposable first toe on the hind-foot, which thus serves as a hand, by the long tail being generally hairless, scaly, and prehensile, and by the incisor teeth comprising five pairs in the upper and three in the lower jaw.

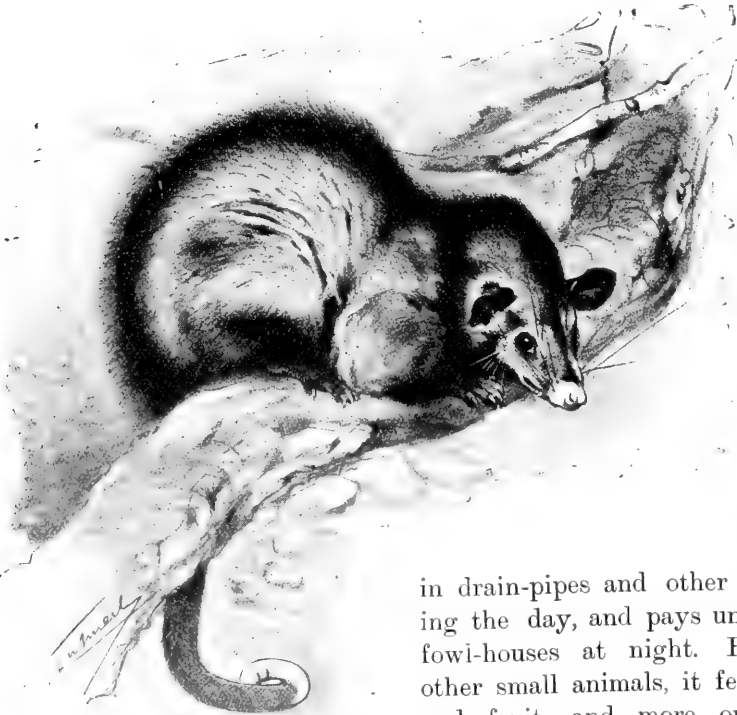
A few years ago only a single species of opossum (*Didelphys marsupialis*) was recognised in the United States; but the one inhabiting north-western Mexico adjacent to California is now regarded as distinct, under the name of *D. californica*. Typically the common opossum is about as large as a cat, attaining a length of over

18 inches with a tail about an inch shorter. In colour it displays considerable variation, some forms being white, others black, and others of almost every intermediate hue. In districts where it is very common it not only lives in forests, but is found in towns, where it shelters

in drain-pipes and other hiding-places during the day, and pays unwelcome visits to fowl-houses at night. Besides birds and other small animals, it feeds on eggs, roots, and fruit, and more or less everything eatable, even carcases. On account of its pilferings, it is much persecuted; it has great vitality and is an adept at feigning death, as is exemplified by the many

amusing stories told about opossums believed to be dead which afterwards escaped.

Coming to the birds of the United States, mention may first be made of the distinctly American group of bluebirds, the best known representative of which is the so-called blue robin (*Sialia sialis*). Somewhat larger than a redbreast, this species is sky-blue above, and chiefly chestnut below. It ranges from southern Canada to the Gulf of Mexico, and is one of the most popular birds in the United States, owing to its graceful movements and pleasing song. The true thrushes have numerous North American representatives; and in another family mention may be made of the beautiful ruby-throat. Among the wrens are



OPOSSUM.

Perching Birds.

the species known as *Thryothorus ludovicianus* and *T. bewicki*, called in some districts mocking-birds, although this name is more usually given to the members of the genus *Mimus* on account of their skill in imitating the human voice. One species of the latter group, the common cat-bird (*M. carolinensis*), is moreover renowned as a songster. In size it is somewhat smaller than a song-thrush, and is bluish grey in colour with the head black and the under surface of the tail chestnut. Although tits and creepers are fairly common in the United States, but very few larks are present in America, where pipits are likewise scarce.

Several kinds of bunting have their home in North America, where the cardinals are conspicuous members of the finch group. One of these is the red cardinal (*Cardinalis virginianus*) of the southern States and Mexico, a beautiful scarlet bird with an agreeable song, commonly called the Virginian nightingale. Another well-known species, the indigo-bird (*Cyanospiza cyanea*), of a deep blue colour and about the size of a linnet, ranges from the United States into Central America, its relative the nonpareil, or painted bunting (*C. ciris*), being confined to the southern United States. The sparrow-buntings (*Zonotrichia*) constitute another group restricted to North America.

The place of the weaver-birds and starlings of the Old World is taken in America by the so-called hangnests, of which the purple troupial (*Quiscalus purpureus*) is perhaps the best known member, at least on the Atlantic seaboard. Another familiar representative of the group is, however, the Baltimore oriole (*Icterus galbula*). Allied to these is the bobolink (*Dolichonyx oryzivorus*), which builds a carelessly constructed nest on the ground, and thus departs widely in habits from the others. The cow-birds (*Molothrus*), which also belong to the same group, generally frequent marshy plains and pastures, where they pick the parasites from cattle; they lay their eggs in the nests of other birds, after the fashion of the cuckoo.

Among the crow tribe, the raven is widely distributed in North America; but the carrion crow is represented by an allied species, as is also the magpie, whose near relative the Californian magpie (*Pica nuttalli*) is distinguished by having a yellow back. The crested jay (*Cyanocitta macrolopha*), so common in the extensive coniferous forests of the western States, belongs to an exclusively American group. On the other hand, the American shrike (*Lanius borealis*) represents the great grey shrike of Europe, of which it is sometimes considered to be only a local form. With the greenlets we come to another exclusively North American group, the best known species of which is the white-eyed flycatcher (*Vireo novæboracensis*). Neither the flycatchers nor the waxwings are numerous in North America, although the latter possess a noteworthy representative in the cedar-bird (*Ampelis cedrorum*). The North American representatives of the swallow tribe include the European sand-martin and the purple martin (*Progne purpurea*), the latter of which is peculiar on account of its habit of nesting for the most part in hollow trees.

Tyrants.

Passing on to a totally different group, mention may be made of Humming-Birds, the pipiri (*Tyrannus pipiri*), a member of the group of tyrants Woodpeckers, etc. remarkable on account of its unusually long and forked tail. The

other members of this group as well as the humming-birds are chiefly characteristic of tropical America. One humming-bird (*Chatura pelagica*) inhabits, however, the eastern United States. The most noteworthy nightjar is perhaps the pyramiding (*Chordeiles virginianus*), which ranges as far south as Brazil. The American kingfishers are mostly tropical. Among the woodpeckers the so-called flicker (*Colaptes auratus*) cannot be passed over without mention, this bird being a resident in the central and southern parts of the United States,

but also breeding in the far north. It feeds chiefly on ants, and is not so confined to forests as other woodpeckers, making long journeys in search of food through treeless districts. In the west it is replaced by the red-winged species (*C. mexicanus*), with which it is connected through an intermediate form (possibly a hybrid) inhabiting the central States. The so-called ivory-bill (*Campophilus principalis*), a black woodpecker larger than the European species, now limited to the southern States, some fifty years ago ranged much farther north.

The two species of rain-cuckoos differ

from the cuckoos of the Old World by building their own nests instead of depositing their eggs in the nurseries of other birds. Of these the yellow-bellied *Coccyzus americanus* ranges as far south as lower Brazil, although the black-bellied *C. erythrophthalmus* has a more northerly distribution, appearing during the summer even in Labrador.

The Carolina parrot (*Conuropsis carolinensis*) alone represents a group otherwise restricted to Central and



THE PIPIRI.

South America. In the typical conures (*Conurus*) the fourth primary feather of the wing is attenuated and the nostrils are exposed; in the Carolina parrot the corresponding feather is not narrowed and the nostrils are concealed among the feathers covering the cere. Formerly this parrot had a more northern range than any other, extending to Iowa, the great lakes, and New York, but

it is now confined to the States bordering the Gulf of Mexico and the Mississippi Valley, and is very local.

Owls and Birds-of-Prey. Perhaps the most noteworthy owl of the United States is the prairie-owl (*Speotito hypogæa*), which extends to Central America, but is represented by a distinct species in South America. Most of the European and north Asiatic owls have American representatives, among which it must suffice to mention the American eagle-owl (*Bubo virginianus*). Among the falcons are the American sparrowhawk (*Falco sparverius*), the peregrine of the Eastern Hemisphere, and the pigeonhawk (*F. columbarius*), a bird smaller than the European kestrel. The golden-eagle, otherwise known as the Canadian eagle, is found in the Rocky Mountains, but a much more common bird is the white-headed sea-eagle (*Hali ætus leucocephalus*), which has been adopted as the heraldic device of the United States. The kites have a conspicuous representative in the swallow-tailed *Elanoides furcatus*. On the other hand, the place of the vultures of the Old World is taken in America by the condors, of which, in addition to the so-called turkey-buzzard or turkey-vulture (*Cathartes aura*), the United States posses the Californian condor (*Pseudogryphus californianus*), now nearly exterminated.



SWALLOW-TAILED KITE.

Game Birds. North America is the home of a very large number of game-birds, among which the prairie-hen (*Tympanuchus americanus*) of the Mississippi valley is a familiar type. The so-called partridges and quails of North America form a group quite distinct from the one which includes the birds properly thus styled; one of the characters of the American group being the

serration of the edges of the lower half of the beak. A well-known member of the group is the Californian crested quail (*Lophortyx californicus*), which owes its name to the tuft of black feathers on the head. There are numerous other generic representatives of the group, such as the bob-white (*Colinus virginianus*), the ruffed grouse (*Bonasa umbellus*), and the sharp-tailed grouse (*Pediocætes phasianellus*). North and Central America form the exclusive home of the turkeys, of which two or three species are known. One of these, *Meleagris ocellata* (often separated generically as *Agriocharis*), is confined to Honduras, Guatemala, and Yucatan. The others, on the contrary, are North American, the typical



MEXICAN TURKEY.

Meleagris gallopavo inhabiting the south-western United States from western Texas to Arizona and south to the Mexican table-land.

Pigeons. Of the pigeons the most remarkable was the passenger-pigeon (*Ectopistes migratorius*), which formerly travelled across many of the more northerly states, notably Michigan and Wisconsin, in flocks many miles in length, but now appears to be extinct.

Cranes and Ducks. Wading and water-birds abound in North America, especially in winter, when the waters are crowded with ducks, geese, and swans, but it is impossible to mention these in detail. By far the handsomest American member of a stately group of birds is the whooping crane (*Grus americana*), whose plumage is pure white, save for a patch of black down on the head. The most

brilliantly plumaged duck is the summer-duck (*Æx sponsa*), a member of the same genus as the Asiatic mandarin-duck, and furnished with a similar long pendent crest.

Very few words, unfortunately, can be devoted to the reptiles of the United States, although they are worthy the best attention of the student of geographical distribution. Terrapins are numerous, very characteristic being the box-tortoises, *Cinyxis*, in which the shell can be closed by a movable flap. The snappers (*Chelydra* and *Macroclermys*), which comprise a few large aquatic species, are equally characteristic. There is also a representative of the soft-tortoises (*Trionyx ferox*) in the southern United States. The North American alligator (*Alligator mississippiensis*) was, for a long time, the only known living representative of its genus; but, as mentioned above, it has a cousin in China. Among snakes, the rattle-snakes, as typified by *Crotalus durissus*, form a very distinctive American group, the common species living on sandy, stony



FLORIDAN EEL-SALAMANDER.

ground among low bushes. Another well-known venomous snake is the water-viper (*Ancistrodon piscivorus*), which dwells near water, in which it finds a safe refuge.

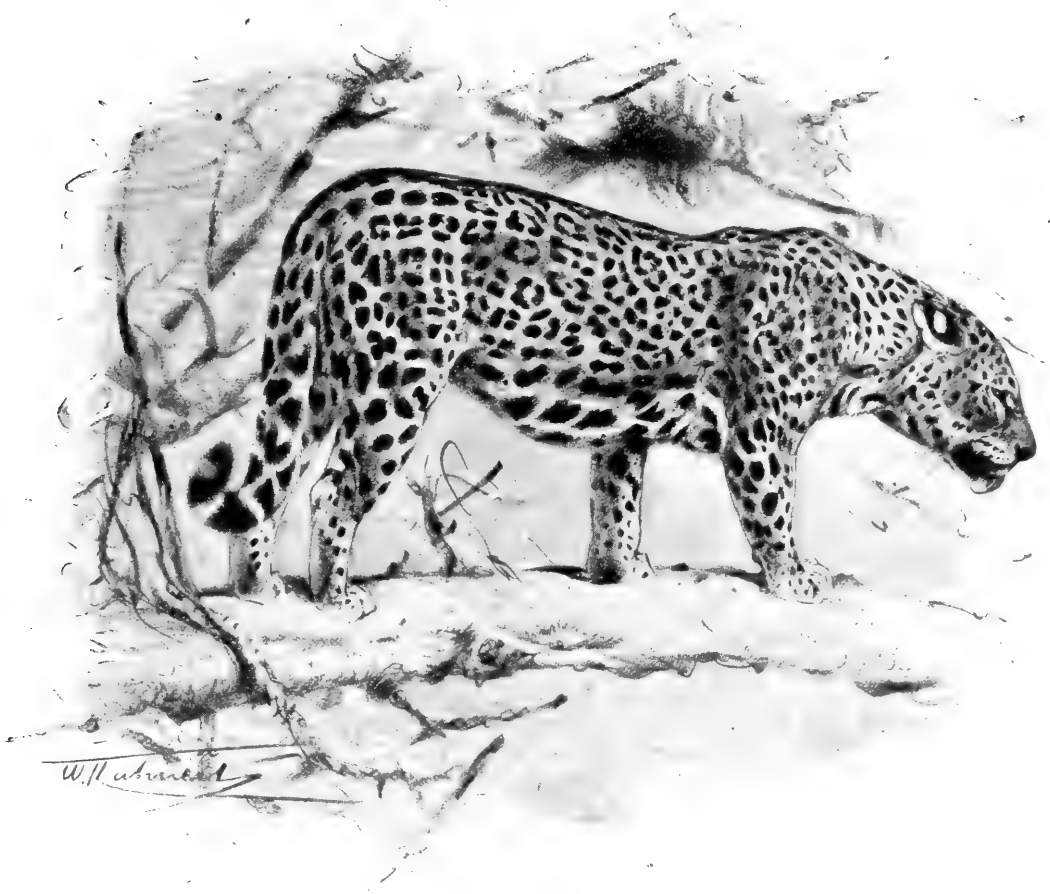
Frogs and Salamanders. Of the frogs the largest is the bull-frog (*Rana catesbeiana*), which may attain a length of some $7\frac{1}{2}$ inches. It takes its name from its loud roaring voice: besides smaller animals it eats frogs, fishes, and birds. In another group we have the eel-salamander of Florida (*Amphiuma means*), distinguished by its yard-long, eel-shaped body and small three-toed feet; and the siren salamander (*Siren lacertina*), which is of nearly the same length, but distinguished by having no hind-legs. Both generic types are exclusively North American. Very characteristic are the salamanders of the genus *Amblystoma*, of which an outlying species inhabits Siam.

Fishes. Four fishes alone can be mentioned. One is the blind-fish (*Amblyopsis spelæa*) of the caves of Kentucky and Indiana, remarkable for having no external eyes. The second is the curious bow-fin (*Amia calva*), the sole living representative of an ancient type. It is a nest-building species,

which occasionally comes to the surface of the water to take in large gulps of air. Not less noteworthy is the bony pike (*Lepidosteus osseus*), one of the few survivors of the enamel-scaled fishes so numerous in past epochs of the earth's history.

The spoon-beaked sturgeons, *Scaphirhynchus*, of which two species inhabit the Mississippi system, and the rivers and lakes of the western States, while the others are restricted to Central Asia, are of special interest on account of their presenting a geographical distribution very similar to that of alligators and several groups of mammals.

It may be added that American waters are also inhabited by true sturgeons (*Acipenser*). In the picturesque piece of water known as The Lake of the Woods—which lies mainly in the British Province of Ontario, although its southern shore is situated in Minnesota, and, therefore, belongs to the United States—and the neighbouring waters, is found the species commonly known as the great lake sturgeon (*A. rubicundus*), which attains very large dimensions. Till about 1892 sturgeon swarmed in this lake, but in that year the fishery began to assume considerable proportions, while between 1893 and 1896 it had become of great value. In 1893 the catch of sturgeon in American waters was no less than 1,300,000 lb., while Canada secured 350,000 lb., so that the total was 1,650,000 lb., the value of the American catch being estimated at \$26,000. In 1909 the total catch fell to 53,316 lb., although in the two preceding years it was three times as large, Canada securing 83,900 lb. in 1907, against 80,122 lb. by the United States. In spite of the diminished output in 1909 as compared with earlier dates, it is reported that during the last few years the catch of sturgeon has been on the increase, but this is probably due to closer fishing. In 1893 the American yield of caviare was 97,500 lb., valued at \$19,500; in 1909 it was reduced to 346 lb., valued at \$519; the Canadian caviare in the same year was 383 lb.



JAGUAR.

CHAPTER III

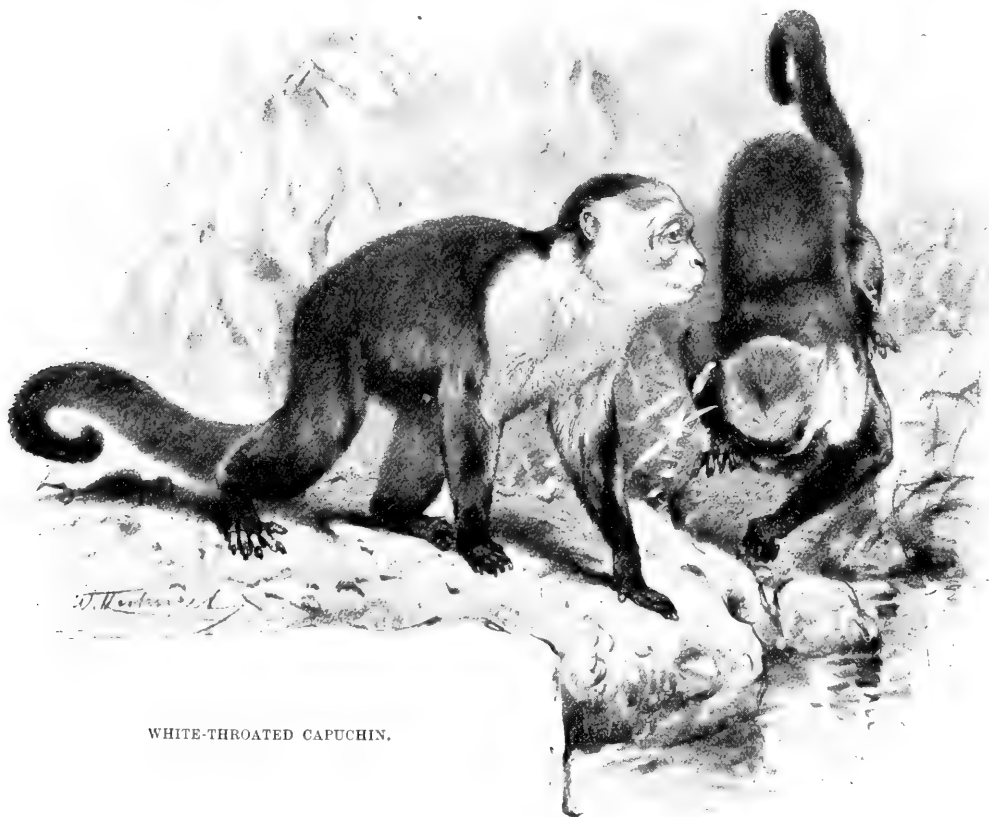
TROPICAL AMERICA AND ITS ANIMALS

TROPICAL America, in which may be included the southern half of the Florida Peninsula, Mexico, Central America, and the northern half of South America, varies greatly in its physical features, containing as it does a portion of the lofty chain of the Andes, and the teeming forests of the Amazon and the Orinoco, together with the open *campos* of Brazil. Its flora is perhaps the richest in the world; while its fauna is perhaps more peculiar and remarkable than that of any other part of the globe except Australasia. This area is, for instance, the sole habitat of the true edentate mammals, such as the sloths, ant-eaters, and armadillos, together with many other peculiar types of both mammals and birds. Formerly indeed, South America, when it was cut off by sea from the northern half of the New World, possessed an absolutely peculiar fauna: but since the union of the two continents the southern types have been introduced into North America, while the forms originally characteristic of that area have passed south, so that the distinction between the

two faunas has to a considerable extent become obliterated. What is perhaps more remarkable is that types like the llamas, originally characteristic of North America, have quite died out there and survive only in the southern continent.

Monkeys.

In contrast to North America where there are none, South America is rich in monkeys, which belong, however, to a group quite distinct from the monkeys of the Old World, from which they differ by their broad, expanded nostrils. No American monkeys have cheek-pouches or bare callosities on the buttocks, and many are distinguished by their prehensile tails. With the exception of the capuchins, none of them possess an opposable thumb.



WHITE-THROATED CAPUCHIN.

Exclusively arboreal, these are restricted to the warmer countries of America, being unknown beyond the tropic in the north or farther south than the 30th degree of latitude.

Among the better known members of the group, the weeper-capuchin (*Cebus capucinus*) ranges from Bahia north-westwards across Brazil to Colombia. Its general colour is golden brown with pale yellow on the temples, cheeks, throat, chest, and front of the shoulders, and a dark stripe down the middle of the head. It owes its name to the whining whistle which forms its cry. From this species the white-throated capuchin (*C. hypoleucus*) of Central America differs by its colour being mainly black, with white on the cheeks, arms, and shoulders and yellowish on the throat and chest, the bare face being of a pale flesh-colour. The

woolly monkeys, as typified by *Lagothrix humboldti*, are distinguished from the last by the longer tail, which is naked on the lower side of the pointed tip, and bears on its gripping surface ridges and furrows similar to those on the human hand, so that it does not easily slide off any smooth object it may clasp. They are likewise characterised by the woolly nature of their coat, a feature to which they owe their name. A connecting link between the woolly monkeys and the spider-monkeys is formed by the woolly spider-monkey (*Eriodes arachnoides*), an animal of much more slender build than the former.

The spider-monkeys, which are more thoroughly adapted to an arboreal life than any of the rest of their kindred, take their name from their long slender limbs and thin bodies. Among the numerous species ranging over the country between Uruguay and southern Mexico, one of the best known is the red-faced spider-monkey or coaita (*Ateles paniscus*), a native of Guiana and the Amazon valley. The tail measures about $2\frac{1}{2}$ feet in length or about 6 inches more than the head and body.

Like the members of the preceding group, the douroucoulis have long tails, although these are non-prehensile and thickly haired. Among the four species, all of which lead



WOOLLY SPIDER-MONKEY.

a nocturnal life and are distinguished by the round whiskered face, short ears, and exceptionally large, owl-like eyes, the most common is the three-banded douroucoli (*Nyctipithecus trivirgatus*), whose range extends from Venezuela and Guiana to Brazil and Peru.



THREE-BANDED DOUROUCOLI.

