



THE
ROYAL
NATURAL
HISTORY

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THE ROYAL NATURAL HISTORY.



BIRDS.

CHAPTER VIII.

THE PICARIAN BIRDS,---*continued*.

THE CUCKOOS.

Family *CUCULIDÆ*.

THE toucans form the last family of the subordinal group, known as climbing picarians, or Scansores. The cuckoos bring us to the first representatives of a second group, termed cuckoo-like picarians, or Coceyges. In this assemblage the palate of the skull is of the bridged, or desmognathous type; while the arrangement of the tendons of the muscles of the foot is different from that in the first group. As a family, the cuckoos are specially distinguished by having a zygodactyle foot, and a naked oil-gland; the after-shafts to the body-feathers are wanting, and the arrangement of the feathers shows the tract on the back forked between the shoulders. They are birds of universal distribution, very

varied in form and habits, some being entirely parasitic, while others build nests. They are divided into six subfamilies; and while the usual number of tail-feathers is ten, in one group (*Crotophaginae*) only eight are present; the other subfamilies being well distinguished.

The first representatives of the typical subfamily *Cuculinae* are the crested cuckoos, which, in common with the other members of the group, have pointed wings, and are strong fliers. The genus is distinguished



GREAT SPOTTED CUCKOO ($\frac{2}{3}$ nat. size).

by the presence of a crest on the head; and of its eight species five are African, while one (*Coccyzus jacobinus*) is common to Africa and India, another (*C. coromandus*) is peculiar to the Indian region, and the last is European. Although the great spotted cuckoo (*C. glandarius*) has twice occurred in England, its home is in South-Western Europe and the Mediterranean countries, extending thence through Syria and Asia Minor to Persia, while in winter the bird ranges into Africa, as far as Cape Colony. It is of an ashy brown colour, white below, with a buff-coloured throat, and is easily distinguished by its crested grey head and long tail, which is broadly tipped with white. The length of the bird is about

16 inches. Its note is described by Canon Tristram as *kee-ow, kee-ou*, and it has an alarm-note resembling the word *cark*, as well as a third note, like *wurree, wurree*. It is parasitic, like the members of the genus *Cuculus*, but does not victimise small birds like the true cuckoos, selecting the nests of crows and magpies, whose eggs bear a considerable resemblance to its own. The great spotted cuckoo often places two, or even four, of its eggs in a nest; where the young cuckoos often live in peace with the offspring of the foster-parents, and, so far as is known, not attempting to eject the rightful owners. The Indian pied crested cuckoo (*C. jacobinus*) lays blue eggs, resembling in colour those of the babbling thrushes (*Crateropus* and *Argya*), in whose nests it places them. Apparently the young cuckoo ejects the rightful owners, when the young are hatched, as the babblers are often seen in attendance on their parasitic dependents without any of their own young being of the party. Sometimes the cuckoo puts two of its eggs into a babbler's nest, and it is said to break some of the foster-parents' eggs to make room for its own. Colonel Butler says that when they discover a nest of a babbler, which does not suit them to lay in, the cuckoos invariably destroy the eggs already there by driving a hole into them with their bills, and sucking the contents.

Hawk-Cuckoos. The six species of hawk-cuckoos are remarkable for their exact resemblance in colour and flight to a sparrow-hawk, being grey birds with a good deal of rufous below, a large yellow eye, and a very broadly banded tail. They lay white or greenish-blue eggs, and one species (*Hierococcyx sparveroides*) is said to build its own nest and sit on the eggs. This fact has been recorded in the Nilgiri Hills of Southern India, but in the Himalaya the bird is stated to be parasitic on the babbling thrushes.