The little squirrel-monkeys are specially characterised by the great relative length of the hinder part of the head. Among them, the common squirrel-monkey (*Chrysomys sciurea*), which inhabits Brazil and the Orinoco valley, is one of the best known. Not much larger than a squirrel, it owes its name of death's-head monkey to the black-snouted large-eyed face which bears some resemblance to a skull.

The titi monkeys of the genus *Callithrix*, which greatly resemble in some respects both the squirrel-monkeys and the douroucolis, have smaller heads and eyes and long bushy tails. They range all over South America but are principally found in the Amazon basin.

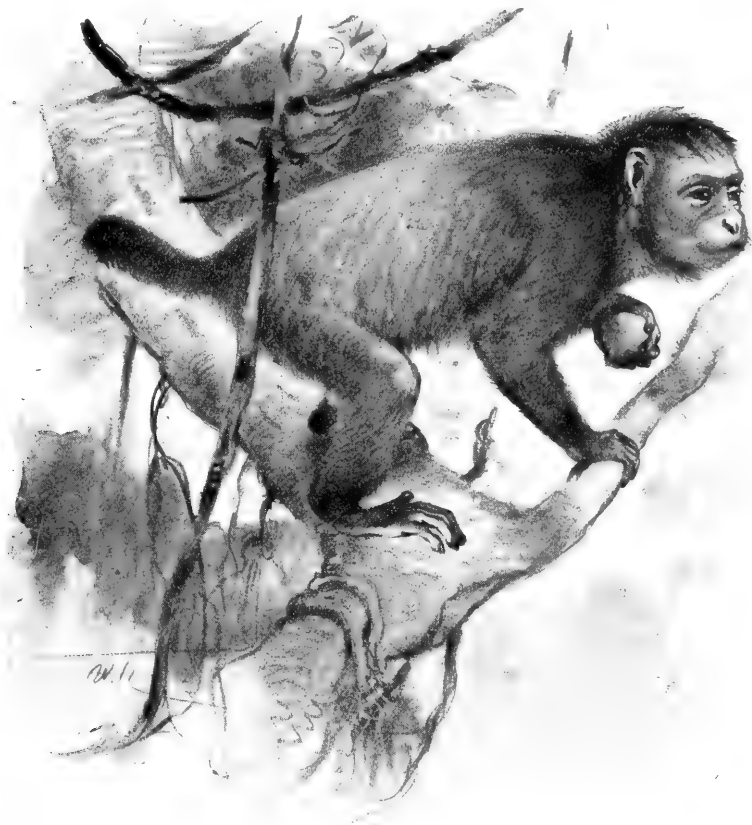
The sakis, again, may be recognised by their long thick bushy tails, which are not prehensile, and are further distinguished by the possession of whiskers and long beards. Among them, the red-backed saki (*Pithecia chiropotes*), which inhabits the valley of the Amazon, the upper Orinoco, and Guiana, is remarkable for its way of drinking, as it does

not stoop down to the water, like other monkeys, but only bends its head and lifts the water to its mouth in the hollow of its hand.

The hairy saki, or Humboldt's saki (*P. monachus*), restricted chiefly to the north bank of the upper Amazon and ranging as far west as Peru, is well known in captivity as an affectionate and intelligent companion.

Nearly related to the foregoing, the uacaris are broadly distinguished from all other American monkeys by the shortness of their tails which never exceed

one-third the length of the body. They are clothed with long silky hair, and their beard is either very slight or absent altogether. The most remarkable is the bald uacari (*Ouacaria calva*), a species of about 18 inches in length, conspicuous on account of its brilliant red face which contrasts strongly with the pale chestnut of the long hair. It inhabits a small tract bounded by the Japura and the Amazon in the vicinity of Ega. Here these monkeys live in small troops among the crowns of the taller trees, feeding on fruits of various kinds.



BALD UACARI.

Very different from all the foregoing are the howlers, distinguished not only by their protruding muzzles and retreating foreheads, but likewise by the fringe of long hair with which the naked face is bordered, this forming a well-developed beard on the cheeks and chin and a thick tuft on the forehead. Their most noticeable characteristic is, however, the enlargement of the upper part of the windpipe into a hollow shell of bone. It is by means of this organ that these monkeys produce the loud howls to which they owe their name. Howlers, which are said to feed exclusively on leaves, are numerous and widely distributed in Brazil, whence they range northwards into Central America. One of the most familiar representatives of the group is the red howler (*Alouatta seniculus*) a chestnut-coloured species inhabiting Brazil, Ecuador, Colombia, and Venezuela, the most southern species

being the black howler (*A. nigra*). Nothing, it is said, sounds more terrible than the howling of these monkeys, which, with short intervals, lasts from eleven o'clock

at night until daybreak. The skulls of howling monkeys undergo a kind of retrograde development, in consequence of which they assume a form assimilating to that of lower mammals, such as Carnivora, rather than the type distinctive of other monkeys. The embryonic skull, on the other hand, is essentially of the monkey type. The degeneration displays itself in the lengthening of the facial region, so that the skull gradually passes from a short to a medium, or even long type; thus most of the cephalic indices become much lower than in any other monkeys, while the hemispheres extend to a smaller degree over the cerebellum in the adult than in the young.



RED HOWLER.

Marmosets.

Although the tiny marmosets, which form a family (*Hapalidae*) by themselves, resemble the other New World monkeys in their broad

and flat noses, they differ by having their cheek-teeth numerically equivalent to those of Old World monkeys, that is to say they have an extra pair of these teeth in each jaw. They are further distinguished by having claws on all the fingers and toes except the great toe, as well as by the frequent presence of tufts of long hair on the ears. In appearance and habits marmosets are more like squirrels than monkeys. They are divided into two generic groups according to the length of the lower tusks or canines as compared with the incisors, the short-tusked marmosets having the lower canines not longer than the incisors. The commonest of these is the ouistiti (*Hapale jacchus*), which inhabits the island of Marajo at the mouth of the Amazon, and belongs to a group of ring-tailed species whose ears are for the most part bald, but provided on the front edge with a broad tuft, the hair on both sides of the upper part of the head being lengthened and the back being marked with light and dark cross-bands. Another marmoset from the same district is the black-eared *H. penicillata*, sometimes regarded merely as a local race of the last, from which it differs by the black ear-tufts. This marmoset is very common. On the other hand the black-tailed marmoset (*H. melanura*) of Brazil and Bolivia is a very rare form.

The long-tusked marmosets, or those with the lower canines taller than the incisors, are generally known as tamarins.

One of the best known is the Negro tamarin (*Midas ursulus*) inhabiting the valley of the lower Amazon near Para, where it is often seen in the woods bordering the suburban streets. There are about twenty species of tamarins, the most beautiful being the silky tamarin or marakina (*M. rosalia*), which has a mane like that of a lion. In colour it is a rich glossy golden yellow with purple hands, feet, and face. There are several varieties, the smallest of which is only 7 inches long. It ranges from south-eastern Brazil through Colombia to the isthmus of Panama. The recently discovered calimito has the form of a marmoset with the teeth of a squirrel monkey.



SILKY TAMARIN

Jaguar.

The order Insectivora is unrepresented in Central and South America, the reported occurrence of a shrew (*Blarina brevicauda*) in Costa Rica being incorrect. We accordingly pass on to the Carnivora, of which the largest South American representative is the jaguar (*Felis onca*), which ranges from Louisiana to the Rio Negro on the borders of Patagonia. Needless to say, with such an extensive range, the species includes several local races. Although with a relatively bigger head, the Brazilian jaguar may be compared in size to a large leopard. The general type of coloration is also leopard-like, but the black



JAGUARONDI.

rosettes are larger and have a black spot in the centre of the enclosed light area; a feature, sometimes at least, seen in Siamese leopards. The rosettes are generally arranged more or less distinctly in seven or eight rows.

Jaguars are partial to the neighbourhood of water, and in forest-districts frequent the wooded banks of rivers and the reed-beds of lakes. Being excellent climbers they live among trees, which, in some districts, they never abandon even during floods. They are also, however, equally at home on the Argentine pampas, where the numerous rodents afford them abundant food. In tropical forest districts jaguars prey largely on monkeys, and on the Orinoco they feed on tortoises and

their eggs. Occasionally they will catch and kill an alligator; and even fishes are said to form an important item of their fare. Jaguars are near akin to leopards; their ancestors probably reached America by way of Bering Strait, and then died off in the north. A similar relationship is presented by the ocelot of America to the clouded leopard and allied Asiatic species.

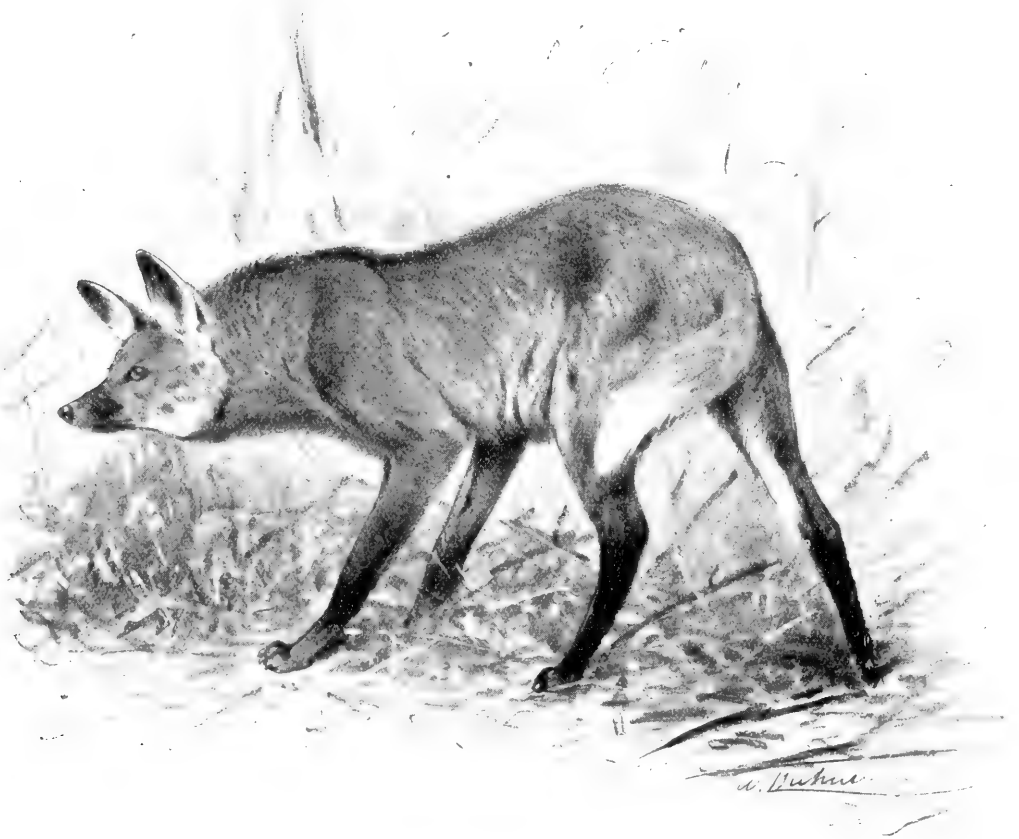
Smaller Cats. The second largest cat of South America is the puma, to which reference has already been made under the heading of North America. A third and smaller species, the ocelot (*F. pardalis*), like the jaguar is a native of the South American tropical tract, ranging from Paraguay northwards to Arkansas, where it is represented by numerous local races not yet fully defined. The most common form is tawny yellow or reddish grey marked by chain-like streaks and blotches bordered with black, and spots and stripes on the head and limbs, and imperfect dark rings on the tail. Ocelots vary in length from 3 feet to 4 feet, inclusive of the tail, which may measure from 11 to 15 inches. They seem everywhere to be true forest animals, and are consequently not met with on the pampas of the Argentine. Another very variable species is the margay or tiger-cat (*F. tigrina*).

A very beautiful South American cat, the colocollo (*F. colocollo*), inhabiting Chile, Bolivia, and other districts, is about the size of a large domesticated cat. In one form the colour is pale grey, with dark spots and streaks, and a black streak uniting the eye with the jaw. Two very remarkable types are the jaguarondi (*F. jaguarondi*) and the eyra (*F. eyra*). The former, which inhabits Paraguay, Brazil, Guiana, and north-eastern Mexico, is blackish or brownish grey in colour, without spots or stripes. In addition to the elongated form of its body and tail (which measure about 35 inches), the jaguarondi is characterised by the narrowness of its nose—a feature noticeable even in the skull. Several local races or subspecies are known. Still more elongated and slender is the eyra, which in form resembles a weasel, and has a small, flat head, long neck, and short legs, standing much higher behind than at the shoulders. In colour the eyra varies from reddish yellow to chestnut-brown, without markings of any kind. Its range extends from Paraguay to the Texan border; like the jaguarondi, it is a forest animal rarely seen in the open.

Maned Wolf. By far the largest South American representative of the dog tribe is the so-called maned wolf (*Canis jubatus*), a long-haired, red-coloured species, in which the hair attains its maximum development on the neck, although it does not form a distinct mane. In size it is about as large as the common wolf, but is longer in the legs and has a shorter tail. In colour it is bright yellowish red with the front of the legs and the ears black. Rare on the pampas, it ranges from Paraguay and northern Argentina to Brazil, everywhere leading a solitary existence, and preferring swampy to dry localities. The food of this wolf consists chiefly of the flesh of rodent mammals, although birds, reptiles, insects, and even fruit, are eaten, while occasionally sheep-folds are raided. Although called a wolf, the species is an overgrown type akin to the other South American *Canidæ*.

Foxes. The other members of the dog-family inhabiting the continent are smaller and more fox-like in appearance, although they are really quite different from the true foxes. One of the most common is Azara's fox

(*C. azaræ*), which has several local races, and apparently ranges from Brazil to Patagonia. On the west side of the Andes it is represented by a closely allied form. Like the aguarachay, as Azara's fox is locally called, the crab-eating fox or carasissi (*C. thous*) is very similar in appearance to a fox. Somewhat larger than the aguarachay, it is generally brownish grey in colour. Its range is commonly said to extend from Guiana to Argentina, although it is unknown on the pampas. Like its kindred, it feeds on rodents and birds, as well as on crustaceans, and



MANED WOLF.

is generally a forest animal, although also met with in the open country. There are several other more or less closely allied species which demand no special notice on this occasion.

A very remarkable member of the family is the bush-dog (*Speothus venaticus*), of the Guianas and Brazil, which differs from other *Canide* both in appearance and dentition. On each side of the upper jaw it usually has only one true molar tooth, and only two pairs of lower true molars, the first of which (the flesh-tooth) has no cusp on the inner side of the blade, and a sharp edge to the heel behind the same. In size the bush-dog is somewhat inferior to an ordinary fox; it has very



RED COAT.

short ears, a long body, and short legs. In colour it is dark brown. A second species, *S. rivetti*, inhabits Ecuador.

Spectacled Bear. The only member of its tribe inhabiting South America is the spectacled bear (*Ursus ornatus*), of the Chilian Andes, a black species marked on the face with spectacle-like brownish yellow rings. It is a relatively small animal, apparently allied to the Malay species. In Bolivia it is represented by a distinct race (*U. ornatus majori*). This bear is clearly an immigrant from the north.

Raccoon and Cacomistles. South America abounds in members of the raccoon group. Among these a representative of the typical genus, the crab-eating raccoon (*Procyon cancrivorus*), inhabits Colombia and Guiana and, in the form of a dark-footed race, Brazil and Paraguay. Somewhat larger than the common raccoon, it has bigger teeth and shorter fur, but seems to be of similar habits.

The cacomistles are nearly related to the raccoons, but of slighter build, with more pointed muzzles and longer tails. One species is limited to Central America, the second (*Bassaricus astutus*), of which several local races are recognised, ranges through Mexico into the United States.

Coatis. Nearly related to the cacomistles are the coatis, easily recognised by their extremely elongated and somewhat up-turned muzzles, compressed bodies, and long tails, as well as by their long and powerful claws. Of the numerous species, the white-nosed coati (*Nasua nasica*), which inhabits Mexico and Central America, is reddish brown in colour with a white nose and upper lip; while the red coati (*N. rufa*), said to range from Surinam to Paraguay, is a brighter red, and has the tail ringed with rufous. Both feed on fruits, insects, birds' eggs, young birds, and lizards.

Kinkajou. The last representative of the group, the kinkajou (*Cercoleptes caudivolvulus*), is about the size of an ordinary cat, and specially distinguished by its prehensile tail and its unusually elongated tongue. In colour it is yellowish brown. Inhabiting the mountain-forests which extend from central Mexico to the Rio Negro in Brazil, the kinkajou is a nocturnal and arboreal creature, feeding on fruits, honey, birds and their eggs, and small mammals.

Otters. Of the aquatic Carnivora, the Brazilian otter (*Lutra brasiliensis*) is far the largest of its genus, measuring over 40 inches in length, exclusive of the tail, which is 23 inches long. This species is characterised by the presence of a ridge along the upper and lower border of the tail, and, unlike other otters, hunts entirely by day. In contrast to the last, the pigmy Chilian otter (*L. felina*) is one of the smallest of its tribe, and peculiar from the circumstance that it passes the greater portion of its time in the sea. Common on the west coast of Chile, this species extends northwards into Peru and Ecuador, and southwards to the Strait of Magellan, where its range meets that of the Brazilian otter.

Skunks. Skunks of the genus *Conepatus* abound in South America, among them being the large and heavily built white-backed *C. mapurito*. The species are chiefly distinguished from one another by the extent of white on the back, which is otherwise dark brown or black.

Grisons.

The grisons, which form an exclusively American group of the weasel tribe, are distinguished by the dentition, their broad flat heads, small rounded ears, nearly plantigrade feet with bare soles, and dark under-parts.

The largest of the group is the tayra (*Galictis barbara*), a species measuring about 3 feet in length, blackish brown in colour, with the ears and soles occasionally white. Its range apparently extends from Mexico to the Argentine pampas.

The grison (*G. vittata*) is a smaller animal than the tayra, from which it differs in coloration, having, like many other members of the weasel tribe, the under-parts darker than the back. It has a considerable range in South America. A third representative of the group is *G. allemandi*.

Weasels.

Although there are no martens in tropical America the weasels are represented in Brazil by *Mustela frenata* or a nearly allied species, while Patagonia possesses a peculiar type known as *Lyncodon patagonicus*.

Deer.

South and Central America are poor in hoofed animals, the most numerous group being the deer. Among these, the white-tailed deer is represented by a small form from Colombia and Ecuador, characterised by its nearly naked ears, and known as *Mazama* [*Odocoileus*] *americana gymnotis*, if it be regarded as entitled to specific rank. The Costa Rica deer (*M.*

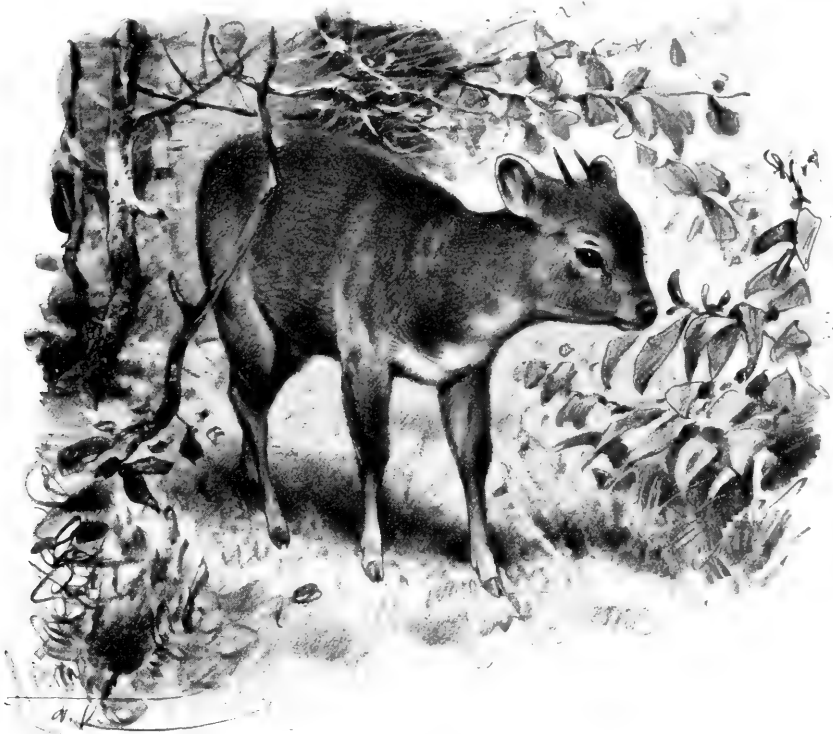
americana truei) may be regarded as another local form of whitetail, characterised by its simple spike-like antlers. The brockets, the typical representatives of *Mazama*, are an exclusively tropical American group, readily recognised by their small stature, simple spike-like antlers, and the reversal of the direction of the hair of the face. The most familiar representative is the red brocket (*M.*



KINKAJOU.

rufa), of Brazil, replaced in Central America by *M. sartorii*. The wood-brocket (*M. nemorivaga*) is a greyer South American species. Allied to the brockets is the pudu (*Pudua pudu*), the smallest of all deer, which inhabits the Chilian Andes and has very small, spike-like antlers.

Another group of exclusively South American deer is that of the guemals, in which the antlers are usually simply bifurcate. Of these, the Chilian guemal (*Mazama* [*Xenelaphus*] *bisulca*) ranges from Santiago to the Straits of Magellan, but is more common in the south than elsewhere, while the Peruvian guemal (*M.* [*X.*] *antisiensis*) inhabits the highlands of Peru. Yet another group, with a much more complicated type of antlers, is represented by the pampas and the marsh deer,



CHILIAN PUDU.

both of which are confined to the eastern side of the continent. The smaller of the two is the pampas-deer (*M.* [*Blastoceros*] *bezoartica*), a species with a shoulder-height of about 30 inches, ranging from Paraguay and Uruguay through Argentina to northern Patagonia; it is the largest and commonest ungulate of the pampas.

The second and larger species is the guazuti or marsh-deer (*M.* [*B.*] *dichotoma*), which inhabits south Brazil, Paraguay, and Uruguay, where it frequents the vicinity of marshes and lakes. In addition to its superior size, it differs from the pampas-deer by the bright red colour of the hair, relieved by black on the front of the limbs. Both the marsh-deer and the pampas-deer differ from the other American members of the family by the reversal of the direction of the hair on the withers and neck.

**Guanaco and
Llamas.**

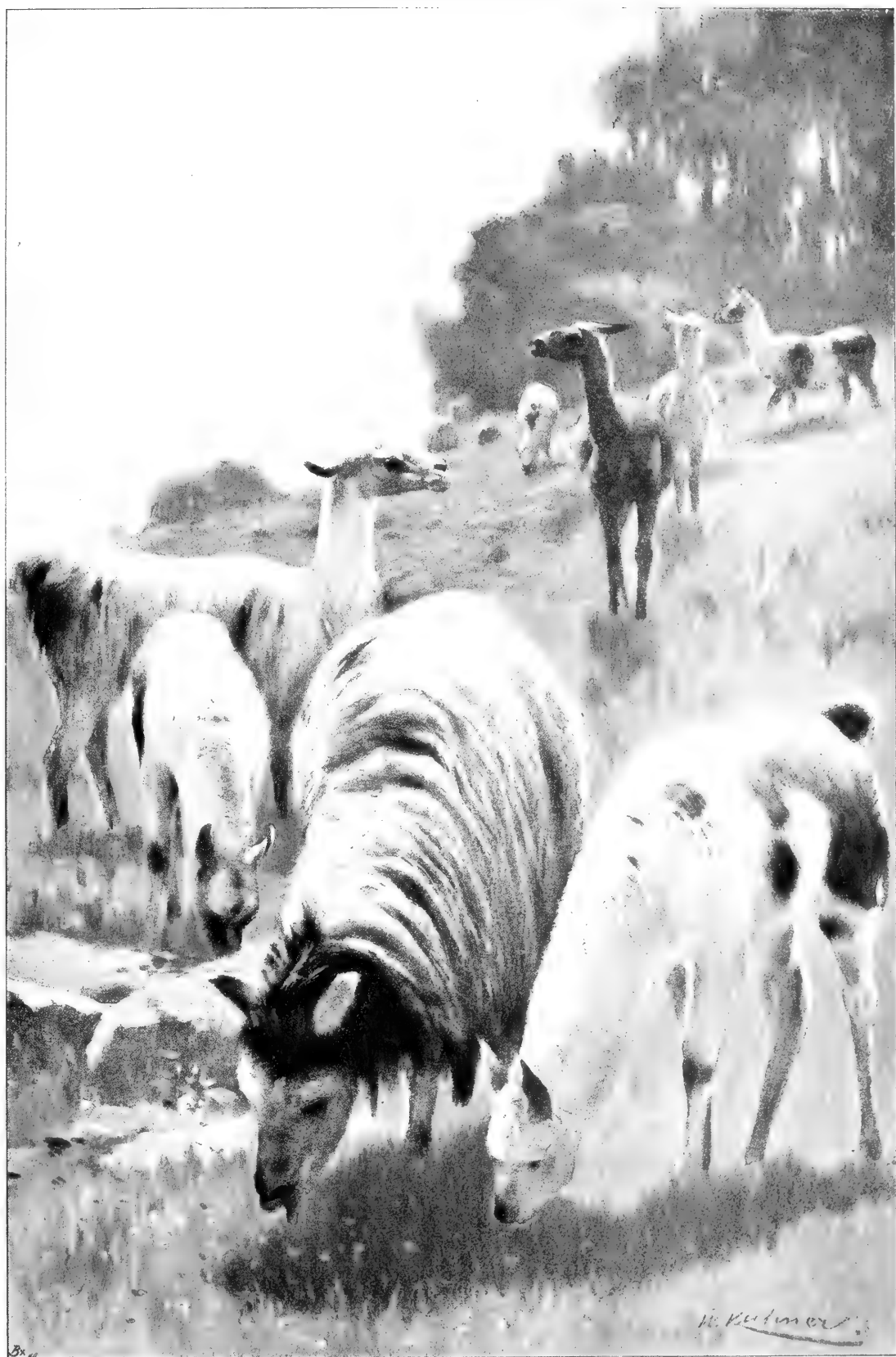
Although originally a northern type, the guanaco and vicuña—the New World wild representatives of the camels—are now characteristic South American ruminants restricted to the western and southern districts, and thrive only in temperate climates. The larger of the two is the guanaco (*Lama guanacus*), whose range extends from the mountains of Ecuador and Peru to the plains of Patagonia and the islands of Tierra del Fuego. Guanaco are not infrequently seen in large herds numbering up to five hundred, and though they seem here and there able to exist without fresh water altogether, they take to water without hesitation, and are excellent swimmers, having been seen swimming in the sea from island to island.



A HERD OF ALPACAS.

Young guanaco are easily tamed, and easily breed in captivity, which explains the fact that from this species have originated the two domesticated breeds known as the llama and alpaca. The alpaca (*L. pacos*) is kept the whole year round in large herds in the highlands of Bolivia and southern Peru, and only driven into the villages to be shorn. It is bred for the sake of its, generally black or blackish brown, wool, which is so long that in some cases it reaches the ground. The coat of the alpaca is long all over the body, and in many cases there are none of the bare patches on the legs characteristic of the guanaco, but not of the vicuña, these being overgrown with wool.

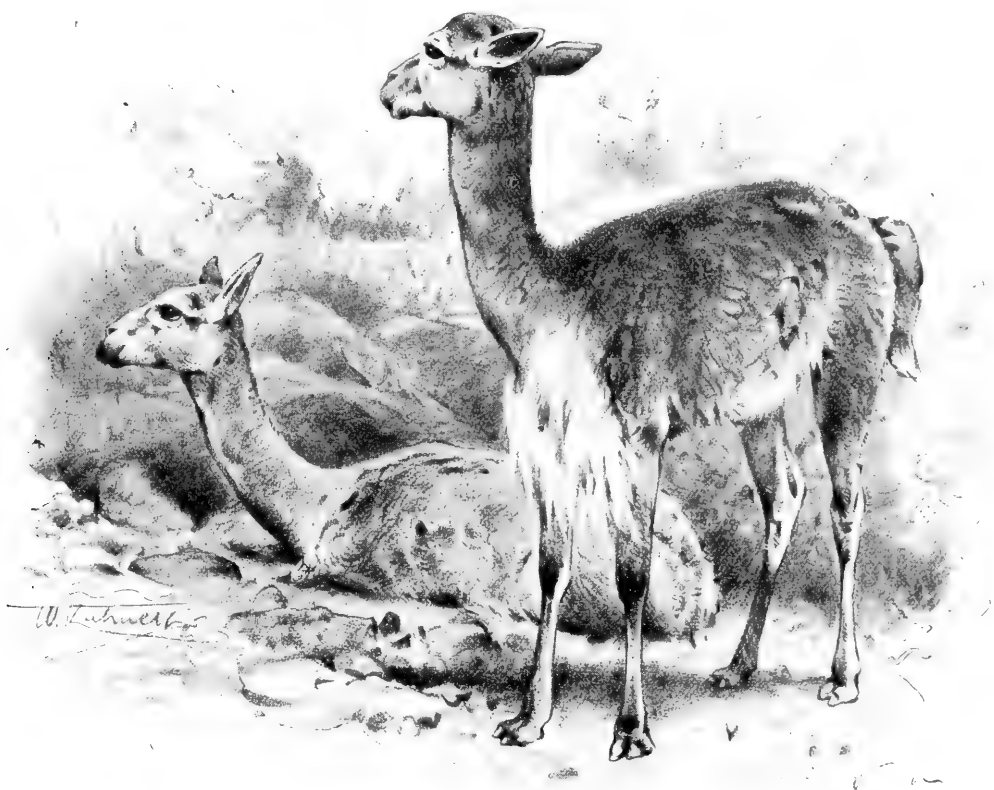
The llama (*L. glama*), on the other hand, is used as a beast of burden, its hair being comparatively short, and hanging but a little way down the flanks. In colour it is much more varied than the alpaca, being seldom entirely brown or



LLAMA.

black, but usually spotted with white, or totally white, while on its knees are always found the bare patches already mentioned. It is a long-necked and long-legged animal, even larger than the wild guanaco, and thus considerably taller than the alpaca. At the time of the conquest of Peru by the Spaniards there were said to be more than 300,000 llamas used for transporting the silver from Potosi, but at the present day in consequence of the introduction of horses and mules—and railways—the llama has almost ceased to be employed as a pack-animal.

The second wild species, the vicuña (*L. vicuna*), is confined to the mountains



VICUÑAS.

of south Ecuador and central Bolivia. Above it is uniform light brown, paler below and on the legs, and on the shoulders it has long white hair.

Peccaries.

True pigs do not exist wild in America, where they are represented in Central and South America by the allied group of peccaries, which are small hog-like animals, with a gland on the middle of the back, the tail rudimentary, and the upper tusks directed downwards instead of upwards. The collared peccary (*Dicotyles tajacu*), the smaller of the two best defined species, is blackish brown in colour marked by a yellowish white collar running down from the shoulders across the chest. The distributional area of this and an allied species (*D. angulatus*), a rare species, extends from the Rio Negro in Patagonia to Texas, Arkansas, Arizona, and Sonora; but there are several local races of these animals

in this extensive tract. Many naturalists substitute the barbarous name *Tajaçu* for the appropriate *Dicotyles*.

The white-lipped peccary (*D. labiatus*) is a somewhat larger animal; the northern boundary of whose habitat is formed by British Honduras, while Paraguay constitutes its southern limits.



COLLARED PECCARIES.

Tapirs.

The only other group of South American hoofed animals is that of the tapirs, which, like the guanaco, are originally immigrants from the north. The Brazilian tapir (*Tapirus terrestris*), when adult, is dark brown, or blackish in colour, as are the other three American species, and its ears have white edges. Its range includes Brazil, Paraguay, and northern Argentina,

but the animal is everywhere confined to the forest tracts, and is entirely nocturnal.

On the highlands of Ecuador and Colombia this species is replaced by Roulin's tapir (*T. roulini*), which has a rounder neck and a long white spot on the chin. The other two species are from Central America, where Baird's tapir (*T. bairdi*) ranges from Panama to Mexico, while Dow's tapir (*T. dowi*) is confined to Guatemala, Nicaragua, and Costa Rica.

Rats and Mice. South America absolutely swarms with rodents, although many well-known northern types such as jumping-mice, dormice, and

beavers are wanting. Squirrels, on the other hand, are represented by a certain number of species. The great majority of the South American mice belong to the cricetine group, and include representatives of the genera *Onychomys*, *Rhipidomys*, *Tylomys*, *Holochilus*, *Oryzomys*, *Rhithrodontomys*, *Eligmodon*, *Neotomys*, *Rhithrodon*, *Phyllotis*, *Scapteromys*, *Ichthyomys*, *Acodon*, *Oxy my cterus*, *Blarinomys*, *Notiomys*, etc.; several of these being peculiar to Central and South America.

Among them, the fish-eating rat (*Ichthyomys stolzmanni*), of the mountains of Peru, is an aquatic species of the approximate size of a water-rat, with fringes of hair to the feet.

Porcupines. In another group, the South American porcupines, which are classed with the Canadian porcupine in the family *Erithizontidæ*, have short spines, in some cases almost hidden in the hair, but very numerous and occasionally provided with small barbed hooks. One of the most common is the



TREE-PORCUPINE.

Brazilian tree-porcupine (*Syntheres prehensilis*), of Brazil, Guiana, and part of Bolivia. A second is the long-haired Mexican porcupine (*S. novæ-hispaniæ*), which looks, when in repose, like a knot of a lichen-covered branch. The bristle-spined porcupine (*Chaetomys subspinosus*) of central and northern Brazil, is rather larger than either of the preceding, from which it is distinguished by its bristle-like spines, the absence of prehensile power in the tail, and the fact that it is not exclusively arboreal in its habits. *Coendou*, the native name of the Brazilian tree-porcupine, has of late years been adopted as the name of the genus, in place of *Syntheres*.

Octodonts.

Another family of rodents, whose distribution is confined to Africa, the West Indies, and Central and South America, is typified by the degu (*Octodon degus*), a species resembling a rat in size and general appearance, but with a shorter tail, tufted at the tip and often bent backwards in squirrel-fashion. The degu, which is a good climber, and stores up provisions like a squirrel, inhabits Peru and Chile, other species of the group being found in Chile and Bolivia. A Bolivian species has been described as *Octodontomys*, or *Neoctodon*. The members of the allied genus *Aconamys* are found in parts of the southern Andes, which are covered with snow for several months of the year.

In the sandy districts of the Argentine pampas may be heard all day and all night the ringing cry of a member of the same group, which in large numbers leads a subterranean life. The sound of the tuco-tuco, as the animal is called, much resembles the blows of a hammer, first strong and measured, then lighter and in quicker succession. Tucos burrow long passages at no great depth beneath the ground, their course being marked by small mounds on the surface. The red incisor teeth of these rodents are very broad, and the fore-feet have long curved claws. There are several species, of which *Ctenomys brasiliensis* is confined to Brazil, while *C. magellanica* is restricted to southern Patagonia. To the same group belongs the genus *Habrocoma*, which, like the preceding and the following, is exclusively confined to Central and South America. The coypu (*Myopotamus coypu*), inhabiting both sides of the Andes from Peru southwards, resembles a beaver in general appearance and habits, living on the banks of rivers and lakes, and feeding on the leaves, roots, and seeds of aquatic plants. In the banks of its native rivers it forms burrows, consisting of a passage some 3 or 4 feet long ending in a chamber 2 feet in diameter; but when the bank is not high enough to admit of this, the coypu builds a flat nest among reeds and rushes. The coypu seems to accommodate itself to different conditions according to locality. In the Chonos Archipelago, for instance, where it lives exclusively in the bays among the small islands of the group, and where it is said to feed partly on molluscs, it establishes itself in the forest at some distance from the water. Again, in parts of Argentina, where it was formerly dying out in consequence of constant pursuit, but began to increase when its destruction was prohibited, it is said to have forsaken an aquatic life and become a migratory land-animal, till it was almost exterminated by an epidemic. In Argentina it is known as *nutria*, under which name its fur is an important article of commerce.

To another section of the same family belong the spiny rats of the genera *Dactylomys*, *Loncheres*, *Echinomys*, etc., all of which are long-tailed rodents, with

a number of stout spines mingled with the hair of the back. They are quite peculiar to Central and South America.

Chinchillas.

The typical representative of an exclusively South and Central American family is the beautiful little chinchilla (*Chinchilla lanigera*), a squirrel-like, large-eared rodent, about 10 inches long, with a tail of half that length, remarkable for the softness of its pearl-grey fur. It inhabits the higher Andes between southern Chile and the north of Bolivia, living in large colonies amid scant vegetation, and digging its own burrows, which it leaves during the day, when, however, it keeps in the shade of rocks. The short-tailed chinchilla (*C. brevicaudata*) is a much larger and still little-known species, inhabiting Peru. Still larger is Cuvier's chinchilla (*Lagidium cuvieri*), which



CHINCHILLA.

has only four toes on each foot, and inhabits the Andes of Chile, Peru, and Bolivia, up to heights of 16,000 feet.

Viscacha.

To the same family belongs the viscacha (*Lagostomus trichodactylus*), a large rodent with only three toes on the hind-feet. A heavily built animal, with strong legs, rather short ears, and a bushy tail about one-third longer than the body, the viscacha measures about 20 inches in length. The short-haired fur is principally grey above, and white or yellowish beneath; but a black stripe, with a white one above it, runs from the point of the nose to each cheek, and there is a russet-coloured band across the forehead. This rodent ranges through the open pampas from the Rio Negro to Uruguay, and during the dry season has nothing on which to feed save withered grass and thistles. It generally congregates in "viscacheras"—collections of mounds formed by the earth thrown out from the burrows. Each viscachera may contain from twenty to thirty viscachas, and has at least a dozen galleries leading into chambers

which are sometimes as much as a yard in diameter, and communicate by similar galleries with each other.

Agutis. Another family of rodents, peculiar to the typical American area, comprises a number of short-tailed species with high-arched backs, known as agutis. Ranging from Paraguay through the greater part of South and Central America, agutis are represented by one species in the West Indies. They are distinguished by having five toes on the fore-feet and three toes to the hind-feet, as well as by their coarse hair, which is somewhat longer on the hind-parts than elsewhere. The common aguti (*Dasyprocta aguti*), which ranges over Guiana, Brazil, and northern Peru, is about 19 inches long, and olive-brown in colour, with a yellow stripe on the back, and bright orange hind-parts.

Paca. The paca (*Cælogenys paca*), a heavily built rodent about 2 feet long, with five-toed feet and bare soles, a wart-like stump of a tail,

and a broad head with a blunt nose, is a member of the same family. In colour it differs from the agutis by the presence of from three to five rows of whitish spots along the sides of the reddish brown body. Pacas inhabit the greater part of South America down to Paraguay, although unknown west of the Andes, and they are also found in Tobago and Trinidad. On the highlands of Ecuador the common paca



VISCACHA.

is replaced by Taczanowski's paca (*C. taczanowskii*), whose burrows, unlike those of the common paca, have two entrances. Branick's paca (*Dinomys branicki*), which probably inhabits some part of upper Amazonia, represents a distinct type, and has a remarkable history, having for many years been known only by a single specimen taken in a Peruvian courtyard.

Cavies. The cavies, another family restricted to the South American region, comprise very short-tailed or tailless rodents, with four toes on the fore-feet and only three on the hind-feet, all of which are provided with hoof-like claws. In the typical or true cavies the tail is absent, the body short, the ears small, and, except in the domesticated guinea-pig, the colour quite uniform.

One of the most noteworthy species is the Peruvian cavy (*Cavia cutleri*), which may very probably have been the ancestor of the guinea-pig. Another species (*C. porcellus*), distributed through Brazil, Paraguay, and Uruguay, is found exclusively in marshy places on the forest borders. The Bolivian cavy (*C. boliviensis*), which is smaller than the last, lives in large colonies, and in many districts completely undermines the ground. Among other species, the small rock-cavy (*C. rupestris*), which is remarkable for its exceedingly short claws, inhabits certain parts of Brazil, and does not dig a burrow.

Carpincho. The largest member of the *Cavidae*, and, indeed, of all living rodents, is the carpincho, or capivara (*Hydrochærus capivara*), a species measuring about 48 inches in length, with brown bristly hair and webbed



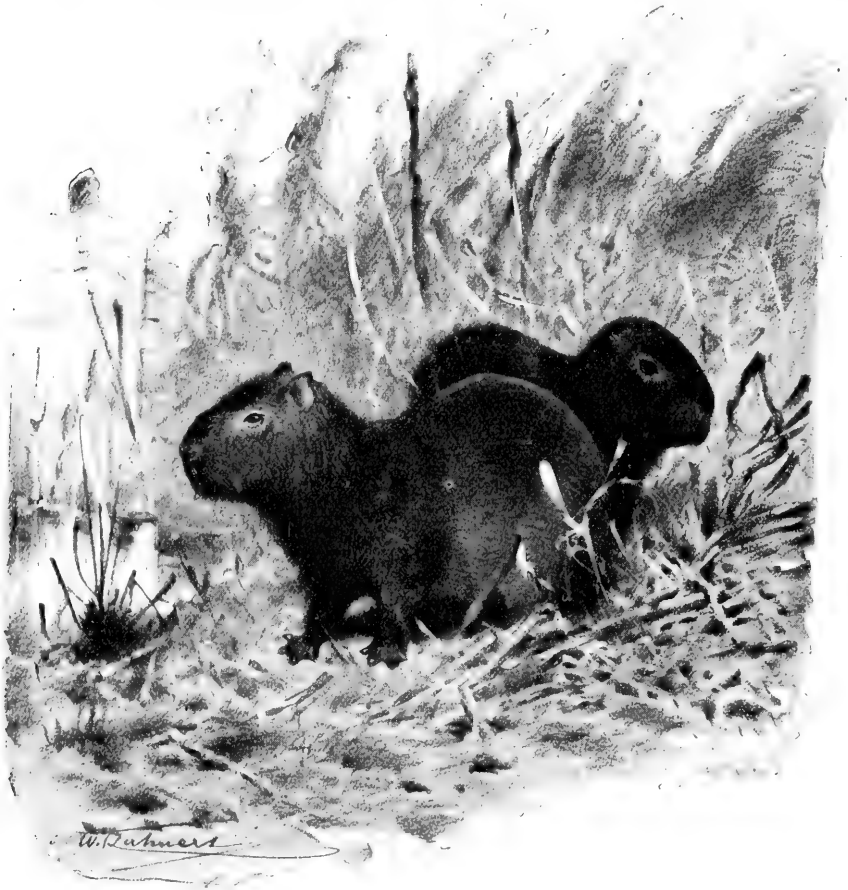
PACA.

feet. It ranges from Argentina northwards over the east of South America, occurring also in the plains of Bolivia and Peru. An exclusively aquatic animal, it swims and dives excellently. Carpinchos wander about in herds, probably having no fixed abode, though visiting more or less the same places on the river banks, where they lazily spend their time eating and resting.

Hares. The widely spread group of hares is represented in South America by several species, among which the tiny Brazilian hare (*Lepus brasiliensis*) is a near relative of the North American wood-hare.

Armadillos. South and Central America form the exclusive home of the more typical groups of edentate mammals, with the exception that one armadillo has wandered into Texas. With the aforesaid exception, armadillos are more or less confined to the warmer countries of Central and South America, generally living in dry districts in the forests and pampas, where they dig their burrows

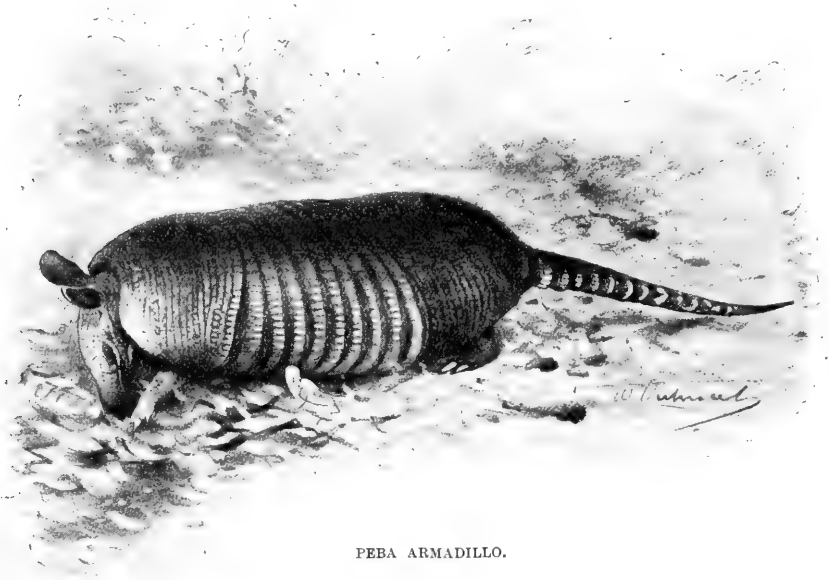
so rapidly that a man cannot dismount in time to catch one before it disappears. By means of their strong claws armadillos dig for their food, which consists of ants, termites, and other insects, as well as worms and snails, and occasionally carrion. Ants and other insects cling to the sticky, protrusile tongue, and are drawn with it into the mouth. Armadillos are protected from their enemies by means of a cuirass of bony plates covered with horny shields arranged in such a way as to leave room for hairs to grow between. The more typical armadillos are characterised



CARPINCHOS

by having a number of movable rows of plates between the front and hind part of the cuirass, as well as by their large ears, standing well apart from each other, and by the slenderness or absence of claws on the first and second fore-toes. In the typical genus the number of movable bands is usually six or seven but sometimes eight. Perhaps the most remarkable species is the peludo, or hairy armadillo (*Dasypus villosus*) of Argentina, on account of the variety of its diet and the way in which this is obtained. The peludo searches for insects, which form its principal food, by running along with its nose close to the ground, like a dog, and when hunting for larvæ or worms some inches below the surface, burrows nearly circular,

funnel-like holes with its wedged-shaped head, hundreds of these holes occurring on the pampas. As these holes are somewhat dangerous to the horsemen, the armadillos are sometimes poisoned with strychnine. Both this species and the weasel-headed armadillo (*D. sexcinctus*) are, however, also hunted with dogs. The last-named species, which is about 16 inches long, replaces the peludo in Brazil and Paraguay. Argentina is the home of the pichi or pigmy armadillo (*D. minutus*) as well as of the woolly armadillo (*D. vellerosus*). The pigmy armadillo is much smaller than either the peludo or the weasel-headed species, and inhabits dry ground, especially sand-dunes on the shore, where it does not obtain water for months. Like most of its relatives, it is a diurnal animal, which, when pursued, tries to escape by pressing its body close to the ground.