True Cuckoos. While the hawk-cuckoos may be distinguished from the crested cuckoos by the absence of a crest, the true cuckoos differ from them by the shape of the tail, in which the outer feathers are nearly of the same length as the others, instead of decidedly shorter. Moreover, the tail-feathers lack the transverse dark bars of the hawk-cuckoos. The genus is represented by ten species, all very similar to one another, and hawk-like in coloration and appearance, the old birds being grey while the young are more or less rufous, the Oriental Sonnerat's cuckoo (*Cuculus sonnerati*) having, however, the plumage for the most part rufous barred with black. Of the ten species, four are African, one Australian, and the rest Indian. Their notes vary greatly, only one other species besides the European having the "cuckoo" note from which the bird takes its name, this being the South African cuckoo (*C. gularis*), which has a note similar to that of the common species, but more slowly uttered, and the first syllable not in such a high key. The red-chested cuckoo of Africa (*C. solitarius*) has a whistling note, on account of which it is known to the colonists at the Cape by the name of *Piet-mijn-vrouw*, while the black cuckoo (*C. clamosus*) is, as its Latin name implies, a noisy bird, uttering a very loud, harsh note. The Indian cuckoo (*C. micropterus*), has a note, which Mr. Oates renders as *bho-kusha-kho*, while the Asiatic cuckoo (*C. intermedius*), on the other hand, has only a single note, a guttural and hollow-sounding *hoo*, resembling the cry of the hoopoe. One of the most interesting of all birds is the common cuckoo (*C. canorus*), not the least remarkable feature in its conformation being its great similarity to a hawk, as not

only evidenced by its colour and form but by its mode of flight, and which is so marked that the bird is always mobbed by smaller birds, as if it was really a hawk. Its colour is grey above and white below, regularly barred with black like a hawk, while the throat is buff. It has also long thigh feathers, like those of an accipitrine bird, so that with its yellow eye the resemblance is complete, and when flying it is by no means easy to tell at the first glance whether it is a cuckoo or a hawk in the air. An accustomed eye may at last detect the more elongated look of the head, owing to the long bill of the cuckoo, whereas a hawk in flight often looks as if it had no bill at all, so blunt is the aspect of a hawk's head when seen



COMMON CUCKOO ($\frac{1}{2}$ nat. size).

at a little distance. The interest in the history of the cuckoo is, however, concentrated on its nesting-habits, and the success with which it imposes on other birds in getting them to rear its young. There can scarcely be any doubt that the number of males considerably exceeds that of the females, and some naturalists not only speak of the species as polyandrous, but declare that the female bird does all the courting. Certain it is that the presence of a female cuckoo excites the interest of more than one male, as may be seen in spring-time by those who know how to detect what has been well-described as the "water-bubbling" note of the female cuckoo, which Brehm renders as *kwi-k-wik-wik*, and Seeböhm as *kurow-ow-ow*. The female, on giving utterance to this note, is answered at once by every male in the neighbourhood, and they lose no time in flying towards the tree

where she is seated, so that there are often quarrels and fierce fights amongst them. It is during the love season that the double call *cuc-cuc-koo* is heard, as if the male were trembling with passion. Although the general belief is that cuckoos do not lay many eggs, it has been recently concluded that each hen deposits about twenty in the course of the season. The variability in the coloration of the eggs is well known, and it appears that in each individual the coloration of the eggs is hereditary. That is to say, that cuckoos brought up by meadow-pipits always select that species to be the foster-parent of their own young in course of time, the same being the case with regard to hedge-sparrows, wagtails, and other ordinary victims of the cuckoo. The small size of the egg, and the extraordinary similarity which it often shows to the egg of the foster-parent, render it difficult to distinguish the cuckoo's egg from those of the rightful owner of the nest; and sometimes a cuckoo will lay a blue egg exactly like that of the redstart or pied flycatcher, the nest of which it is about to utilise. This is perhaps the most curious instance known of strict similarity in colour, the true cuckoo's egg looking merely like a somewhat larger egg of the redstart. That such eggs are really those of cuckoos was, however, proved by Messrs. Seeböhm and Elwes, who were in Holland together when a redstart's nest was brought to them, the eggs of which were hard set. On blowing them the young birds had to be picked out, and the little cuckoo exhibited the characteristic zygodactyle foot perfectly formed. In the case of eggs laid by the cuckoo in wagtail's nests and those of other birds, the resemblance is exact, and when a cuckoo's egg is found in a nest where the eggs of the foster-parent are different, it is probable that the cuckoo has not been able to find a nest at the moment in which the eggs belonged to its own hereditary type. The nest of a sedge-warbler has indeed been found with a cuckoo's egg in it, which was the exact counterpart of those of the foster-parent; and a few days after, the finder, having noticed the female cuckoo to be hovering about the neighbourhood all the time, found a cuckoo's egg of the same sedge-warbler type in a reed-bunting's nest, where, of course, it looked thoroughly out of place. From these facts it would appear that a cuckoo, laying a "sedge-warbler" egg, had been unable to find a second sedge-warbler, and had been constrained to put it into a reed-bunting's nest. A series of nests of the meadow-pipit, each with a cuckoo's egg, has been recently presented to the British Museum, all of which were taken near Portsmouth in 1893. There would seem to have been three cuckoos who visited these nests, since three of the nests contain a greyish type of egg, three an egg of a lighter character, and three an egg of a purplish grey type. The story of the way in which the young cuckoo ejects the young of its foster-parent from their rightful home is well known. The cuckoo feeds entirely on insects, and it is believed to be the only bird which eats hairy caterpillars. It has also been accused of devouring eggs, and this idea may have arisen from eggs being found in the mouth of a cuckoo. These were no doubt the bird's own eggs, which it was conveying to some nest.