PEBA ARMADILLO.

Next to the great armadillo, the tatouay (*Lysiuirus unicinctus*) is the largest representative of the family, and belongs to a genus distinguished by the presence of twelve or thirteen movable bands. It inhabits Surinam, Brazil, and Paraguay. The great armadillo (*Priodon gigas*), of the forests of Surinam and Brazil, is, as its name implies, the largest representative of the family, and is almost a yard long from the tip of the nose to the root of the tail, which is about the same length as the body.

Of quite a different type is the apar (*Tolypeutes tricinctus*) of the Argentine pampas, which, together with two other species, forms a genus distinguished by three movable bands. The tail, which is covered with angular tubercles, is retractile, as is the long narrow head, within the cuirass, so that the creature is able to roll itself into a ball, in which state it is completely protected from attack. In colour the apar is dark brownish grey above and russet below, with the spaces between the three movable bands white. Like others of its kindred, it is remark-

able for its manner of walking, the fore-legs touching the ground only by the tips of their claws, a circumstance all the more singular since the toes are of unequal lengths. The third toe is even more strongly developed than that of the great armadillo, while the first and fifth have either very small claws or none at all.

Very different from all other armadillos is the peba (*Tatusia novemcincta*) conspicuous on account of its closely approximated mule-like ears, and further distinguished by certain peculiarities connected with its dentition and other parts of its structure. The range of this species extends from Paraguay to Texas; an allied form is the mulita (*T. hybrida*) of Argentina and other parts of South America, and another is the shaggy armadillo (*T. pilosa*) of Peru, in which the whole body, except the head, is so densely covered with light brown hair that it looks like an ordinary soft-skinned animal.

More remarkable than all is the fairy armadillo or pichiciago (*Chlamydophorus truncatus*), distinguished not only by its diminutive size but by the peculiar form and structure of the cuirass. In conformity with its burrowing habits, the pichiciago has the body much narrower in front than behind. The broad disk-like hinder end of the body, which seems to be used for ramming down the earth to stop the entrance of the hole, is formed of bony plates closely joined in rows of different sizes, and covered with thin horny shields, these making an almost perpendicular buckler, at the lower corner of which is situated the stumpy tail. Besides this posterior buckler, the pichiciago carries on its back a mantle-like cuirass commencing at a point close above the nose and gradually widening as it extends backwards. This mantle is fastened to the skull, but is connected with the body merely down the middle of the back so that it only loosely covers the hairy sides.

Pichiciagos inhabit sand-hills covered with cactus plants or thorn-bushes in western Argentina, and are most common in the neighbourhood of Mendoza, although seldom seen. The larger pichiciago (*C. retusus*) is an even scarcer species, inhabiting Bolivia, and distinguished from its smaller relative by the mantle being completely joined to the body, a circumstance which has led to its being regarded as the representative of a second genus.

Sloths. The sloths, which form the second family of edentates, inhabit those parts of South and Central America in which the moisture of the air, and accordingly the development and abundance of vegetation, are at their highest. The darker and more impenetrable the forests, the more are they inhabited by sloths, which are so thoroughly arboreal that they never, or only in case of need, descend to the ground. They are indeed able to touch the ground only with the outer edges of their feet, and are hopelessly awkward out of their native trees. Some travellers describe these animals as comparatively agile, and during the twilight and at night, when they are most lively, they may perhaps travel some distance, yet they are regarded as types of laziness by the natives, although their exceedingly slow movements are very likely due to extreme caution. A sloth moving slowly from branch to branch is a most peculiar sight. It never leaves go one branch before it has firmly clutched the next, and for a long time fumbles about in the air with its feet in order to get a firm hold for them. When asleep, sloths roll themselves up into a ball, and cling to the branches, with the head between the front-legs, and the legs in a position similar to that of the potto, a

West African lemur, which also lives exclusively in trees. In this position they are able to fast for a month or longer. This sluggishness probably accounts also for their immunity to large doses of poison, and their power of resistance in the case of serious wounds, for they are not able to escape poisonous snakes, or beasts-of-prey. Their favourite haunts are the cecropia trees so abundant in the South American forests, whose large leaves and milky sap afford them abundant food. They seldom leave their own tree, and on account of the moisture in its leaves, twigs, and fruit, which form almost exclusively their nutriment, these animals need no water, and are thus not compelled to descend to the ground even during a protracted period of drought. Like other vegetable-feeders, sloths are provided with a stomach consisting of several compartments so as to get the full benefit of their food. Their extremely long front-legs, which far surpass the hind-legs in this respect, have elongated slender feet and strong hook-like claws enclosed, as in a glove, by a common skin. Owing to the strength of their claws, these claspers serve their purpose so well that sloths when feeding hang from branches with their backs downwards, and even when killed by a shot do not drop to the ground until the stiffness of death has relaxed. In accordance with this strange hanging attitude is the flexibility of the neck, which enables them to turn the face completely round. Never very conspicuous, they are even less so when asleep, for the body is covered



UNAU.

with long, coarse, somewhat brittle hair of brownish or dull ashy grey colour tinged with green, this green tinge being due to the growth in the grooves of the pithy hair of an alga allied to the green water-weeds of our pools, which, owing to the moist atmosphere of the forests, flourishes luxuriantly. Between the shoulders male sloths show a patch of short under-fur marked with bright brown and orange stripes. Young sloths, which are born completely developed, but with short hair, clasp their mother's neck with their arms and cling to her long hair. The female has two teats, but gives birth only to one young at a time. The

internal structure of sloths is in many respects as remarkable as their external appearance. The windpipe is apparently too long for the neck, which accounts for the facility with which they turn their heads, and, as in some birds, forms a loop. The neck does not contain the same number of vertebræ in all the sloths. Most mammals have only seven neck-vertebræ, but the three-toed sloth possesses nine, although the ninth, and sometimes also the eighth, is provided with a pair of small, independently moving ribs not joined to the breast-bone. It might have been thought that this extra number of vertebræ had something to do with the flexibility of the neck of the sloths, were it not that the two-toed sloths have the ordinary number of seven vertebræ sometimes reduced to six.

Besides the number of the vertebræ of the neck and the number of toes on the feet, the three-toed sloths are distinguished from the two-toed species by the form of the first upper tooth. One species of the former group (*Bradypus tridactylus*) inhabits the drier parts of the forest, while a second, distinguished by a long, tan-coloured stripe between the shoulders, prefers permanently flooded areas. The latter species (*B. infuscatus*), called by the natives the sloth of the flooded country, is distinguished by being able to swim. The two-toed sloths, which have only two toes on their fore-feet but three on their hind-feet, are distinguished by their long, thick, and almost tusk-like first upper and lower teeth. One of these, Hoffmann's unau (*Cholæpus hoffmanni*), has been heard to utter various sounds such as a sheep-like bleating and a loud snorting. This species, which has only six vertebræ in the neck, is confined to Brazil, while the common unau (*C. didactylus*), which has seven neck-vertebræ, inhabits Ecuador and Costa Rica.

Ant-Eaters.

The ant-eaters, which form the third family of edentates, although very different from the sloths in external appearance, are yet closely allied. They live, however, exclusively on insects, and are adapted in a remarkable way for that sort of nourishment. They have unusually elongated heads with tube-like mouths, through the small aperture of which they protrude and withdraw the long, sticky tongue. The large, bent claw of the long middle toe of the fore-feet serves for scratching up insects buried in the ground or hidden beneath the bark of trees, while the long viscid tongue conveys them into the mouth. Compared with this large middle toe, the other toes are small and in some cases rudimentary. But while the toes of the fore-feet are irregular, the four or five toes of the hind-legs, which are as long as the fore-legs, are of more or less equal size, and provided with claws of equal length. One species of ant-eater has feet somewhat like those of a sloth, adapted for climbing trees. The second also climbs, and, like the first, has a long prehensile tail. The third and largest species, on the other hand, lives entirely on or in the ground, and its tail though long is non-prehensile.

The great ant-eaters *Myrmecophaga*, locally known in Paraguay as yurumi, and in Surinam as tamanoir, inhabit the tropical regions of South and Central America, where they live either in river-marshes or forest-swamps, and are nowhere numerous. They are the largest members of the family, attaining a length of about 48 inches exclusive of the tail, which may be 3 feet in length. The position of the toes and the powerful claws might lead to the belief that these ant-eaters, which generally move at a trot and, when pursued, at an awkward gallop, are burrowing



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GREAT ANT-EATER.

W. R. R. R.

animals. This, however, is not the case. The long claws of the fore-feet only serve their owner to tear up ant-hills, whose alarmed inhabitants cluster in masses and stick in hundreds to the slimy tongue as it is alternately darted out and withdrawn as quick as lightning. This process, as well as the cleaning of the mouth from earth and saliva, is but seldom observed, since the great ant-eater is rarely visible, being a nocturnal animal and sleeping throughout the day in high grass or other covert. Here it lies on one side, with the head buried in the long hair of the chest, the legs drawn close to its body, and the back covered by the bushy tail. On awaking, it leisurely gets its limbs into their usual position, first sitting up on its hind-legs, and then stretching its fore-legs and slowly moving its head to and fro. Except during pairing-time, males as well as females live alone; the lair of the female generally contains a single young one, which is born in spring, and after having been suckled for several months remains with the mother until she is again far advanced in pregnancy. The typical *M. jubata*, or *M. tridactyla*, of tropical South America, is replaced in Central America by *M. centralis*, mainly distinguished by skull-characters.

The tamandua or lesser ant-eater (*Tamandua tetradactyla*) is scarcely half the size of the preceding species, and has a shorter head, longer ears, and a prehensile tail. The hind-feet resemble those of the great ant-eater, but the fore-feet are rather stronger and somewhat different in structure. The middle toe has the strongest claw, but the claws on the second and fourth toes are fairly strong, while the first toe carries only a small claw, and the fifth, which is hidden in the skin, has none at all.

The tamandua, which inhabits South and Central America, is much more common than the larger species, and generally found on the edges of the forests, where it lives principally in trees, often climbing to the top of the highest. Here it finds the greater part of its food, which consists of ants and perhaps also of honey. In all its movements it is more lively than the great ant-eater and tries to escape when pursued, but if hard pressed will sometimes sit down like the other species and attempt to hug and wound its enemies with its claws. Although chiefly nocturnal, it is sometimes seen about by day. Tamanduas generally sleep with the head sunk on the breast and covered with the fore-paws, and the tail drawn close to the side.

The third species, or two-clawed ant-eater (*Cycloturus didactylus*), is confined to the hottest countries of South and Central America, inhabiting the north of Brazil, Peru, and Guiana, and not found more than 2000 feet above the sea. It is not much more than 6 inches long, the tail being rather longer and prehensile. The hind-feet have four toes of almost equal length placed close together and used like those of the sloths as claspers, the same being the case more or less with the fore-feet, which have four toes but only the third and the fourth clawed. This animal has the same way of hanging on trees and the same slow movements as the sloths, and, like them, is exclusively arboreal. It sleeps among the branches in the deepest parts of the forest all day long, and on account of its nocturnal habits is rarely seen even by the natives. Apparently never uttering a sound, it climbs about in a quiet, circumspect way in search of food, which includes ants, bees, wasps, and their larvæ. It eats its food like a squirrel, holding it between the fore-feet.

Opossums.

Although, as already stated, North America has but one or two marsupials, in South America the order is well represented. The opossums of the area under consideration are, however, much smaller than the common species of the north, of which local races are met with. One of the South American opossums found in Guiana and in southern Brazil and Argentina is the thick-tailed opossum (*Didelphys crassicaudata*), distinguished by the tail being thickly haired along its basal half and thinly haired almost to the tip. As in the rat-tailed opossum (*D. nudicaudata*), which ranges from Costa Rica to Brazil, its pouch is rudimentary or absent. Unlike the latter, the Quica opossum (*D. opossum*) has a tail bare of hair except at the base, and a well-developed pouch. All three are of medium size with long tails and short crisp fur. On the other hand, in the philander opossum (*D. philander*) of Guiana and north-eastern Brazil, the fur is woolly and soft. Another species, ranging from Mexico to Paraguay, is the woolly opossum (*D. lanigera*), which is of somewhat larger size and is the common opossum of tropical South America. Neither species has a pouch, the place of which is taken by two large folds on the skin, and consequently the females have to carry their young, sometimes twelve in number, on their backs, a load which does not hinder them from climbing trees with great quickness. The philander opossum is distinguished by a narrow brown line down its pale grey face, and a brown ring round each eye, its general colour being reddish or yellowish grey above and yellowish below. The murine opossum (*D. murina*), which has the dark eye-stripes very noticeable, ranges from central Mexico into Brazil, and somewhat resembles a bright red mouse. Another group of opossums is composed of still smaller species, the smallest being the pigmy opossum (*D. sorex*) of Rio Grande do Sul, which is less than 3 inches long. It should be added that by many modern zoologists the arboreal opossums are divided into several generic groups such as *Philander* and *Marmosa*. Whether such subdivisions are altogether advisable may be an open question, but there is no doubt as to the right of the yapock, or water-opossum (*Chironectes minima*), to rank as a genus by itself. Its range extends from southern Brazil to Guatemala. In colour it is greyish white curiously marked and marbled with dark brown, four broad saddle-like patches extending from the dark line on the back down the sides. In habits and mode of feeding the yapock so closely resembles an otter that it was at first regarded as a diminutive member of that group. In length it measures about 14 or 15 inches.

Selvas.

Although described in two papers, one written in 1860 and the other in 1863, the marsupials known as selvas long escaped full recognition. In external appearance, and especially in their long, sparsely haired tails, they resemble rats, and have almost rat-like incisors. The larger species (*Cænolestes fuliginosus*) is a dark brown animal of the approximate size of a rat, with a small and undeveloped but distinct pouch, and all the habits of an opossum, although not closely related to the latter. This species and its Bogota relative, *C. obscurus*, were at first referred to the diprotodont section of the marsupial order (see the section on Australia in vol. iii.), but it was subsequently pointed out that they showed so many polyprotodont resemblances as to preclude their reference to the former group, and *C. fuliginosus* was made the type of a new sub-order, Paucituberculata. Still later, the diprotodont lower dentition (like the front teeth

of the aye-aye) was regarded as of no taxonomic importance, and consequently the genus has been placed in the Polyprotodontia, and regarded as a specialised relative of the American opossums. Selvas belong to a family (*Epanorthidæ*) of which the existence was first made known by the evidence of specimens from the Tertiary deposits of Patagonia. Both species are very rare, and their habits are practically unknown. The larger species, known by the name of "raton runcho" in its native country, lives in large forests, and is said to eat birds' eggs and small birds.

Fresh-Water Dolphins. The larger rivers of South America are the habitat of two remarkable fresh-water dolphins belonging to a distinct family, the *Iniidæ*. One of these, the inia (*Inia geoffroyensis*), of the Amazon, has no distinct back-fin, and attains a length of about 7 feet. The second, *Pontoporia blainvillei*, which frequents the lower reaches of the Plate River, is much smaller, and has a well-developed back-fin, and a sharper beak. In colour it is brown, lighter below than above. The inia has from twenty-six to thirty-three pairs of teeth, which show distinct tubercles at the inner sides of their crowns in the posterior part of the series. A few hairs occur on the body. These dolphins are commonly seen in pairs, and this fact, combined with their peculiar movements in the water, makes them at once recognisable. When coming to the surface, the inia first shows the crown of the head, after which it "spouts," and then descends head-downwards, so as to show the back in what looks like a somersault.

True Dolphins. In addition to the foregoing, true dolphins occur in the larger South American rivers. Among these is the Amazonian tucuxi (*Sotalia tucuxi*), which differs from the inia in generally swimming about alone, and in showing its back-fin when rising to the surface. Besides the tucuxi, which is very common in the mouth of the Tocantins during the dry season, the Amazon is inhabited by another species, the pale river-dolphin (*S. pallida*), distinguished by the pale flesh colour of its back and tail-fin, and the white of its under-parts.

Bats. Reverting to land mammals, some mention must be made of the South American bats, of which a large proportion belong to the vampire group. Among the typical bats a notable species is the tri-coloured bat (*Thyroptera tricolor*) of Brazil, which carries on the lower surface of the thumb, as well as on the side of each foot, a disc-like sucker, for the purpose of enabling it to cling to the smooth surfaces of trees and large leaves. This bat is further distinguished by the possession of three joints to the middle finger. Its nearest relative lives in Madagascar. Equally remarkable are the pouch-winged bats of Central and South America, distinguished by a glandular pouch on or near the elbow. One of these, the thin-tailed bat (*Saccopteryx leptura*), of British Guiana, has a frill-like fold of skin which it can protrude from the gland-sac, the use of which is as yet unknown. The white bat of Central and South America is remarkable as being the only species of that colour, except albinos. This bat (*Dididurus albus*) is creamy white on the body and pure white on the wing-membranes, and has a peculiar pouch between the legs on the under side of the membrane. Another curious species is the hare-lipped bat (*Noctilio leporinus*), which takes its name from the form of the muzzle, and eats cockroaches, sucks the bodies of small birds, and catches not only fresh-water shrimps, but also small fishes.

Another characteristic group is that of the mastiff-bats, distinguished by their

thick-lipped muzzles which enable them to catch the hard, round beetles on which they feed. Although they fly well in every way, they are better adapted for walking on the ground than any other bats on account of their stout limbs and large flat feet, which are free of the membrane. A well-known species is the red mastiff-bat (*Molossus rufus*).

The vampire bats, an exclusively New World group, range over the West Indies, Central America, and South America as far as the 30th degree of south latitude, but live apparently only in the forest regions. Their scientific name, *Phyllostomatidae*, is derived from a leaf-like, skinny flap borne by most of them on the nose, some of the species having warts, or skinny folds on the chin instead. Such chin-flaps are found, for instance, in Blainville's chin-leaved vampire (*Mormops blainvillei*), a bright orange-coloured species, so fragile in structure that its head is translucent.

Vampires differ greatly in the nature of their food; a few species with a well-developed tail and a large membrane between the hind-legs being exclusively insect-feeders, but some subsist solely on fruits, some both on fruits and insects, while others occasionally suck blood, and two or three are entirely blood-suckers. The common vampire (*Vampyrus spectrum*), a gigantic bat of some 28 inches in expanse of wing, which inhabits parts of the Amazon valley, is an ugly but harmless species, feeding chiefly on fruits, although it sometimes eats insects, and visiting villages only in search of shelter. The large-eared vampire (*V. auritus*) of the same tract is rather smaller, and distinguished by possessing a short tail, the common vampire being tailless.

Another group is represented by the well-known javelin-bat (*Phyllostoma hastatum*), a species almost as large as the common vampire, which, together with two or three other Brazilian bats, has the reputation of occasionally sucking blood. The long-tongued vampires take their name from their long narrow muzzles, and elongated protrusile tongues; the latter organ, which has warts at the tip, being used, not for injuring the skin, but for licking up the juices of soft fruits. The common long-tongued vampire (*Glossophaga soricina*) has a well-developed membrane between the hind-legs which enables it to make sudden changes in the direction of its flight, thus indicating that the chief food of this species consists of insects, bats with less largely developed hind-membranes not feeding on insects alone. For example, this hind-membrane is but feebly developed in the short-nosed vampires, which live chiefly on fruits, although one of them, the flat-nosed vampire (*Artibeus planirostris*), was formerly accused of blood-sucking. Of the undoubted blood-suckers only two genera are known, one represented by two species and the other by one. The common blood-sucking vampire (*Desmodus rufus*), which is about 3 inches in length and ranges from Central America to southern Brazil and Chile, has no cheek-teeth, whereas the smaller tailless species (*Diphylla ecaudata*) possesses a single rudimentary pair. The last-named vampire is apparently confined to Brazil.

Perching Birds. As mentioned in an earlier chapter, the birds of North America are more or less closely related to those of the Old World, but in Central and South America, as well as in the West Indies, the bird-fauna is of a

much more peculiar type, singing birds being remarkably few. There are, however, a few representatives of Old World or northern types, South America being the home of some species of thrushes, while mocking-birds, their allies, range all over South America as well as the West Indies and the Galapagos Islands. Very characteristic of tropical America are the warbling wrens of the genus *Cyphorhinus*, or *Leucolepia*. On the other hand, the creeping tits (*Psaltiriparus*) of California and Mexico are represented in Central Asia and India by the closely allied *Egithaliscus*. Tropical America is the home of many species of sugar-birds, so called from their frequenting sugar-factories in search of flies; one of the best known being *Dacnis cayana*, of which the male is turquoise-blue and black, while the female is grass-green.

The tanagers, so characteristic of South America, are finch-like birds of gorgeous coloration, with a notch at the tip of the beak. The typical group comprises about sixty species, the majority of which are smaller than the European chaffinch. Among them, the superb tanager (*Calliste*, or *Calospiza, thoracica*) inhabits south-eastern Brazil. On the other hand the true tanagers, which range into North America, are somewhat less varied in coloration, blue and red being the prevailing tones.

A well-known species is the sky-blue tanager (*Tanagra caelestis*) of eastern Brazil. The velvet tanagers, again, are distinguished by their velvety red and black plumage; the tapiranga (*Rhamphocelus brasilius*) of southern Brazil being blood-red with black wings and tail. The piping tanagers form a sombre-coloured group, the male of the mourning tanager (*Tachyphonus luctuosus*) being black, except for certain small white feathers in the wing and the upper wing-coverts, while the females are olive-yellow. The organ-tanagers, again, are worthy of mention, their well-known representative, the violet tanager (*Euphonia violacea*), being one of the most beautiful birds of tropical South America.

The shrike-finches form another New World group, chiefly characteristic of the tropics. Among these the Brazilian shrike-finch (*Arremon fasciata*) is a light grey bird of the size of a chaffinch, with a



GLOSSY TANAGER.

broad black band along the sides of its head. Another handsome finch is the red-beaked *Pitylus fuliginosus* of Brazil.

The cherry-finches are confined to the South American region, among them being the monk-finch (*Sporophila nigro-aurantia*) of Brazil. The siskins have a representative in the red siskin (*Chrysomitris*, or *Spinus, cucullata*) of Venezuela and Trinidad, which is grey above and white below, with a red throat and head, and a pointed crest. The bird is rather larger than a chaffinch, but the glossy, bluish black satin-finch (*Volatinia splendens*) of tropical America is much smaller, and belongs to a genus with one other species. One of the sparrow buntings, the

morning-finch (*Zonotrichia pileata*), is South American, as is also the saffron-finch (*Sycalis flaveola*), which is confined to the eastern side of the continent, and belongs to a group all of whose members are South American.

Among the troupials, the South American representatives of the starlings of the Old World, the common *Icterus vulgaris* of Colombia and Venezuela, is black, white and orange-yellow in colour. Nearly allied is the Brazilian silky cow-bird (*Agelaius bonariensis*), a glossy black bird with violet or greenish reflections. Among the cassiques, distinguished by a rounded, horny shield at the base of the upper half of the beak, it will suffice to mention



GREY CARDINAL.

the crested *Cassicus cristatus*. The black starlings again, also distinguished by a shield on the head, are confined to the north of South America; the common black starling (*Cassidix ater*) being of the size of the European missel-thrush, with a pale violet gloss on the head and throat. Another group of glossy black plumage is represented in South America by the mourning-bird (*Chalcophanes lugubris*).

In the crow family the Urraca jay (*Cyanocorax chrysops*), a bird of the size of a jackdaw, inhabits southern Brazil, Uruguay, and Paraguay. It is easily recognised by its large head-crest, and the white of the under-parts below the upper portion of the breast.

In the American greenlets, *Cyclorhis guianensis*, of Guiana and northern

Brazil, is notable from the circumstance that it whistles like an oriole, both sexes singing together, and the female always having the last note. The crested flycatchers form a group indigenous to Central America, the grey crested species (*Ptilogonys cinereus*) being pale grey in the male sex, and pale brown in the females.

The swallows are represented in the region by the purple martins, of which there are several species.

Passing on to another group, the piculets, or tree-peckers
Tree-Peckers. (*Dendrocolaptes*), of which there are a large number of species, are



ORANGE TROUPIAL.

very similar in habits to woodpeckers. This is also the case with the sickle-beaked tree-peckers, distinguished by the strongly bent, thin, and sickle-shaped beak. The common species (*Xiphorhynchus procurvus*), which is confined to the tropics and is about the size of a hoopoe, is brown in colour, streaked on the head, neck, and lower-parts with white.

The tree-runners are easily distinguished by the pointed shafts of the feathers extending beyond the webs, these shafts being soft. In this group the tregadors are creepers of thrush-like or nightingale-like appearance, which climb trees like tits in search of insects and grubs; a well-known representative being the russet-coloured tregador (*Philydor rufus*) of Brazil.

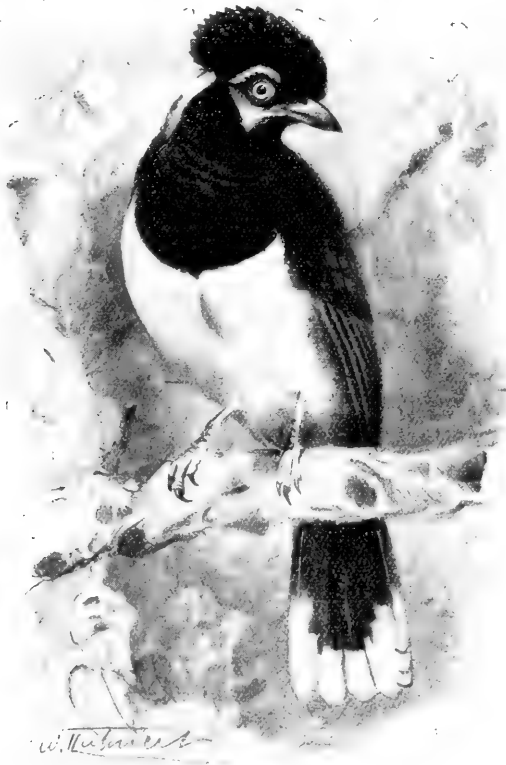
Spine-Tails.

Another group, the spine-tails (*Synallaxis*), includes rather smaller birds resembling reed-warblers, all of which, like the foregoing, are exclusively South American, and live in low bushes, or reeds. These birds, which always support themselves on their tail-feathers when perching on branches, are remarkable for the construction of their nests, which are club-shaped and covered with twigs projecting on all sides. The structure is of considerable size, a tube leading from above to the interior, which is lined with leaves and plant-wool.

These nests are always built in open situations, where they look like heaps of sticks.

Oven-Birds.

Resembling thrushes in their habits, the oven-birds (*Furnarius*) comprise about thirty species, of which more than half are confined to the temperate regions of South America. They are often seen on the ground, searching for food, which consists chiefly of insects, but are also very active in their movements in trees. These birds prefer the open plain to the forest, and often appear in the neighbourhood of human habitations. They live mainly on beetles and berries, and derive their name from the nests they build on branches; these being made of clay, and shaped like a baker's oven, with the opening always directed towards the east. In Brazil the natives believe these birds keep Sundays, and therefore protect them carefully as sacred.



TYRANNA JAY.

Tyrant-Flycatchers.

The tyrant-flycatchers, comprising about four hundred and fifty species, are almost confined to the tropical regions of America, only a few ranging into temperate latitudes, and none known elsewhere. Except in the pairing-season, they live like tits, frequenting bushes and tree-tops, in small parties, and feeding upon beetles and berries. *Culicivora* is a well-known genus of these birds.

Tyrant-Birds.

The fork-tailed tyrant-birds are distinguished from the true tyrants by their forked and generally very long tails, as is well shown in the common fork-tailed tyrant (*Mitrobus tyrannus*). The small tyrant birds are about the size of small warblers, and in shape resemble tits. The golden-headed

species, *Tyrannulus elatus*, inhabiting the north of South America, is but little larger than a gold-crest, and of similar colour and marking. The flycatcher-tyrants resemble flycatchers in appearance; one of them, the crown-tyrant (*Myiobius swainsoni*), which inhabits south-eastern Brazil, being distinguished by a red, fan-like crest tipped with blue.



SICKLE-BEAKED TREE PECKER

Plant-Cutters. The plant-cutters are included in a single genus, with four species, found mostly in cultivated districts. These birds, which are named from their habit of biting off the young shoots of plants with their short, thick, finch-like beaks, inflict much damage in this manner, as well as by their partiality for ripe grapes. The best known is the rarita (*Phytotomus rara*), of

Chile, a bird about the size of the European corn-bunting, which the females resemble in plumage, although the males are redder.

Chatterers. The gorgeous chatterers, which are not unlike crows in shape and size, form a loud-voiced group peculiar to the region, one of the best known species being the umbrella-bird (*Cephalopterus ornatus*) of Brazil. Black in colour, this bird carries a curious umbrella-like crest of feathers on the



COSTA RICAN HAMMERER.

head. Nearly allied are the bell-birds, which make the South American forests resound with their loud ringing calls, sounding at a distance like bells. The common bell-bird (*Chasmorhynchus nudicollis*) is nearly as large as a missel-thrush, and lives almost exclusively on berries and other fruits, as indeed do all its kindred. A native of Brazil, it is white in colour, with a bare face and throat. Another bell-bird is the Costa Rican hammerer (*C. tricarunculatus*), the males of which are reddish brown with the exception of their white heads, while the females are olive-green above and yellow streaked with brown below. The male has a long horny

appendage at the base of the upper half of the beak and at each corner of the mouth, the female having shorter appendages to the mouth and only a small tuft on the forehead. The cocks-of-the-rock, which are even more gorgeous than their relatives the bell-birds, are spread over the north of South America, and remarkable for their helmet-like crest-feathers, and for their splendid red and orange colouring. Feeding on fruits and inhabiting the mountains, these birds dwell on moss-grown and fern-covered rocks, and breed in rocky clefts, the cocks performing the most extraordinary dances

during pairing-time. In Guiana and on the north bank of the lower Amazon the only species is *Rupicola croceus*, which is a little smaller than a jackdaw, the males being mainly of a pale orange red, and the females dull reddish brown. Peru and Bolivia are inhabited by the somewhat larger and darker Peruvian cock-of-the-rock (*R. peruvianus*), and in Ecuador lives the scarlet *R. sanguinolentus*, which closely resembles its Peruvian relative, but is a darker and brighter red. The closely allied hangmen-birds, also distinguished by their predominantly red plumage, are not quite the size of a thrush, and have only a small crest, while the



PERUVIAN COCK-OF-THE-ROCK.

fourth quill of the males ends in a very narrow point. They are indigenous to the north of South America, the black-necked hangman (*Phænicocercus nigricollis*) being found near Para, and the russet-winged hangman (*P. carnifex*) near Cayenne and in Amazonia. The cotingas, or true chatterers, are small birds with thrush-like beaks, but otherwise resemble starlings. They inhabit the tropical forests of South America, where they feed on fruits, and are much sought after by the natives on account of their flesh, and their beautiful feathers, which are used for ornamental purposes. The gorgeous cotinga (*Cotinga maynana*), a pale blue bird with a violet spot on the throat, is indigenous to Ecuador and the upper valley of the Amazon.

False Tyrant-Birds. The false tyrant-birds, or *Lipanginae*, in habits are partly like shrikes, and partly like tyrant-birds, and their food is chiefly insects. The becards resemble tyrant-birds in the shape of the beak, and partly also in colouring. A well-known representative is the inquisitor (*Tityra cayana*), indigenous to the north of South America, a bird about the size of the great grey shrike, which it resembles in coloration and markings.

Wood-Nightjars. Many kinds of picarian birds are characteristic of South America, especially the tropical districts, among which are some allied to the European nightjar. Of these so-called wood-nightjars there are half a dozen species, confined to the tropics; one of them, the great wood-nightjar (*Nyctibius grandis*), which is as large as a wood-owl, ranging from Cayenne to south-eastern Brazil



RIBBON-TAILED HUMMING-BIRD.

Humming-Birds. The most characteristic birds of South America, and more especially the tropics, are, however, the humming-birds (*Trochilidae*), the largest of which are the size of a swallow, while the smallest scarcely exceed a humble-bee in bulk. Humming-birds have thin, and in many cases disproportionately long beaks, with narrow tips, and long tongues with which they suck in their food. This tongue is extensile like that of a woodpecker, and cleft at the tip into two flat strips. The food of these birds consists chiefly of the small insects living in flowers, and also nectar sipped from blossoms. Those humming-birds which visit open blooms have short beaks, while those frequenting funnel-shaped or tubular blooms are provided with long beaks. When on the wing, humming-birds dart from flower to flower, hovering in the air over each for a few moments. Occasionally they may peck an insect from a leaf or a spider's web, but their slender beaks are not adapted for catching insects on the wing. Their beaks are, however, of great use in building their nests, which are generally placed in the

forks of branches, and interlaced with soft plant-wool and covered with lichen and moss, although in some cases consisting of lichen and moss alone. In spite of their diminutive size, humming-birds are very bold and quarrelsome, fighting with their fellows, and also defending themselves against large birds, although they are really safe from attack owing to their rapid flight. Certain species are restricted to particular areas, according to the presence of their respective food-plants. Although most are indigenous to the American tropical area, some visit the temperate zones, and in summer range as far north and south as Labrador and Tierra del Fuego. Some even ascend to the snow-line in the mountains, and others are restricted to certain mountain-peaks. They are divided into various groups, the two principal divisions being those with straight beaks, and those with arched beaks. Among the latter is the ribbon-tailed humming-bird (*Æthurus polytmus*) of Jamaica, distinguished by its very long, ribbon-like tail-feathers. To mention other kinds is impossible here.

Oil-bird.

One of the most remarkable types is the oil-bird, or guacharo (*Steatornis caripensis*), which represents a family by itself. This bird has rather short legs in comparison to its long body, and is therefore unable to run, and can only push itself forward along the ground by the aid of its wings. It finds shelter and nesting-

places in the deep rocky clefts of the mountains of Peru, Colombia, Venezuela, and Trinidad, where it lives in large numbers, and lays its white eggs in cracks and crevices, without apparently constructing a real nest. In habits it is entirely nocturnal, and it feeds solely on fruit. Sleeping in their hiding-places during the day, these birds fly abroad with loud cries as night comes on, and in their thousands, especially on moonlight nights, make so loud a tumult in the mountain valleys as to drown the voices of all the other animals.



GUACHARO.

Motmots.

Motmots are entirely restricted to tropical America, a representative species being the red-bearded *Urospatha martii* of the district around Veragua. These birds have the strange habit of removing the vanes of the middle pair of elongated tail-feathers for a certain distance, so as to give them a racket-like form very similar to that which occurs naturally in certain kingfishers and humming-birds. Recent observations have shown that the

length of feather thus devanied is invariably constant, even when the adjacent pair of feathers, which might serve as a guide, has been removed. Further, the portion destined to be stripped has the vanes markedly narrower than in the rest of the feather, while the component barbs and barbules are much weaker and less coherent than elsewhere, so that their removal is a comparatively easy matter. Consequently, in the course of the preening to which these birds subject all their tail-

feathers, the weak area in the vanes of the middle pair becomes stripped, resulting in the production of the symmetrical pair of terminal rackets. The original cause of the narrowing and degeneration in the affected area is still unknown, but it does not appear to be a case of the inheritance of an acquired character.

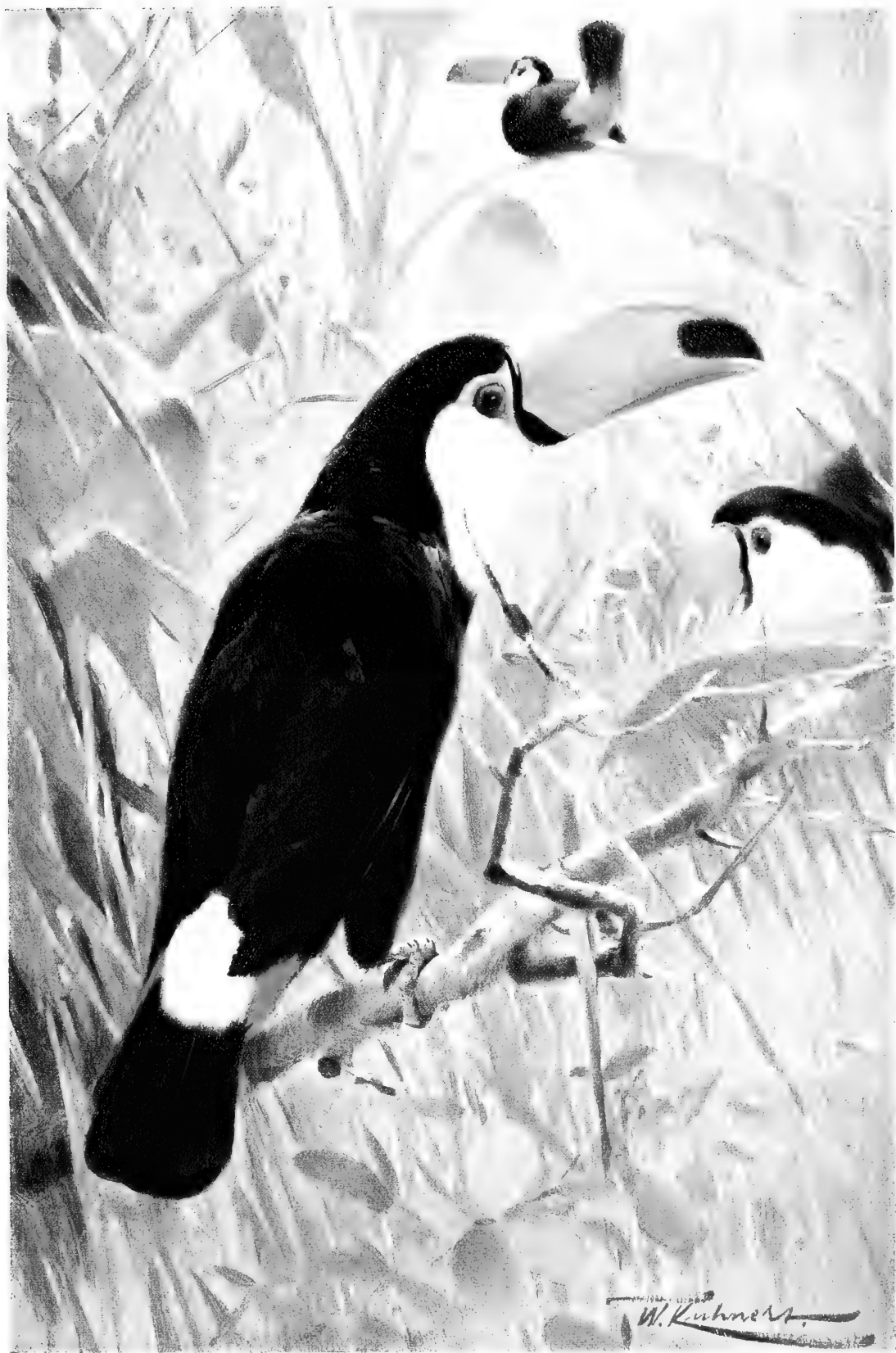


RED-BEARDED MOTMOT.

Motmots represent a family (*Momotidae*) by themselves, which contains eight generic groups, of which the typical *Momotus* has about sixteen species.

Kingfishers and Woodpeckers.

Among the kingfishers the handsomest species is perhaps the glossy kingfisher (*Ceryle amazona*) of Brazil, Bolivia, and the Argentine, which is about the size of the green woodpecker, with a metallic green plumage. There are several other South American species of *Ceryle*, such as the Peruvian *C. cabanisi*, but the genus itself has a very wide geographical



GIANT TOUCAN.

distribution, being represented in North America as well as in Asia and Africa. No other kingfishers are found in South America.

One of the woodpeckers indigenous to the region is the white-headed *Leuconerpes candidus* of Brazil, a species remarkable for being chiefly white in colour. The white-headed bright-shafted woodpecker (*Colaptes formicivorus*) of Central America is another species remarkable for the manner in which it stores up provisions by drilling small holes into the bark of trees sufficiently large to be just filled by an acorn each. The leaf-woodpeckers of the genus *Dendrobates* are common to tropical America and Africa; but the crested woodpeckers (*Celeus*) are confined to tropical America, as are also the genera *Cerchneipicus* and *Crocomorphus*.

In addition to the above, South America possesses two species of the so-called sapsuckers (*Sphyrapicus*), the remaining two species being North American. Unlike insect-eating woodpeckers, which are in the main beneficial, although certain species do much harm to telegraph-posts and other timber in the United States, the sapsuckers are exceedingly mischievous birds. In fact the case against the sapsuckers, whose main food consists of the soft fluid layer, or cambium, beneath the bark of trees, is so strong that the owners of forests and orchards in the United States where the two most destructive species abound are justified in destroying them by every available means, taking care, of course, to identify the two species, namely, the yellow-bellied sapsuckers (*Sphyrapicus varius*) and the red-breasted sapsuckers (*S. ruber*). The annual loss in the United States due to sapsuckers is estimated at no less than \$1,200,000 (£240,000).

Toucans.

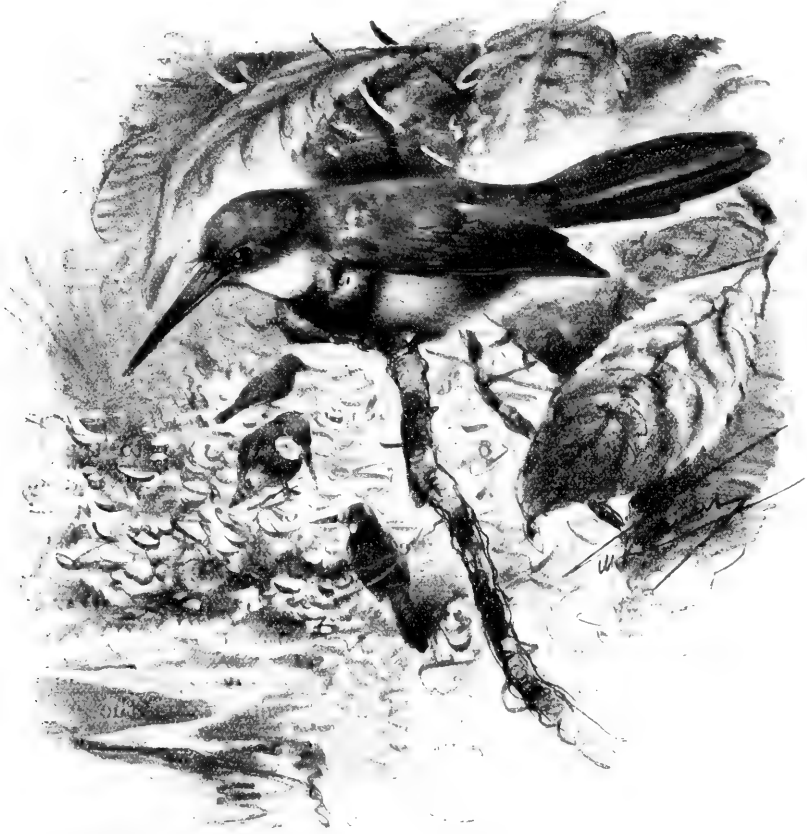
Another family of picarian birds confined to the tropics of America are the toucans (*Rhamphastidæ*), so often confounded by non-scientific people with the hornbills of the Old World. Toucans are easily recognisable by their enormous and gorgeously coloured beaks, which are mostly toothed at the edges. Although awkward in their movements, these birds are nevertheless active in the branches where they dwell. When asleep they always hold their tails straight up; and they breed in holes in trees, hardly ever coming to the ground. By the natives they are eagerly sought after on account of their flesh, as well as for their many-coloured plumage. A well-known species is the giant toucan (*Rhamphastus magnirostris*), a bird of the size of a crow, indigenous to Central and South America.

Five generic types of toucans are recognised, namely, the typical *Rhamphastus*, *Andigena*, *Pteroglossus*, *Selenidera*, and *Aulacorhamphus*; between them they include at least sixty species, of which a few range into Mexico. In addition to their monstrous beaks, toucans are characterised by the tufted oil-gland, and the presence of ten feathers in the tail. The Brazilian forests absolutely swarm with toucans, which are highly esteemed as food by the natives of South America. They fly with an easy and graceful flight, and associate in large flocks, which will sometimes venture to mob intruders on their domain. Their cry, which varies according to the species, is loud, short, and harsh.

Jacamars and

Trogons. The jacamars (*Galbulidæ*) present us with a very different type of beak, which is slender and slightly curved, instead of thick and heavy as in the toucans. These birds are likewise exclusively confined to the South American region, and in the north of South America are represented by the

red-tailed jacamar (*Galbula ruficauda*), a member of the typical genus, which contains about ten other species. The remaining genera are *Urogalba*, with two species, *Brachygalba*, with half a dozen, and *Jacamaralecyon*, *Galbalcyrrhynchus*, and *Jacamerops*, with one each. Jacamars are characterised by the fourth toe being turned backwards parallel with the first, so that the foot has two toes in front and two behind. The beak is characterised by its length and straightness, and the feathers of the body are provided with after-shafts, a feature by which jacamars are readily distinguished from the undermentioned puff-birds. Usually the tail



RED-TAILED JACAMAR.

is provided with a dozen feathers, but in two of the genera (*Brachygalba* and *Jacamaralecyon*) the number is reduced to ten.

In Tobago, at any rate, jacamars breed in holes in the mud-cliffs on the banks of rivers, in which, like nearly all birds nesting in similar situations, they lay pure white eggs, nearly round in shape. In these respects jacamars resemble their relatives the motmots.