Represented in India and Australia by the nearly allied group of Golden Cuckoos, the bronze-cuckoos (*Chalcococcyx*), the golden cuckoos form a genus confined to Africa, and represented by four species. These birds differ from the true cuckoos by their metallic coloration, of which the latter show no trace.

Among them, the emerald cuckoo (*Chrysococcyx smaragdineus*) is one of the most beautiful of birds, being of a brilliant metallic emerald-green on the upper-parts, and also on the throat and chest; while the breast and under-parts are bright yellow. Found all over tropical Africa, it inhabits the wooded country, and is conspicuous, not only from its brilliant coloration, but also from its habit of sitting on the top of a tree, sometimes for hours together, uttering its loud call of love or defiance. The typical golden cuckoo (*C. cupreus*), illustrated on our first page, is a somewhat smaller species, with the plumage of a metallic golden-green



YELLOW-BILLED CUCKOO ($\frac{1}{2}$ nat. size).

hue, the throat being white. Mr. Layard says that "this beautiful little cuckoo is known by the name of Didrie, from its oft-repeated mournful cry of *di-di-di-didrie*. We have frequently seen a dozen or more in a morning, while their loud notes were incessantly ringing in our ears; they are, however, so shy, that we only procured three specimens in as many months. When calling, they perch on the summit of some dead branch, ready to do battle with any male, or engage in an amorous chase after any female that comes within their ken. They pursue each other with great ardour, turning, twisting, and dashing about with great rapidity. The stomachs of those examined contained nothing but small insects, chiefly swallowed whole." Mr. Ayres has found the remains of an egg of the Cape

sparrow in the stomach, and as the cuckoo is parasitic on this species it looks as though it sometimes devoured the eggs of the foster-parent to make room for its own.

**American
Cuckoos.**

The American cuckoos, although of sober grey and brown shades of colouring, and resembling the true cuckoos in this respect, may always be distinguished by their oval and not rounded nostrils. They are grey or brown in colour, generally with an olive gloss, although two species have rufous backs. Except as regards their nesting-habits they are nearly allied to the cuckoos of the Old World. One of the best known species is the yellow-billed cuckoo (*Coccyzus americanus*), which is olive-brown in colour, with white tips to the tail-feathers; the under-parts being white, and the inner side of the quills rufous. This cuckoo, together with its near ally, the black-billed cuckoo (*C. erythrophthalmus*) is migratory to the United States in summer, the latter extending its breeding-ranges as far to the north as Manitoba and Labrador. Dr. Coues says that the ways of these cuckoos are shy and retiring. They are more often heard than seen, "passing from one tree to another stealthily, with a rapid, gliding, noiseless flight, and they often rest motionless as statues for a long time, especially when crying out, or when they have detected a suspicious object. The peculiar notes of this bird, sounding like the syllables, *koo-koo-koo*, indefinitely repeated, are probably uttered more frequently during the atmospheric changes preceding falling weather, and have given rise to the name Rain-crow, by which both our species of *Coccyzus* are known to the vulgar." He also says that they are great plunderers of the eggs of small birds, and are even said to devour the helpless nestlings. The nest is said to be like that of a crow, but poorly constructed. In connection with the supposition that our English cuckoo lays its eggs at intervals, it is interesting to know that the yellow-billed cuckoo undoubtedly does so, since in its nest there have been found fresh eggs and young in all stages, from the bird just hatched to the one able to fly, showing that there must be a considerable interval between the laying of each egg. Audubon gives an instance in which as many as eleven young birds had been hatched in a season. The eggs are pale greenish in colour.