One of the most beautiful of all birds is the quezal (*Pharomacrus mocinno*) of Guatemala, a species about the size of a jackdaw, of a magnificent violet and metallic green colour above and red below. It is a member of a genus containing five other species, and belongs to the tropical family of trogons

(*Trogonidae*), represented by eight other genera, of which *Euptilotis*, *Tmetotrogon*, *Prionotelus*, and the typical *Trogon* (with some five-and-twenty species) are exclusively tropical American, where some of the species range so far north as Mexico. The remaining genera are found in the tropical parts of Asia and Africa.

The quezal, which at one time figured on the postage-stamps of Guatemala, ranges as far north as Panama, but, owing to incessant persecution for the sake of its beautiful plumage, has now become very scarce in its more accessible haunts. The cock, whose head is ornamented with a large comb-like crest of feathers, has the two middle feathers of the tail so elongated as to be fully four times the length of the head and body, while the lateral feathers are likewise of considerable length. The general colour of this magnificent bird is bright metallic green, but a considerable portion of the under surface of the body is blood-red. The female lacks a crest, and has a much shorter tail than her partner.

In Guatemala the quezal feeds on certain black fruits, which communicate to its flesh an odour of marjoram. Like so many of the so-called picarian birds, quezals, in common with other trogons, breed in holes, but are reported to lay pale blue eggs.

Puff-Birds.

An exclusively South American group is formed by the puff-birds (*Bucconidae*), which resemble kingfishers in appearance, habits, and size. Among

them may be mentioned the russet-throated *Bucco ruficollis*, which, like the others, has a disproportionately large beak, and when perching puffs out its feathers till it resembles a ball; the latter feature giving rise to the popular name of the family. Puff-birds are represented by seven genera, of which the typical *Bucco* contains by far the largest number of species, no less than twenty-one being recognised by naturalists in 1900. They are connected with the cuckoos by means of the two species of swallow-winged puff-birds (*Chelidoptera*). None of the puff-birds ranges northward of Central America: the distributional area of the group extending in the opposite direction to Bolivia and the south of Brazil. Resembling jacamars in the conformation of their feet, puff-birds are distinguishable by the absence of after-shafts to the feathers of the body, and are



RUSSET-THROATED PUFF-BIRD.

further characterised by the bare oil-gland and the presence of six pairs of tail-feathers.

These birds are essentially arboreal in their habits, generally perching on the topmost or outermost branches of the trees they frequent, and usually selecting those devoid of leaves, in order that they may dart without impediment on their insect prey. They are usually found solitary or in pairs, and appear to be sluggish and stupid in demeanour. Those species of which the breeding habits are known nest in holes in mud-banks, where they lay white eggs.

Cuckoos.

As already mentioned, puff-birds are connected with cuckoos by the swallow-winged *Chelidoptera*. The cuckoos themselves are represented in the South American region by the two rain-cuckoos, which live on the ground and run so quickly that a horse can scarcely overtake them. The typical species is the Mexican road-runner (*Geococcyx mexicanus*), a bird about as large as a magpie, blackish brown above and white below. The double-tailed cuckoos are considerably smaller, and remarkable for their long upper tail-coverts, which more or less resemble the feathers of the tail. One kind, the lark-cuckoo (*Diplopterus navius*), derives its name from its lark-like plumage, and is the only member of its genus; the allied *Dromococcyx* being represented by two species. The savana cuckoos, which are confined to the American tropics, differ from other members of the family in that they inhabit open country and pastures, where they peck the ticks from the backs of cattle, and also feed on small vertebrates. Their bluish green eggs, covered, sometimes completely and sometimes in a net-like way, with white chalk, resemble those of other cuckoos. Several females use one large nest, and incubate in company. The ani (*Crotophaga ani*), one of these birds, ranges from Peru and Colombia, into the south of the United States and the West Indies. Another, the guira cuckoo (*Guira cristata*), has a pointed crest on the head, and is like a partridge in colour. The last-named bird is the sole representative of its genus; but there are two species of *Crotophaga* in addition to the ani, namely, *C. major*, ranging from Colombia and Ecuador to Brazil, and *C. sulcirostris*, with a distribution extending from Texas and Ecuador to Peru. *Crotophaga* and *Guira* represent by themselves one subfamily (*Crotophaginæ*), and *Diplopterus* and *Dromococcyx* a second (*Diplopterinæ*); each of these groups being thus characteristic of tropical America. A third subfamily group, *Neomorphinæ*, is, however, only in part tropical American, where it is represented by the genera *Neomorphus*, *Geococcyx* (with two species, of which *G. mexicanus* ranges from Mexico to California and Texas, and *G. affinis* from Mexico to Guatemala), and *Morococcyx*, with a single Central American species. The remaining genus is restricted to tropical eastern Asia.

Of the third subfamily of cuckoos, the *Phænicophainæ*, the majority of the genera are also found in tropical Asia, but there is one genus, *Piaya*, in tropical America, where it ranges from Mexico to Brazil, while there are two others in the West Indies. In the more tropical cuckoos constituting the subfamily *Cuculinæ* the genus *Coccyzus* is wholly New World, and includes a considerable number of tropical American species.

Parrots.

The tropical American area is very rich in parrots of peculiar generic types, the largest and most gorgeous being the macaws. Most of the smaller sharp-tailed species belong to the genus *Conurus*, but the Mexican



BLUE MACAW.

Rhynchopsittacus pachyrhynchus is distinct; it is chiefly green, but marked with red, and in its powerful beak approaches the macaws. The latter, which are the biggest of all parrots, are distinguished by their very large beaks and long tails. The largest is the cobalt-blue hyacinthine macaw (*Anodorhynchus hyacinthinus*) of Brazil, the blue and yellow macaw (*Ara ararauna*) being considerably smaller. The latter is blue above and golden yellow below. Besides the macaws and conures, the family is represented by the thick-beaked parraquets, one species of which, the monk-parrot (*Myopsittacus monachus*), inhabits Bolivia, Argentina, Uruguay, and Paraguay. In colour it is green, with a grey breast. Unlike all other parrots, it places its nest in the open, the nest consisting of a large number of dry twigs twisted together, with an entrance-hole at the side. Some years ago one of these parrots built in the open in the New Forest, near Lyndhurst. The nest, which was of large size, was constructed in the angle of the roof of a house. The parrotlets are distinguished by their diminutive size, and differ from other wedge-tailed groups by their short, almost straight tails. Their best known species (*Psittacula passerina*), the blue-winged parrotlet, inhabits Brazil.

Among the square-tailed parrots are the Amazons, of which the red-breasted *Amazona* (or *Chrysotis*) *æstiva* is indigenous to Brazil and Paraguay; it has a blue crown and red-edged wings. The hawk-billed parrot (*Deroptyus accipitrinus*) of Guiana and Brazil is distinguished by the neck-feathers forming a collar. As an indication of the enormous development of tropical American parrot-life, it will be well to give a list of the genera restricted (with the exception of one or two species which range so far south as northern Patagonia) to the region under review and the West Indies. In the first place, all the members of the family *Conurinae*, about one hundred and fifteen in number, belong to the South American region, and are represented by the genera *Anodorhynchus* (hyacinthine macaw and its relatives), *Cyanopsittacus* (blue macaw), *Ara* (blue-and-yellow macaw and fourteen other kinds), *Rhynchopsittacus* (with one species), *Conurus* (with over thirty species), *Conuropsis*, *Cyanolyseus*, *Leptosittaca*, *Gnathosittaca*, *Henicognathus*, *Microsittaca*, *Pyrrhura* (with over twenty species), *Myopsittacus*, *Bolborhynchus*, *Psittacula* (parrotlets), and *Brotopogys*. Of the ten genera of the subfamily *Pioninae* all but one are tropical American; they include *Amazona* or *Chrysotis*, with five-and-forty species, *Pachynus*, *Pionus*, *Deroptyus*, *Triclaria*, *Pionopsittacus*, *Gypopsittacus*, *Urochroma*, *Pionites*, and *Pæocephalus*; the total number of specific representatives of the group being over one hundred.

Birds-of-Prey. Coming to the birds-of-prey, the first on our list are the hook-beaked kites (*Rostrhamus*), a small group of tropical American birds resembling crows rather than true birds-of-prey, having slender, rather straight, claws, and long, and in some cases very thin, beaks with which they extract molluscs from their shells. They also feed on lizards and fishes, and are sociable birds, flying about in parties and nesting in colonies.

The pigmy kite (*Gampsonyx swainsoni*), the only representative of its genus, inhabits the north of South America, and is of the size of a thrush and thus one of the smallest birds-of-prey. In contrast to this is the harpy (*Thrysaëtus harpyia*), the largest and strongest of all South American true birds-of-prey, distinguished by its exceedingly powerful legs. Of the chanting hawks (*Asturina*) the majority

are South American and the rest African. Very characteristic of South America is the group represented by the carancho (*Polyborus tharus*), which ranges all over South America. It is black on the back, lower-parts, and legs, but the breast is



THE HARPY.

brownish white marked with black cross-bands or spots. This hawk eats all kinds of small animals, as well as carcasses; when excited the flesh-coloured skin of its face turns yellow. Another caracara is the chimachima (*Milvago chimachima*), whose range extends from Brazil northwards to Panama, the allied *M. chimango* ranging from south-eastern Brazil and Chile to the Straits of

Magellan. The third genus of the group is *Ibycter*, with seven species, of which one inhabits the Falkland Islands.

Condors. Perhaps the most common South American condor (as it is best to term the so-called American vultures) is the turkey-vulture (*Cathartes*, or *Rhinogryphus*, *aura*), which, like its relative the black condor (*Catharista atrata*, or *Catharistes urubu*), inhabits not only South and Central America but the south of North America. The largest of all is the true condor (*Sarcorhamphus gryphus*), which chiefly inhabits the Andes of Peru and Chile, whence it ranges down south to Patagonia. A near relative of this species is *S. equatorialis* of Ecuador; while a more distinct type is represented by the king-condor (*Cathartes papa*) of Mexico and tropical South America, a bird the size of a hen-turkey, mainly black and white with brilliant colours on the bare parts of the head and neck. The condor is becoming very rare, owing to its being slaughtered for its quills, which are used for millinery purposes.

The condors form the exclusively American family *Cathartidae*, all the members of which are distinguished, among other characters, from the vultures (*Vulturidae*) of the Old World by the absence of a median vertical partition between the two apertures of the nostrils. The marked super-

ficial resemblance existing between condors and vultures may, doubtless, be explained by the similar habits of these birds; just in the same way as swifts resemble swallows, to which, however, they have no near relationship.

Owls.

Of the South American owls the most remarkable is the little burrowing owl (*Speotito cunicularia*), individuals of which may be seen at any hour of the day sitting in front of their burrows, greeting the passers-by with a nod of their heads, and when disturbed flying screaming around the head of the intruder. The chief haunts of the burrowing owl in North America are the prairies, and in South America the pampas. In the latter these birds associate with viscachas, while in North America they are generally found in parts inhabited by prairie-marmots.



THE CONDOR.

The Striges are also represented by several species of horned owls belonging to the widely distributed genus *Asio*, as well as by an eagle-owl (*Bubo nigrescens*) peculiar to Ecuador, and by two North American species, which range respectively as far south as Mexico and Costa Rica. The genus *Pulsatrix*, with two species, is



TURKEY-VULTURE.

peculiar to the region, and there are likewise representatives of the widely ranging genus *Scops*. *Lophotrix* and *Psiloscoops*, each with two species, are other genera restricted to tropical America, while *Cicaba*, with at least eight species, forms a fourth genus peculiar to the area. There are also representatives of the wood-owls (*Syrnium*). In another group the genus *Gisella*, with one Colombian and one Brazilian species, is solely tropical American; and the north Acadian owl (*Nyctala acadica*) of North America ranges as far south as Mexico. The pigmy owls of the European and Asiatic genus *Glaucidium* are fairly well represented in the area, and the two species of the allied North American genus *Micropallas* enter Mexico. Finally, there is a representative (*Strix contempta*) of the cosmopolitan barn-owls in Ecuador.

Curassows and Guans.

The game-birds known as curassows and guans form a family (*Cracidae*) restricted to Central and Southern America. One of the commonest species, whose plumage is dark green above and white beneath, is the Mexican curassow (*Crax globigera*), easily identified by the presence of a large yellow knob at the base of the upper half of the beak. Its range extends from Honduras to western Mexico. Some of these large and handsome birds are ornamented with head-crests, and in most of them the dark

green or blackish plumage shows metallic reflections. There are eleven genera of the family, among which the typical *Crax* has twelve, *Penelope* fifteen, and *Ortalis* nineteen species; the total number of species recognised in 1900 being fifty-nine. These birds may be regarded as occupying in South America the position held in Malaya by the megapodes.



KING VULTURE.

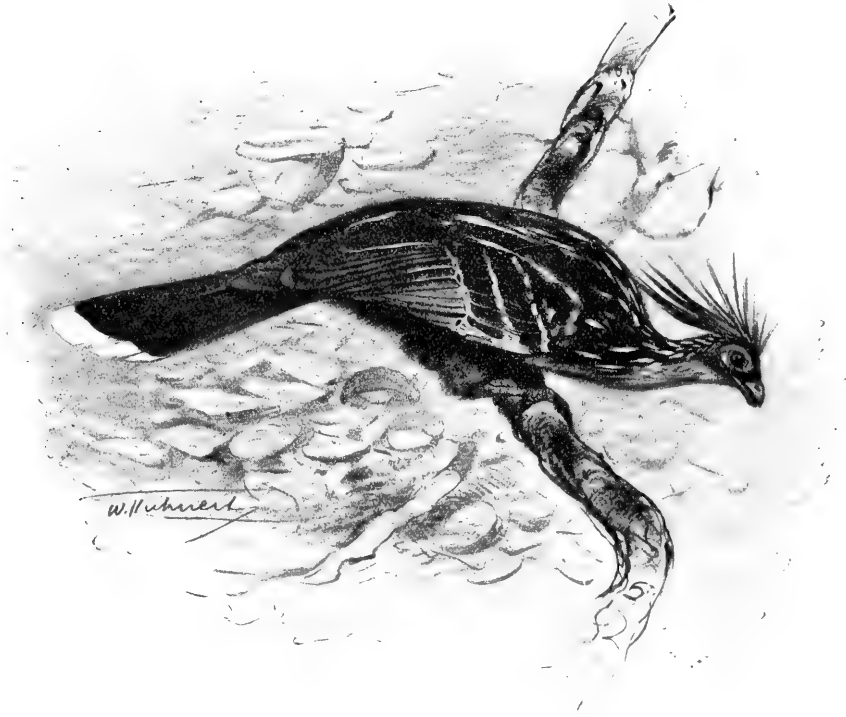
Hoatzin. A very remarkable and primitive type of bird is the hoatzin (*Opisthocomus cristatus*), whose affinities are still doubtful. It is the only representative of its family, and noteworthy, among other peculiarities, on account of the presence of claws on the first and second digits of the wings in the young birds, by means of which they hold on to the branches or bark as they climb in the trees. Among other peculiarities of this bird, it may be mentioned that the crop is unique on account of having assumed the structure and function



MEXICAN CURASSOW.

of the gizzard of other birds, being much larger than ordinary, with the walls thick and muscular instead of thin and flabby. Despite this specialised feature, the primitive character of the hoatzin is indicated by many points, the vestigial claw of the third digit of the wing linking it with the extinct lizard-tailed bird (*Archæopteryx*), while another claim to primitiveness is apparent in the quadrupedal habits of the young. Thickly wooded river-valleys form the haunts of the hoatzin, of which Lower Amazonia may be considered the centre, the distributional area, according to our present information, being in several instances discontinuous. The bird has a peculiarly disagreeable odour of its own, which is, however, less

powerful than commonly reputed, and, at all events, insufficient to render it immune to the attacks of parasites. In general character the nest and eggs are very similar to those of the Guiana green herons (*Butorides*), but are placed higher above the water. Both sexes assist in nest-building, and two eggs seem to be the usual number in a clutch. There is no foundation for the assertion that these birds are polygamous, or for the old legend as to their snake-eating habits. If they can possibly avoid it, hoatzins never resort to flight or descend to the ground, their method of locomotion being to creep from branch to branch of the mangrove and other trees to which they resort in the river-valleys of Guiana,



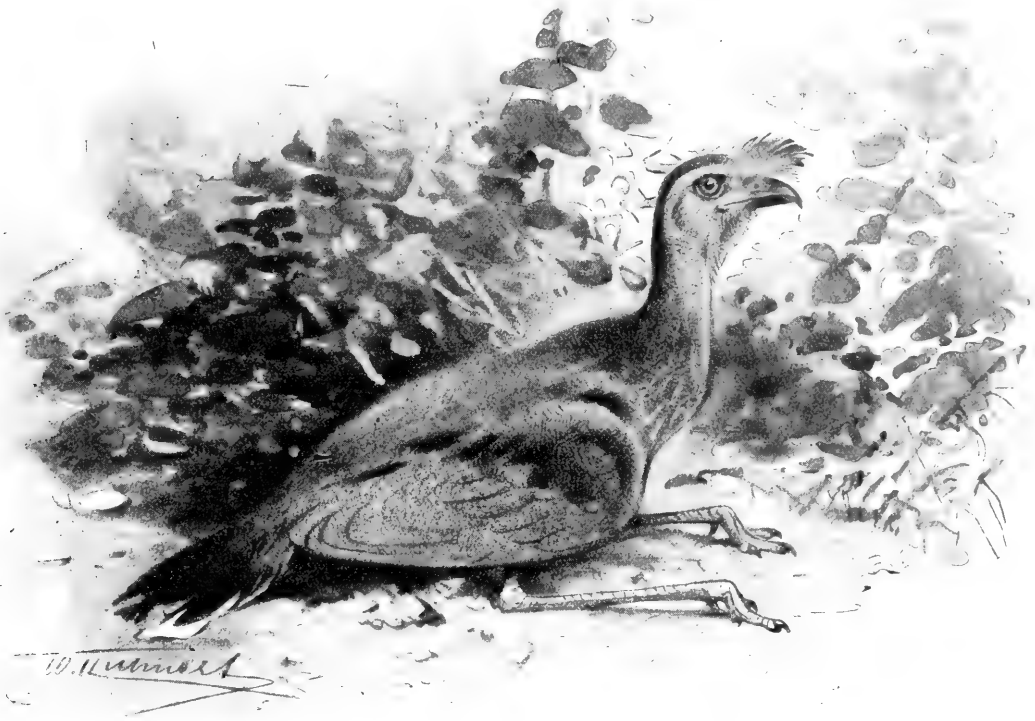
HOATZIN.

Venezuela, and Brazil. When the foliage and creepers are unusually dense the wings are used, either alternately or in unison, to push aside obstructions, and to aid the birds in preserving their balance until a firm grip has been obtained with the feet. In consequence of this habit the primary quills become much frayed and worn by friction with the branches. The crest, like that of the cock-of-the-rock, is permanently erect.

Waders.

Conspicuous on account of their gorgeous coloration are the red flamingo (*Phoenicopterus ruber*), the red spoonbill, or ajaja (*Platalea rosea*), and the red ibis (*Plegadis rubra*), all of which are common to Central and South America. Two other South American birds of this group are the jabiru or giant stork (*Mycteria americana*) and the maguari (*Dissura maguari*), which is

nearly related to the white stork of Europe. The sun-bittern (*Eurypyga helias*), which inhabits wooded banks of rivers, where it lives mostly on the ground in pairs and flies in an uncertain fluttering way, represents the family *Eurypygidae* in Brazil, Amazonia, Bolivia, Guiana, and Venezuela; the only other member of the group being *Eu. major*, of Central America, Colombia, and Ecuador. Sun-bitterns, which are classed as a suborder of the crane-like birds, are characterised by the naked oil-gland, the presence of powder-down patches and a notch on each side of the lower border of the breast-bone, but have no bare areas on the sides of the neck. The feathers of the upper parts are beautifully barred with



SERIEMA.

brown, black, and white, in marked contrast to which are the red eyes, the waxy yellow beak, and the straw-coloured legs. These birds, which go about either alone or in pairs, derive their name of sun-bittern from their habit of basking, with outspread pinions, in the full glare of the tropical sun. Insects form their staple food, and in capturing them sun-bitterns display remarkable activity. They breed in bushes or trees at a height of only a few feet above the ground, laying two greyish eggs, mottled and speckled with rufous, in a clutch.

Courlans and The Brazilian courlan (*Aramus scolapaceus*) and the Florida
Seriemas. courlan (*A. giganteus*), which ranges from Florida to Central America and perhaps Ecuador, have been regarded as large relatives of the rails, but are now placed near the sun-bitterns. On the other hand some doubt still exists

with regard to the affinities of the seriemas, tall greyish-brown birds, which fly seldom, but run with great speed. They roost and nest on trees, and lay eggs resembling those of birds-of-prey; while they make their presence known by their loud voices. The Brazilian seriema (*Cariama cristata*) of Brazil and Paraguay, is a light brown bird marked with narrow dark undulating lines, and is about the size of a heron, and is the sole representative of its genus. It is easily recognised by the plume

of feathers rising from the root of the beak, which are much less developed in the smaller Burmeister's seriema (*Chunga burmeisteri*) of Argentina, the only other living representative of the family *Cariamidae*. That these birds are related to the cranes seems practically certain, their curious superficial resemblance to the secretary-bird, or secretary-vulture, of southern Africa (to which they also approximate in habits), being connected with the similarity of the conditions under which they live. The group is evidently an ancient South American type, for it appears to be akin to a gigantic extinct bird (*Phororhachus*) of which the remains occur in the Tertiary deposits of the Santa Cruz district of Patagonia. Large as it was, this bird had a proportionately big head, its skull being nearly equal in size to that of a horse.



TRUMPETER.

cal species is *Psophia crepitans* of Guiana and Amazonia, but the family *Psophiidae* includes half a dozen other species, of which the united distributional area extends from Ecuador, Bolivia, and Peru to Amazonia. The trumpeters are now classed as a subordinal group, placed between the sun-bitterns and the seriemas. They are long-legged and long-necked birds, without plumes or crests on the head, somewhat resembling big blackish guinea-fowls with abnor-

Another interesting group includes the trumpeters, forest-birds which take their name from their peculiar, subdued, trumpet-like sounds. The typi-

mally long legs; the beak being short, stout, and slightly bent down at the tip. In the oval shape of the nostrils they resemble seriemas, from which they differ by the absence of notches in the lower border of the breast-bone. Trumpeters are poor flyers, and congregate in immense troops, which utter their trumpet-like cries in chorus. To produce this volume of sound, the windpipe is of unusual length, extending backwards beneath the skin of the abdomen. The cry, which is uttered with the beak wide open, lasts about one minute. There can be no reasonable doubt that trumpeters, like screamers, form part of the indigenous fauna of South America, dating from the period when that continent was isolated from North America.

Screamers.