Koels.

Found only in the Indian and Australian regions, two species being peculiar to the former and four to the latter, the koels show a remarkable sexual difference in colour, the males being black, and the females rufous with black bands. In most birds, when the parents differ in plumage, the young at first resemble the hens, but in the instance of the koels the young of both sexes are black like the cocks. The koels may also be distinguished from the preceding genus by having a much rounder and stouter bill than in the preceding genera. The tail is long and wedge-shaped. Regarding the coloration of the young, Mr. Whitehead, writing of the Philippine koel, or phow (*Eudynamis mindanensis*), asks "why should the young birds not follow the general rule, and take the plumage of the female, or have a plumage distinct from that of both parents? The answer to this riddle appears to be that the phow lays its eggs in the nest of the yellow-wattled myna. The young cuckoo, being black, does not differ from the young myna, and so the deception is carried on until the young bird can take care of itself. If the young followed the general rule, and resembled their mother in being of a brown colour, the mynas might not feed them. The

myna breeds in holes of old rotten trees, sometimes using woodpeckers' holes, making it more difficult to see the intruder in the dark; and no doubt, when the young bird emerges into daylight, it would startle the old birds to see the young cuckoos of any other colour. One of the young cuckoos was shot whilst being fed by the foster-parents, and no doubt the young cuckoo gets rid of the nestling myna at an early period. Of course it might be argued that it would not be



YOUNG MALE OF THE INDIAN KOEL ($\frac{1}{3}$ nat. size).

necessary to deceive the myna, for other birds take care of their parasites; but perhaps the myna has a greater knowledge of the world." The Indian koel (*E. honorata*) is the rain-bird of India. The bird is parasitic on crows, and it would appear from the notes of naturalists in India that the koels must look after their offspring to a certain extent, for they have been seen feeding their own young ones after they have left the nest.

Long-Clawed
Coucals.

Distributed over the great part of Africa, India, China, and southwards through Malaysia to Australia, the coucals form not

only a genus but a separate subfamily. They are ground-birds, of medium or large size, remarkable for the long spur on the first toe, whence their English name is derived. They build nests, and lay several white eggs, the shell of which is chalky, showing an approach to the remarkable eggs of the anis described farther on. The general colour of the coucals is red and black, but some of them are entirely black, while the Australian pheasant-cuckoo (*Centropus phasianellus*) is banded with brown and buff. The young birds of all the other species have a similar kind of plumage, and it is said that some species also possess a winter garb or "seasonal plumage." If this is the case, it lasts for a very short period.



EGYPTIAN COUCAL ($\frac{1}{2}$ nat. size).

The Indian coucal (*C. sinensis*) is a species of large size, measuring nearly two feet in length, and black in colour, with the mantle and wings chestnut, and having a blue gloss on the head and a green gloss on the under-parts. It is found all over India and Ceylon, and, like the rest of the genus, has a curious howling note, *whoot, whoot, whoot, whoot*, followed after a pause of four or five seconds by *kurook, kurook, kurook, kurook*. The nest is generally domed, and is a rough structure, described by Mr. Hume as a "hollow, oblate spheroid, some eighteen inches in external diameter, and from six to eight inches in height, with a large hole on one side, from the entrance of which to the back of the nest inside may be twelve inches. This, of course, is not large enough to admit the whole bird, so that, when sitting, its tail is commonly seen projecting outside the nest. The latter

is placed at varying heights above the ground, in the centre of thick, thorny bushes or trees. It is usually made of dry twigs, lined with a few green leaves, but all kinds of odds and ends are at times incorporated into the fabric. Occasionally quite different materials are made use of, the nest consisting almost wholly of leaves, rushes, or coarse grass."

With these birds we come to another subfamily, known as the Rain-Cuckoos. bush-cuckoos (*Phaenicophaeinae*), and including upwards of sixteen genera. Their bright metallic plumage, and short, rounded wings, show that they are resident in the countries where they live, and are not migratory



THE ROAD-RUNNER ($\frac{1}{2}$ nat. size).

like the long-winged cuckoos. They are mostly Indian and Malayan, but one genus (*Ceuthmochares*) is African; while two genera (*Saurothera* and *Hyetornis*) belong to the New World. With the exception of *Cooua*, which is a Madagascar form, they have all some bright colours on the face or bill, the latter being in many of the genera parti-coloured and brilliant. The rain-cuckoos in the West Indies, are only found inhabiting the Greater Antilles and the Bahamas. They attain to a size of 18 or 20 inches, are mostly of an ashy-brown colour with rufous wings, with white-tipped tail-feathers, these having a black bar before the tip. The Jamaican species is a bird of retiring habits, generally sitting immovable in a dull and sluggish manner, but on alighting in a tree it "traverses the branches with facility by a succession of vigorous jumps, when it appears active enough." The

nest is placed high on a tree, and is a loose, flat structure of twigs, the egg being chalky white. In India and the Malayan countries there occurs an assemblage of genera of bush-cuckoos, of which the best known are the malkohas (*Rhopodytes*). These birds are met with in gardens, thin tree-jungles, and secondary scrub, being and having a marvellous capacity for making their way through dense cover. The notes of the malkohas seem to vary considerably, being described as a "cat-like chuckle" in one species, in another as a "hoarse chatter, much like that of a magpie," while another of the malkohas has a "cat-like mew." These cuckoos build their own nests, and lay white eggs.

Another subfamily

(*Neomorphina*) is represented by the four genera of ground-cuckoos, all of which are terrestrial birds with powerful feet for run-

ning, and weak wings in which the secondary quills are as long as the primaries. In Borneo and Sumatra the pheasant-cuckoos (*Carpococcyx*) represent the group; the species from the former island being two feet in length, with the aspect and ways of a game-bird. In South America the subfamily is represented by the genus *Neomorphus*, which extends from Northern Brazil to Guiana, Amazonia, and Ecuador, thence to Colombia and to Nicaragua. All the five species of this genus are extremely rare, and nothing is known of their habits. In all the genera above mentioned the bill is very stout, but there remain the two American genera *Geococcyx* and *Morococcyx*, in which it is longer; a familiar example of the former of these being the so-called road-runner (*Geococcyx mexicanus*). In

plumage this curious cuckoo has nothing striking to recommend it, being brown with rufous or white streaks; the under surface whitish; and a buff-coloured throat, which is also streaked with black. But if its coloration is somewhat sombre, it has some bright colour on the face, similar to that of the preceding



GREEN-BILLED MALKOHA
($\frac{1}{2}$ nat. size).

genera, for the iris is red, and it has a bare space round the eye of a blue colour, fading off into white behind, and then followed by a patch of orange-red. The length of the bird is about two feet. The road-runner is an inhabitant of the Southern United States, from Texas to New Mexico, Southern Colorado, and California. It has obtained its name of the "road-runner" from the speed with which it flies over the ground, some idea of which may be gained from a statement of Colonel Stevenson, that when in Southern California he saw on two occasions the ranchmen of that part of the country chase one of these birds on horseback for a distance of a mile or more at full speed, when the cuckoo, though still in advance, would suddenly stop and fly up among the upper-limbs of some stunted tree or bush near the roadside, and the rider having kept the bird in view all the way would dismount and easily take the exhausted bird from its perch alive.