The three species of so-called screamers, forming the family *Palamedeidae*, are the sole representatives of an ordinal group related to the water-birds and flamingoes, although differing from both, as well as from all other birds, by the absence of the narrow projection arising from the middle of the hind border of each rib to overlie the one next in the series. The typical or horned screamer (*Palamedea cornuta*) of Guiana and Amazonia is a somewhat turkey-like bird, easily recognised by the slender horn-like projection arising from the crown of the head and curving forwards over the short and stout beak, the puffy neck, and the two powerful spurs with which each wing is armed. These last at once proclaim the screamer to be a fighter. In habits these birds are mainly terrestrial; but at least one of the other two members of the group, namely, the chaja, or crested screamer (*Chauna chavaria*) of Argentina, has much the habits of a goose, to which it also approximates in size. The third member of the group is the Derbian screamer (*C. derbiana*) of Colombia, which agrees with the last in the absence of a "horn" on the forehead.

Musk-Duck.

One remarkable South American duck, the only representative of its genus, is distinguished by the presence of bare tracts round the eyes and at the sides of the neck, and of warts at the base of its beak; from the musk-like smell of a fat secreted by this bird it takes its name of musk-duck (*Hyonetta moschata*). Besides South America the musk-duck inhabits Central America, where it lives chiefly in swamps among the forests, being less fond of water than other ducks, and finding its food on the ground like geese. It often perches on trees and always nests in branches. A domesticated breed is known by the name of Turkish duck.

Tinamus.

Another very remarkable group of birds known only from the South American region are the tinamus. In structure they connect the game-birds very closely with the ostrich group, with which they are sometimes classed. In shape they are very like partridges, and have short wings and tail. Living chiefly on the pampas and campos, they fly heavily, but run quickly. One of the largest is the solitary tinamu (*Tinamus solitarius*) of Brazil, which is of the approximate size of a guinea-fowl, and belongs to a genus with ten other species, ranging, collectively, from southern Mexico to Amazonia and the south of Brazil. The genus is one of seven in which the first toe is well developed. To the same section belong the genera *Nothocercus* and *Crypturus*, the former containing five species, with a range extending from Central America to Colombia, Venezuela, Ecuador, and possibly Chile, and *Crypturus* with over thirty species, of which the collective distributional area reaches from northern Mexico to north-

eastern Argentina. The banded tinamu (*C. noctivagus*) is a well-known representative of the second genus. These and the other smaller representatives of the group are commonly known in South America as partridges, but the great tinamu or martinetta (*Rhynchotus rufescens*) of Brazil and Argentina, together with the Bolivian *R. maculicollis*, is designated a pheasant, on account of its greatly superior size. In common with the other members of the family *Tinamidae*, this bird lays beautifully glazed and porcelain-like eggs. These are of a wine-red colour in this particular species, but in *Nothurus* they are purple-red or wine-colour, while in some of the other species they are blue. The other genera of the four-toed section are *Nothoprocta*, with eight species, and ranging from Bolivia, Ecuador, and Chile to north-western Argentina; *Nothura*, with seven species, of which the collective range extends from Bolivia and southern Brazil to Patagonia; and *Taoniscus*,

represented only by the dwarf tinamu (*T. nanus*) of eastern Brazil and Paraguay. Of the second genus the spotted tinamu (*Nothura maculosa*) of Argentina and southern Brazil, and Darwin's tinamu (*N. darwini*) of Argentina and Patagonia, are two of the best known representatives.

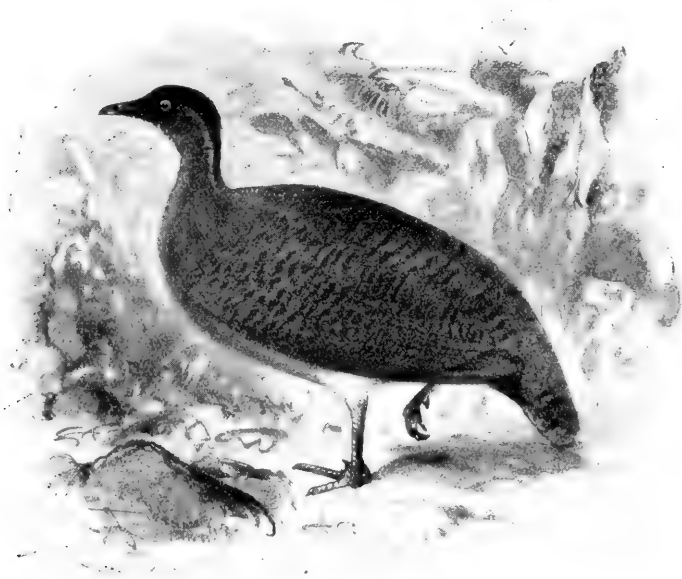
Of the three-toed tinamus there are two genera, *Calopezus*, with a single species from Argen-

tina and Patagonia, and *Tinamotis*, in which Pentland's tinamu (*T. pentlandi*), is a native of Ecuador, Peru, and Chile, while *T. ingorifi* is a native of eastern Patagonia.

Tinamus are essentially ground-birds, showing a great disinclination to fly, and when on the wing flying with a slow and heavy flight. They have plaintive, flute-like notes, that of the martinetta being especially loud.

Rhea.

The rheas, or American ostriches, form a special group of the ostrich-like, or flightless, birds. They are most familiarly known by the typical Argentine species, or nandu (*Rhea americana*), formerly abundant on the pampas of Uruguay and Argentina. Here they live in family parties comprising a cock, which attends to the incubation and nursing of the young, and about half a dozen hens which lay their yellowish-white eggs, some twenty in number, in the same nest. Rheas are caught by the bolas from horseback, or hunted with dogs



SOLITARY TINAMU.



CRESTED SCREAMER.

for the sake of their feathers, which are not, however, particularly valuable, although still forming an important article of trade. Sometimes rheas are kept in a domesticated state. The smaller *Rhea darwini* inhabits Patagonia between the



RHEA OR NANDU.

Rio Negro and the Straits of Magellan, while a third kind, the long-billed rhea (*R. macrorhyncha*), lives in northern Brazil. Rheas, which constitute an exclusively South American family (*Rheidae*), differ from ostriches in that they have three, in place of only two, toes to each foot, which terminate in claws instead of nails;

and are further distinguished by the longer wings, the fully feathered head and neck, and the absence of a tail. On the other hand, they resemble their African relatives in the superior size of the cock, as compared with the hen, and likewise in the presence of after-shafts to the body-feathers.

From their large size, rheas are the most distinctive birds of the campos, or plains, of Brazil and the pampas of Argentina. It has been considered that these ostrich-like birds form an essentially southern group; but against this view is the fact that they are represented in the upper Tertiary deposits of northern India, as well as in the lower Tertiaries of Egypt.

Among South American reptiles particular interest attaches to the river-tortoises, or terrapins, all of which belong to the group in which the head and neck are moved sideways in place of being retracted with the S-like flexure characteristic of the tortoises and terrapins of the Northern Hemisphere. The largest is the great aru tortoise of the Amazon (*Podocnemis expansa*), whose shell may be close on a yard in length. These tortoises are taken by the natives for their flesh, while their eggs yield a kind of oil. The matamata (*Chelys fimbriata*), which has irregular processes of skin on its head and neck and a much corrugated shell, is the sole representative of its genus. *Podocnemis*, on the other hand, occurs elsewhere in Madagascar at the present day, while it is also represented in the Tertiary formations of the Northern Hemisphere, a circumstance indicating apparently that the Pleurodira, as the side-necked tortoises are technically termed, originated in the north, and made their way southwards during the Tertiary epoch.

None of the families of these tortoises is peculiar to South America, the *Pelomedusidæ* being represented at the present day in Ethiopian Africa and Madagascar by the genera *Pelomedusa* and *Sternothærus*, and in South America and Madagascar by the above-mentioned *Podocnemis*.

The second family, *Chelyidæ*, on the other hand, is partly South American and partly Australasian; the American genera being the above-mentioned *Chelys*, together with *Hydromedusa*, represented by one species from Brazil and a second from southern Brazil and Argentina, *Hydraspis* with some seven species, *Platemys* with two, and *Rhinemys* with a single representative. The Australasian genera, which range into New Guinea, are three in number.

The absence of fresh-water tortoises of the family *Trionychidæ* from South America is a fact in geographical distribution almost as important as the presence of the aforesaid side-necked tortoises, especially when it is borne in mind that the former group is well represented in North America.

Crocodiles and Caimans. Crocodiles are represented in South America by the sharp-nosed *Crocodylus americanus*, while the caimans (*Caiman*), which differ from alligators in having bony plates on the lower surface of the body, are peculiar to the region. Caimans, frequently called alligators, include five species, of which the black caiman, or black jacare, is the largest, growing to a length of about 13 feet. In colour, it is black above and yellow beneath; and it is further characterised by the upper eyelid being flat and finely striated, with a small bony plate on the inner side. In another species, *C. solerops*, the upper eyelid is prominent and tuberculated, one of the tubercles sometimes forming a small horn.

Another type of eyelid is presented by *C. palpebrosus*, in which it is flat and entirely bony, the bone consisting of four separate pieces.

An imperfectly known caiman from the Magdalena River, Colombia, on account of certain alleged structural peculiarities, has been made the type of a distinct genus under the name of *Perosuchus fuscus*.

In general habits caimans are very similar to crocodiles and alligators.

Lizards.

Of lizards, one species (*Heloderma horridum*) of the family *Helodermatidae* is a native of Mexico; the other, commonly known as the Gila monster (*H. suspectum*), inhabiting the deserts of Arizona. These lizards, which are poisonous, are very brilliantly coloured—orange or red with black markings; and, although it has been stated that this colouring harmonises with the colour of the sand on which these reptiles delight to bask, it is more probably



HELODERMA

of the "warning" type, that is to say, it serves to proclaim the dangerous nature of these lizards.

Considerable difference of opinion has been expressed in regard to the character of the bite of these lizards, some naturalists maintaining that it is more or less completely innocuous, while others state that it is intensely poisonous. As regards frogs, mice, rabbits, dogs, pigeons, poultry, etc., experiments leave no doubt that the fangs are venomous. As regards the effects on the human subject, a statement was made in 1882 to the effect that a bite in the thumb by a Gila monster was, after severe local pain, followed only by great weakness and perspiration. On the other hand, in 1888, a case was cited in which death is stated to have occurred a few hours after the infliction of the bite; this being the third or fourth case of a fatal result attending the bite of these lizards in Arizona. In 1911 a lady was bitten in the index finger of her right hand while holding a Gila monster. By prising open

its mouth, the reptile was removed without injury, when it was found that one of the lower venom-teeth had penetrated the nail, two others had compressed the nail sufficiently to produce extravasation beneath, and two of the solid upper teeth were fixed in the tissues of the finger. The finger became swollen and discoloured, the swelling and discoloration extending some way up the arm. Soon after the



HORNED IGUANA.

bite the lady was affected with severe headache, accompanied by pallor of the face, perspiration, and sensations of vertigo. A short fainting fit also ensued. These effects continued for about a week, after which they gradually disappeared. This experience proves that heloderm-poison has severe effects on the human system.

The large lizard known as the teju (*Tubinambis teguexin*) is the typical representative of the New World family *Tupinambidae*, to which also belong the exclusively South American genera *Dracana* and *Centropus*, as well as several

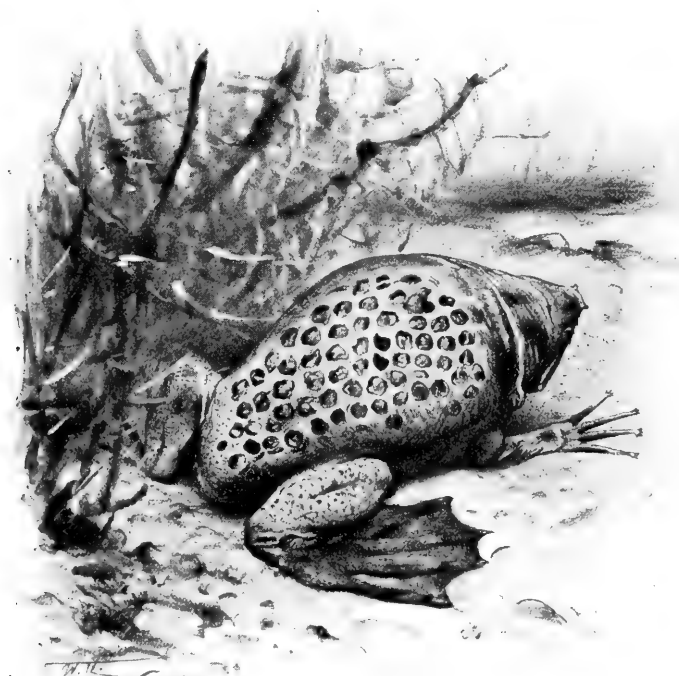
South America (in addition to a host of species to which no reference is here possible) possesses a representative of the blind snakes in *Typhlops reticulatus*; the group having a very wide geographical distribution.

The above-mentioned bushmaster differs from most other pit-vipers in laying eggs instead of producing living young; a similar peculiarity occurring in *Tremeresaurus monticola* of the Himalaya, as well as in the tropical African vipers of the genus *Atractaspis*.

The boas of South America are particularly interesting on account of presenting a remarkable parallelism in their geographical distribution to that of the pleurodiran or side-necked tortoises, the genera *Corallus* and *Boa* being common to tropical

America and Madagascar. On the other hand, *Epicrates*, *Trachyboa*, *Ungalia*, *Ungaliophis*, and *Eunectes* are restricted to the region under consideration, inclusive of the West Indies.

Although the anaconda is admitted to be the largest of living snakes, considerable diversity of opinion obtains with regard to its maximum dimensions. Naturalists, for instance, mostly refuse to believe that this snake ever



SURINAM WATER-TOAD.

exceeds a length of about 30 feet, but travellers report much larger dimensions—in one instance a length of no less than 65 feet. Till tangible evidence of the existence of such monsters is forthcoming, naturalists will, however, be well advised in maintaining their attitude of reserve.

Among the frogs and toads of the South American region the most remarkable are the brilliantly coloured horned toads of the genus *Ceratophrys*, the Brazilian representative of which is a huge creature. The "jackie-toad" (*Pseudis paradoxa*), a Surinam species, is peculiar on account of its very large tadpoles, which before they throw off their gills are almost the size of the adults. The southern Brazilian pigmy frog (*Paludicola falcipes*), which makes a noise like a cricket, is one of the smallest of all frogs, being only about half an inch in length. The large Darwin's frog (*Rhinoderma darwini*), of Chile, has a



HORNED FROG.

curious mode of bringing up its family, the male depositing the eggs laid by the female in a pouch on its throat, where they develop. The pouched frogs, on the other hand, as represented by *Nototrema marsupiatum* of Mexico and Peru, pass through all the stages of their development in a pouch in the back of the female; while those of the Surinam water-toad (*Pipa americana*) develop in the skin of the back of the female, which forms a cell round each egg.

All the above-mentioned genera, together with many others, such as *Phyllodes* among the *Ranidæ* and *Leptodactylus*, *Paludicola*, and *Hylodes* among the *Cystignathidæ* (in which group *Pseudis* is included), are restricted to the South American region. It is, however, noteworthy that *Pipa* has a near relative in the tropical African *Xenopus*; these two genera constituting the family *Xenopodidæ*, or *Dactylethridæ*, which is distinguished from all other batrachians by the absence of the tongue. Two families, namely the *Amphignathodontidæ*, with the species *Amphignathodon guentheri* of Ecuador, and perhaps the imperfectly known *Grypiscus umbrinus* of Rio de Janeiro, and the *Hemiphractidæ*, with the genera *Hemiphractus*, *Ceratophyla*, and *Amphodus*, are peculiar to the present region.

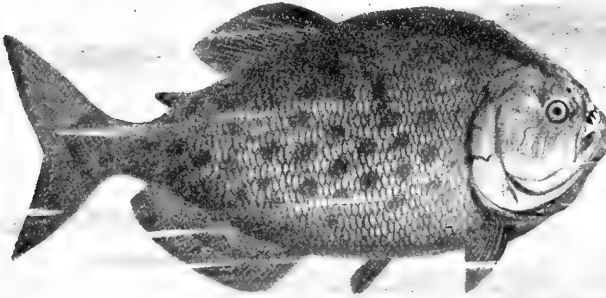
Some of the strange "nursery" arrangements of South American frogs have been already mentioned; it may be added that certain tree-frogs of the genus *Phyllomedusa* (which is another of the types peculiar to the region) spawn in nests of froth made in the leaves of trees overhanging water. The tadpoles hatch in the froth, in which they move freely for a few days till their external gills are shed, when they drop into the water beneath, there to complete their development into frogs. Several kinds of *Hylodes*, such as the well-known *cogni* (*H. martinensis*) of the West Indies, spawn in damp moss or under stones, laying unusually large eggs in which the tadpole undergoes practically its full development, coming forth with a mere rudiment of a tail, which probably served as a breathing organ during its incarceration. Other small South American frogs, pertaining to the genera *Dendrobates* and *Phyllobates*, have been observed to go about with their tadpoles adhering to their backs by means of the sucker-like structure of their lips and the flattened surface of the belly.

Axolotl. A dark-coloured salamander, furnished with external gills, and measuring about ten inches in length, which inhabits the lake surrounding the city of Mexico, is of special interest on account of being the permanently immature form of a species, *Amblystoma tigrinum*, ranging from New York southwards to California and central Mexico. Normally this species at the close of its aquatic existence develops lungs, sheds its external gills, and takes to a life on land. The axolotl, as its Mexican representative is called, is, however, under normal circumstances aquatic throughout its existence, breeding in this permanently immature condition. Axolotls when kept in confinement will, however, sometimes develop into adult salamanders, which leave the water and take to a life on land after the manner of the rest of their kind. The reason for the arrested development is not definitely known.

As mentioned in the chapter on the fauna of North America, the salamanders of the genus *Amblystoma* are mainly characteristic of that continent, where they are represented by about sixteen species. Very interesting is the occurrence of a representative of this otherwise American genus in Siam, as it affords another

instance of the community of type between the animals of Eastern Asia and North America.

Fishes. One South American cat-fish, known as the sheath-fish (*Aspredo batrachus*), has breeding habits somewhat similar to those of the



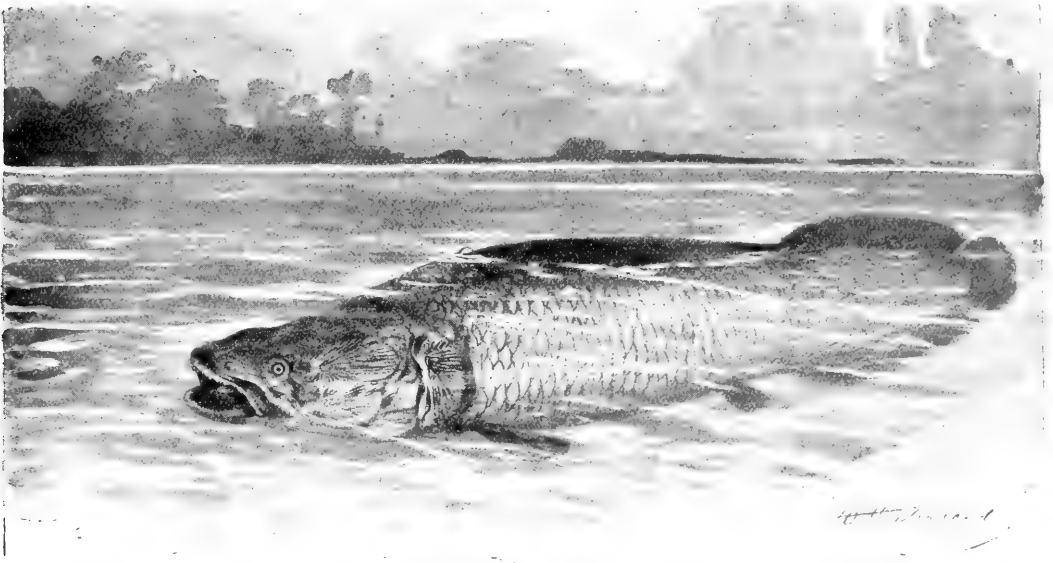
PIRAYA.

Surinam toad, although in this instance the eggs are attached to the loose and spongy skin of the female's abdomen, instead of being embedded in her back.



THE DOUBLE-EYED FISH.

To the same group belongs the giant piraiba (*Piratinga piraiba*). Another fish, the haimora (*Macrodon trahira*), is appreciated on account of its savoury flesh, but dreaded on account of its sharp teeth. The piraya (*Serrasalmo piraya*), although



ARAPAIMA.

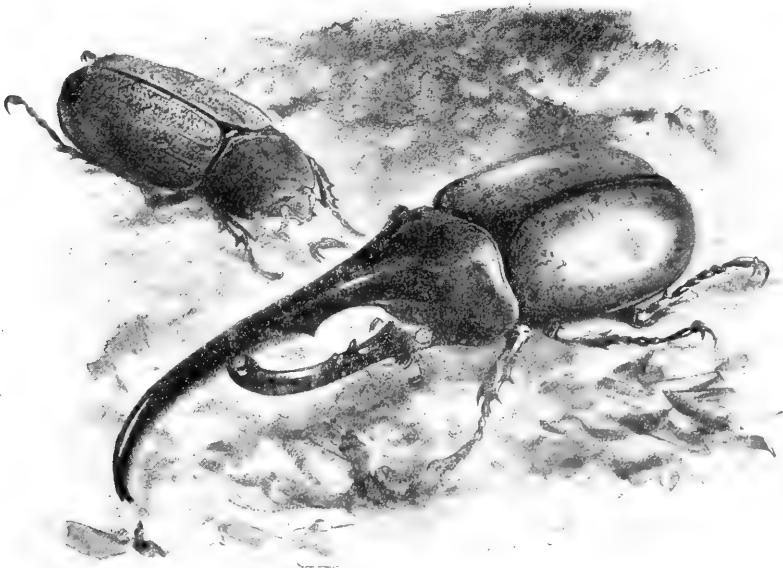
only a foot in length, attacks animals of every kind with great ferocity, and is dangerous even to the larger mammals and man. Like the haimora, it belongs to the family of the *Characinidae*, which replaces the carps and salmonoids in South America.



LEPIDOSIREN.

In the family of toothed carps (*Cyprinodontidae*) the double-eyed fish (*Anableps tetraphthalmus*) is unique in that its eyes are divided into two halves, of which the upper one is adapted for vision in air and the lower one to see in water. The

largest of fresh-water fish, not only in America but elsewhere, is the *Arapaima gigas* of Guiana and Brazil, which attains a length of more than 15 feet and a weight of over 400 lbs. It belongs to a family, *Osteoglossidæ*, almost peculiar to the Southern Hemisphere, and is the only representative of its kind. The electric eels are confined to the American tropics, the best known species (*Gymnotus electricus*) inhabiting the rivers of Guiana, Venezuela, and northern Brazil. It has been known to attain a length of 6 feet, and feeds on other fishes and frogs. This fish is provided with a pair of electric organs on the back of the tail, and another pair along the base of the anal fin, with which it gives shocks powerful enough to be dangerous to man. A species of lung-fish (*Lepidosiren paradoxa*) inhabits the rivers of South America from Brazil to Paraguay, and is akin to the



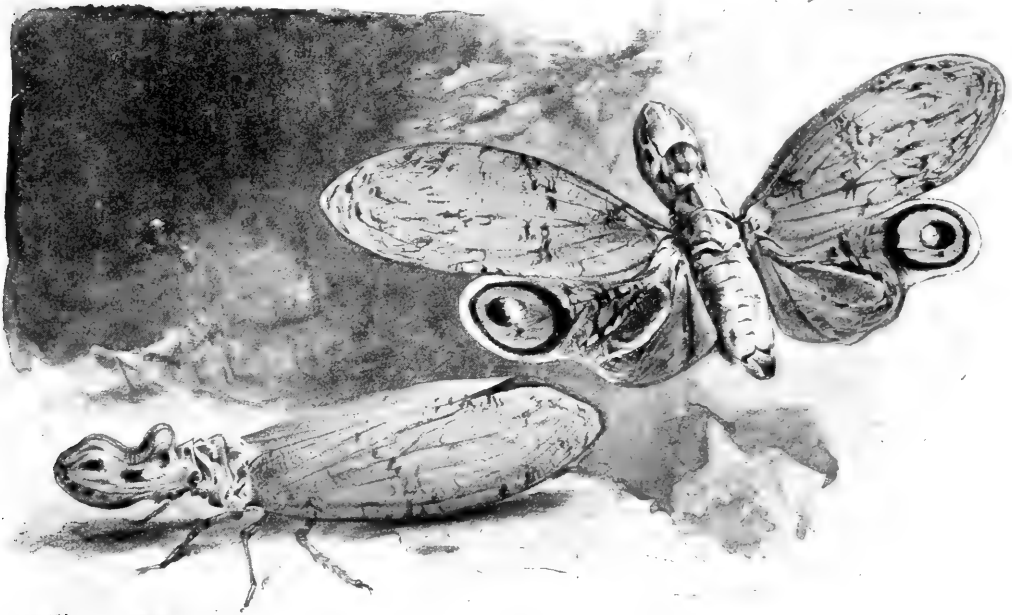
HERCULES BEETLE—MALE AND FEMALE.

West African genus *Protopterus*, and more remotely to the Austranian *Ceratodus*, or, as it is also termed, *Neoceratodus*. Like its African and Australian relatives, this fish breathes atmospheric air by means of its swim-bladder, although it can likewise make use of its gills. Some very remarkable forms of armoured cat-fish (*Loricariidæ*) are also met with in the South American rivers. These include the typical genus *Loricaria*, the members of which are small fishes specially abundant in Amazonia, and *Acestra*, in which the muzzle is much elongated.

Insects.

The insects of the South American region, like those of other tropical countries, include many large and strange types, such as, for instance, the Hercules beetle (*Dynastes hercules*), the males of which are over 5 inches in length, and the Surinam lantern-bearer (*Fulgora lanternaria*), one of the cucujas which measures some $2\frac{1}{2}$ inches in length and bears a bladder-like expan-

sion on the head resembling a lantern. Tropical American butterflies are specially notable on account of their numbers, their beauty, and in many cases their large size. They are further remarkable for the number of families by which they are represented; no less than thirteen families out of sixteen recognised in one of the older classifications occurring in the region, to which three of them, namely the *Brassolida*, *Heliconiida*, and *Eurygonida*, are entirely restricted, while a fourth, the *Eurycinida*, is found elsewhere only in North America. Moreover, in families occurring in other parts of the world, the South American forms are often quite different from the rest, as in the case of the *Danaida*, which are brightly tinted instead of being of a sombre type of colour. Some of the



SURINAM LANTERN-BEARER.

Heliconiida mimic species of the *Danaida*, which are believed to be unpalatable to birds. Very striking are the large and handsome butterflies of the exclusively tropical genus *Morpho*, the typical representative of the family *Morphida*, of which the other genera are Indo-Malay. The species of *Morpho* are conspicuous on account of the splendour of the blue on the upper surface of the wings of some of the species, such as *M. rhetenor* of Amazonia, which looks almost like a bird when on the wing, and *M. cypris* of Colombia. Other species display, however, a different coloration, *M. hecuba* of Guiana, represented in the annexed illustration, being brown and tawny: its expanse of wing is 7 or 8 inches.

Among moths it must suffice to refer to the magnificent diurnal species of the genus *Urania*, which are specially interesting on account of being represented by

an allied species in Madagascar, thereby presenting a remarkable parallelism in development to the side-necked tortoises and boas.

Ants are strongly represented in the region, many of them being remarkable on account of their habits. The parasol-ants, well exemplified by the South Brazilian *Atta hystrix*, move, for instance, in troops like a green river across the forest-paths, each worker carrying on its head a circular piece of leaf half an inch across, which it has cut out from some leaf close by. Others exhibit the slave-

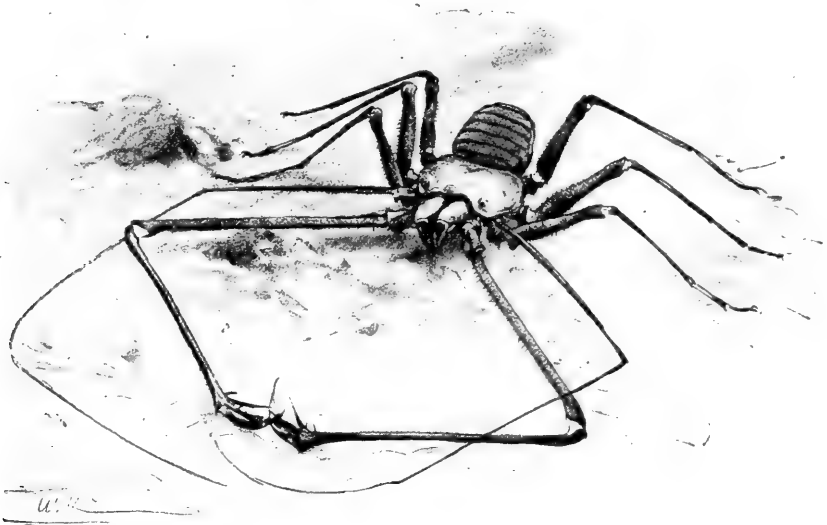


MORPHO HECUBA.

making habit in great perfection. In the case of an Amazonian species, *Polyergus rufescens*, it seems that new colonies are formed by one or more fertilised females effecting an entrance into a nest of a species, *Formica fusca*, belonging to a totally different group. The intruding female, unless she be stopped by hostile workers, immediately makes her way to the domicile of the reigning queen, whom, when found, she attacks and finally kills with her powerful jaws. During the contest the attendant workers remain stupefied with fright, but at the death of their legitimate queen quickly receive the foreign female in her place. In the second

year the new queen lays eggs, from which emerge *Polyergus* workers, and these eventually obtain the mastery of the nest.

The great majority of the numerous kinds of ants inhabiting the flooded lands of the valley of the Amazon make their nests in trees, so as to be above the water level. Among these some of the most remarkable are the long, pendent, skein-like nests of *Azteca barbifex*, the torpedo-like structure formed by a species of *Campopnotus*, and the sheet-like papier-mâché nest of *A. trigona*. Fungus-growing ants are very abundant, their presence being generally indicated by the crater-like elevations leading to the subterranean chambers in sandy districts of certain parts of the country. To these the ants bring fragments of leaves from long distances, and, after storing them in the subterranean chambers, use them as hot-beds for the



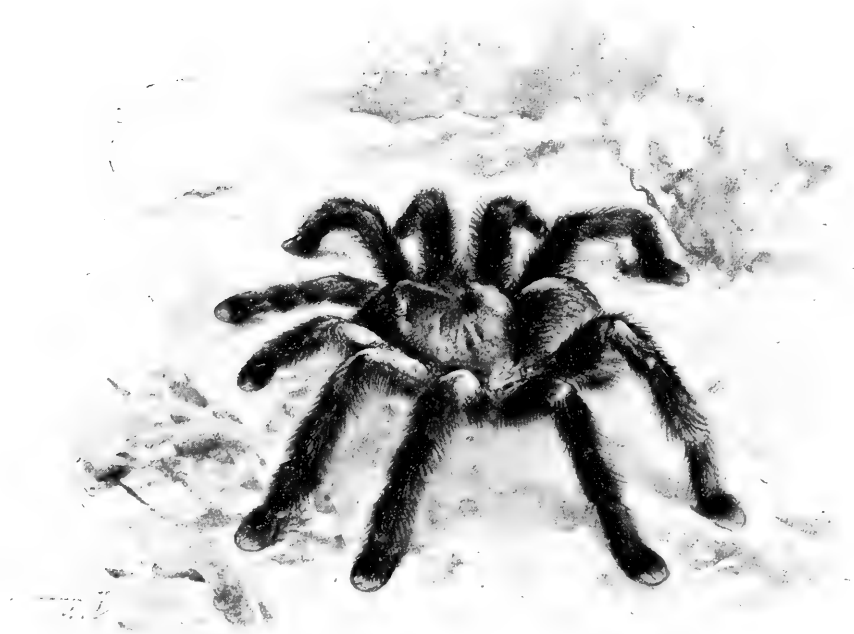
LONG-ARMED WHIP-SCORPION.

cultivation of the mycelium stage of the fungus *Rhizites gongulophora*. Whether the fungus, in its fully developed state, ever reaches the surface through one of the entrance-tubes is a point which has not yet been definitely determined.

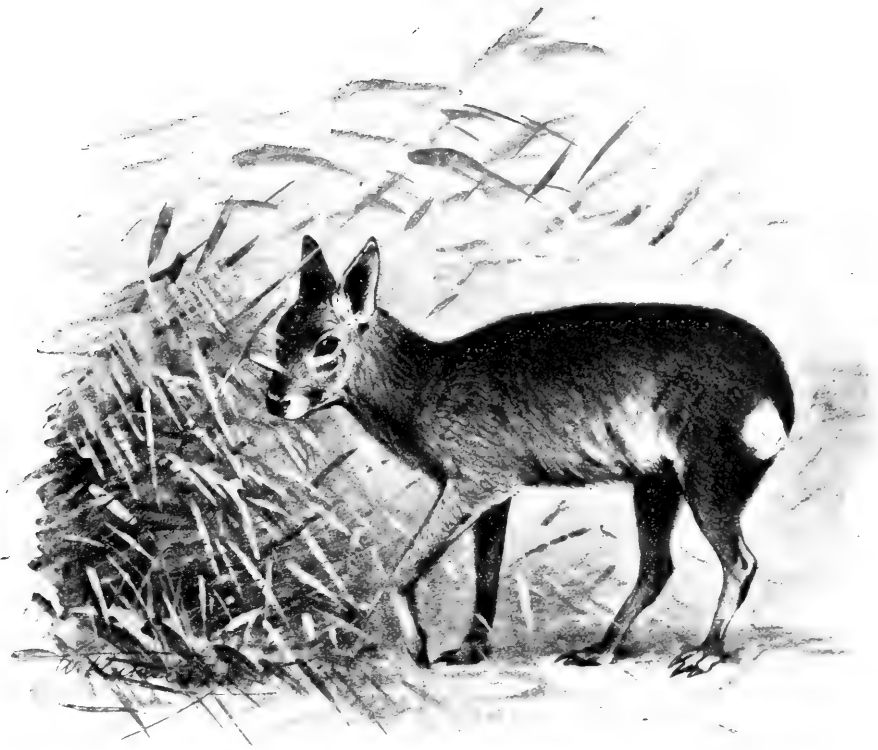
Whip-Scorpions and Spiders. Among the Arachnida of South America is the curious long-armed whip-scorpion (*Tarantula*, or *Phrynus reniformis*), armed with pincers an inch in length. It belongs to a family, *Tarantulidae*, of which the typical section, containing three genera, is exclusively tropical American and West Indian, while the other two sections are Old World. The spiders include the large bird-catching forms, such as *Avicularia*, or *Mygale vestiaria*, whose bodies are clothed with coarse hairs and bristles. The members of the genus *Avicularia* are exclusively tropical American, as are those of the allied *Eurytelma*. Their nearest relatives are the Indian *Pacilotheria*, and the West African *Scodra*.

Although the fact that these giant spiders ascend trees at night to suck the

eggs and drain the life-blood of the young of humming birds was recorded many years ago by two French travellers, the report was generally discredited in Europe; and it was not till the naturalist-traveller H. W. Bates brought home corroborative evidence, that the story received credence. On one occasion Bates saw one of these spiders, which was nearly a couple of inches in length of body, and covered a space of about seven inches when the legs were spread out. Bates "was attracted by a movement of the monster on a tree-trunk; it was close beneath a deep crevice in the tree, across which was stretched a dense white web. The lower part of the web was broken, and two small birds, finches, were entangled in the pieces."



BIRD-CATCHING SPIDER



THE MARA.

CHAPTER IV

THE ANIMALS OF PATAGONIA AND CHILE

THE fauna of the Patagonian and Chilian province is closely related to that of the tropical districts of the South American region, but includes a few peculiar, or almost peculiar, types, and is therefore deserving of a separate section. The area embraces a large part of Argentina as well as Tierra del Fuego, and is inhabited by guanacos, pampas deer, guemal, and rheas.

One of the most characteristic mammals of the open districts of Pampas Cat. Argentina and Patagonia is the pampas cat (*Felis pajeros*), a species about the size of the European wild cat, but stouter in build. In colour it is yellowish grey, striped obliquely with yellow or brownish bands, with the tail and legs ringed, and the cheek marked by two dark streaks extending from the eyes to the throat. Another species is Geoffroy's cat (*F. geoffroyi*) of the Argentine pampas.

Colpeo. Very characteristic of the province is the colpeo (*Canis magellanicus*), a large and handsome fox-like species, whose range apparently extends from the damp beech-forests of Tierra del Fuego to the deserts of northern Chile.

Maras. The most interesting rodent of this province is the mara (*Dolichotis patagonica*), an ally of the guinea-pig. Maras abound on the vast plains of Patagonia, where they appear in parties of from four to thirty or forty in number, running in single file. They stand about 13 inches at

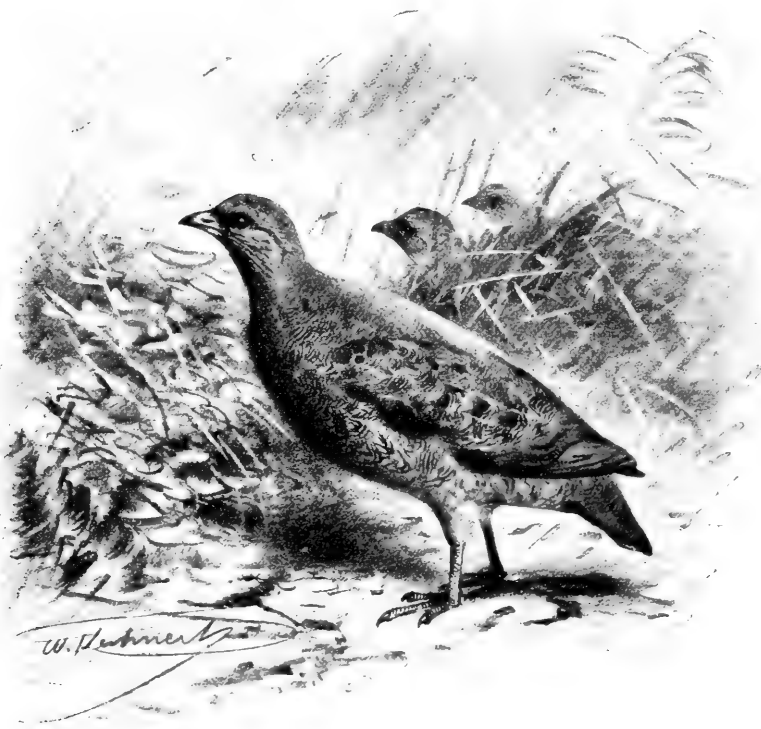


SLENDER-BEAKED PARAQUET.

the shoulder, and are a little under 3 feet in length; the head is hare-like, and the colour approximates to that of a hare or a roe. In length of leg maras resemble deer, as they also do in the white patch on the rump, which is always wider than the short stumpy tail, and in one race is edged with a black line above, which is, however, absent in a second variety. The eyelashes of these rodents are strongly developed to protect the eyes from the glare of the noonday sun, the mara being a diurnal mammal which enjoys basking in the full sunshine. A second and smaller species of mara (*D. salinicola*), which has no light rump patch, inhabits the salt-tracts, or "salinas," of the Argentine.

Birds.

Among the more characteristic birds of the province under consideration are the so-called rail-creepers, which somewhat resemble wrens, but are almost as large as fieldfares. They hop on the ground, where they hide among grass and bushes, flight being difficult to them owing to their heavy bodies and short wings. They breed in holes in the ground, which they probably dig themselves with their long claws. A well-known species is the turco (*Hylactes megapodius*), whose colour is chiefly brown. Another bird living in holes excavated by its own exertions is the slender-beaked paraquet (*Heni-*



UNDULATED SEED SNIPE.

cognathus leptorhynchus), which inhabits the beech-forests of Chile, and migrates northwards in winter. The deserts of the Chilian Andes are inhabited by the undulated seed-snipie (*Attagis gayi*), a species not unlike a sand-grouse in appearance, though very different in structure. Of the water-birds the most noteworthy are the black-necked swan (*Cygnus nigricollis*) and the small Coscoroba swan (*Coscoroba candida*), the former being white, with black head and neck, and red beak, and the latter white, with black tips to the wings.

The upland or Magellanic goose (*Cloëphaga magellanica*), of the Falkland Islands, visits Patagonia in winter, where, as previously stated, Darwin's rhea is a common bird.



CUBAN SOLENODON.

CHAPTER V

WEST INDIES—GALAPAGOS ISLANDS

ANIMALS OF THE WEST INDIES

Solenodon. THE most remarkable mammals of the West Indies are the solenodons, inhabiting Hayti and Cuba, whose nearest allies are, undoubtedly, the tenrees of Madagascar. These curious Insectivora are characterised by the prolonged cylindrical muzzle, long, tapering, scaly tail, large strong claws, especially on the fore-feet, and coarse shaggy hair. The Haytian species (*Solenodon paradoxus*), which is the size of a very large rat, is brown above, black on the thighs, and pale brown on the sides of the head and under-parts. In the Cuban species (*S. cubanus*), on the other hand, the general colour is some shade of tawny or rufous, with a variable amount of black on the back and throat, and a pale nuchal spot. The two species were long believed to be distinguished merely by colour, but it is now ascertained that there is a difference in the number of the vertebræ. As regards habits, these nocturnal insectivores assume a characteristic pose when feeding, throwing the body backwards, with the full length of the soles of the hind feet applied to the ground, and the strong tail serving as the third leg of a tripod. In this posture one or both of the fore feet can be raised from the ground. In walking the toes only are in contact with the ground, the greater part of the soles of the hind pair being elevated. Captive specimens fed greedily on chopped meat, but would also eat lettuce leaves. Usually they appeared peaceful enough, but occasionally one would seize its companion by its long snout and inflict a severe bite. Very rarely they uttered a shrill cry, but they were constantly sniffing with a kind of explosive snort, and they emitted a disagreeable odour, somewhat between that of a goat and that of a porcupine. How these aber-

rant and primitive Insectivora reached their present isolated habitat is a mystery, seeing that there are no members of the order in either Central or South America.

Hutias. The rodents are represented in the West Indies by the hutias, which appear to be more or less intimately allied to the South American coypu, but are more rat-like and mainly arboreal in their habits. The hutia-couga (*Capromys pilorides*) represents the genus in Cuba, to which island it is confined. It has a total length of about 22 inches, and is clothed with

long coarse hair yellowish grey and brown in colour. Its smaller relative, the hutia-carabali (*C. prehensilis*), is distinguished by the tip of its tail being prehensile. Living in the tree-tops, it is much more wary than the hutia-couga, and defends itself just as fiercely. Jamaica and the Bahamas each possess a separate species of these rodents. Jamaica and Hayti are likewise inhabited by the closely related *Plagiodon ædium*, distinguished from the hutias by the zigzag enamel folds of the cheek-teeth.

Todies. The todies are characteristic West

Indian birds, entirely confined to those islands; they are diminutive

in size, with long, narrow and flat beaks, whose edges are finely serrated. Todies feed on small insects, which they capture in much the same way as flycatchers, darting down on them as they pass the bough on which the birds are perching. Todies

nest in tunnels made in the sides of ravines and high banks, and even in deeply cut ditches. The green tody of Jamaica (*Todus viridis*) is perhaps the best known species of the family *Todidae*, which contains only the one genus with five species.

Tree-Frog. In Martinique is found a curious tree-frog (*Hylodes martinicensis*), already referred to in an earlier chapter on account of the circumstance that within ten or twelve days the eggs, which are laid on the leaves of plants near the coast, develop into the adult animal without the intervention of a gill-bearing tadpole stage. The four legs appear simultaneously, and a short tail is retained when the frog leaves the egg, although it soon withers.



GREEN TODY.

THE ANIMAL LIFE OF THE GALAPAGOS ISLANDS

Tortoises.

The Galapagos Archipelago, consisting of fifteen small islands situated on the equator, derives its name from the gigantic land-tortoises by which it is inhabited, the nearest relatives of these reptiles living on the isle of Aldabra near Madagascar. Four islands of the Galapagos group have each a different species of tortoise, while Albemarle Island possesses two. The latter, which is the largest island of the group, is divided by a lava-flow into two districts, each of which has its own species of tortoise. The Galapagos tortoises feed chiefly on a juicy cactus, which serves not only as food, but likewise as drink. Nevertheless these reptiles are fond of water, and in the larger islands traverse long distances to reach the springs. Their journeys occupy two or three days, even when the tortoises travel day and night, and regularly trodden paths lead in all directions from the springs to the coast. In past times these tortoises were probably found in large numbers on all the islands of the group; but as early as 1846 they were extinct on Charles Island and in 1875 only a few were left on some of the others. At the latter date seven men were still occupied in making tortoise-oil on Albemarle Island, of which they obtained 3000 gallons a year. Dogs introduced by settlers were largely instrumental in the destruction of the tortoises, by killing not only some of the full-grown individuals, but numbers of the young. At the present day the tortoises are much smaller than formerly. In 1888 most of them weighed little more than 20 lbs. and only one reached 44 lbs., while in 1835 tortoises of 220 lbs. were not rare, and sometimes it required six or eight men to lift the largest. The diminution in weight is due to their being killed before they are fully grown, for tortoises grow all through life and live to a great age. All the Galapagos species, like those of the Mascarene Islands, belong to the typical genus *Testudo*.

Birds.

The two noteworthy species are the flightless cormorant, *Naunopterum harrisi*, and a penguin, *Spheniscus mendiculus*, the latter, which is by far the most northern member of its kind, being regarded as a relic of a former extension of the southern ice. This tends to confirm the view as to the continental origin of the Galapagos group, and suggests that its union with the mainland lasted until North and South America were themselves connected by land, but at a period when there was a temporary sundering by means of an arm of the sea, thereby permitting the influx into the Galapagos area of forms from the Caribbean coast and the Antilles. Some writers are, however, of opinion that the Galapagos are "oceanic" islands, that is to say, islands which have existed as such from a very remote epoch.

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