**Savana and
Guira Cuckoos.**

The last subfamily of the cuckoos is represented by the so-called savana and guira cuckoos, three of which belong to one genus, while the fourth constitutes a genus apart. Distinguished from all other cuckoos by having only eight tail-feathers, these birds are further remarkable for their eggs. Externally these eggs are blue, covered with chalky white scratches, produced by contact with the lining of the nest; and it appears that this blue colour belongs only to the outer covering, so that when this is removed the true egg-shell, which is white, is revealed. The guira cuckoo (*Guira*) has a very slender beak, and a crest; the plumage being brown streaked with black, the under surface buff, and the back white; while the length of the bird is about 18 inches. It inhabits Brazil and Paraguay. The members of the other genus are black, and have an extraordinary bill with a kind of high and narrow keel on the upper mandible, looking as if it had a ridge along it. Of the three species, the largest is *Crotophaga major*, which is 18 inches in length, and is found from Brazil and Amazonia to Guiana, and also extends to Colombia. The other species, *C. anis* and *C. sulcirostris*, are smaller, not exceeding 13 inches in length; the *anis* inhabiting much the same areas as its larger relative, but being found also in the West Indian islands, while it has occurred in the Southern United States. It has a smooth bill, while the latter has several grooves on the side of the bill. It likewise occurs in the Southern United States, and extends throughout Central America to Colombia and Peru, but does not seem to reach Brazil and the other countries of South America.

The savana cuckoos are gregarious birds, and it will be seen from the notes given below that they also nest in company. Señor Alfaro says that in Costa Rica he found the zopilotillo, as it is called, very abundant in the fields near Tambor, a little town about twenty miles north-west of San José, where along the hedgerows and in the scrubby timber they find their insect food, as well as on the hides of the cattle. The wood-ticks or 'garrapatos,' which are found on the legs and about the head and neck of the cattle, are esteemed above all else a favourite morsel. The bird is also called the tijo-tijo in imitation of its peculiar notes, which seem to repeat the word *tee-ho* over and over again. He likewise tells of the finding of three nests, one of which was situated in the branches of a mango-tree, and contained fourteen eggs. Noticing on one occasion one of these birds building its nest, he returned in a week's time, and found, to his surprise, not only the nest completed but containing six eggs, while in the thorns and leaves

about it were scattered seven more. He writes that "in the finding of some of the eggs scattered in the leaves was revealed one of the architect's peculiarities. A hole had been left in the centre of the nest, and only recently filled with leaves, whose fresh green colour testified that they had been cut and placed there later than the others, forming the carpeting to the bottom of this common incubator. The eggs were all fresh, the six occupying the nest having the characteristic white calcareous surface perfectly clean, and without the slightest variation in colour. Not so with the eggs found about the outside of the nest: those found in contact with the leaves had taken on a dirty yellowish tinge, while those suspended among the leaves and thorns showed various spots and lines of the lustrous blue colour forming the base for the chalky external coat."

THE PLANTAIN-EATERS.

Family MUSOPHAGIDÆ

Having many characters in common with the cuckoos, the plantain-eaters, or touracos, of Africa, are regarded as indicating a separate suborder, distinguished by having the oil-gland tufted and after-shafts to the body-feathers, while the feet are not wholly zygodactyle, the fourth toe being capable of being turned either backwards or forwards. The tail-feathers are ten in number. Twenty-five species are known, which may be divided into two sections, one including those which have crimson quills, and the other those in which there is no red in the wings.

Crimson-Winged Plantain-Eaters. These birds are often called louris in South Africa, where they frequent the forest districts, building an open nest of sticks in a bush, and resembling that of a pigeon, the egg being also white like that of the last-named birds. Of Fraser's plantain-eater (*Turacus macrorhynchus*) Mr. Büttikofer gives some notes in his account of the birds collected by himself in Liberia, stating that it is a splendid and very lively bird in a wild state, always keeping to the densest crowns of the trees in the virgin forest, where it lives in pairs or in families after the breeding-season. It is so shy that it would not be easily found by the hunter if it was not for its crow-like voice, interrupted now and then by a mewling, exactly like that of a cat. When not disturbed these birds can be very noisy, flapping their beautiful red wings, and running after each other like squirrels among the branches. As their bright wings would render them too obvious to their enemies, they seldom fly very far at once, but advance by running through the foliage of the trees, hidden by the resemblance of their colour to that of the surrounding foliage. Their food consists of different kinds of wild fruits, and insects were never found in dissected specimens. A very interesting fact has been discovered with respect to the colouring matter in the wing of the touraceous, which consists of a kind of copper, called turacine. It was at one time supposed that this coppery impregnation of the colouring matter of the bird's wing could be accounted for by its picking up grains of malachite, but the touraceous are birds which live in trees, and do not apparently descend to the ground, while the red feathers have been assumed by specimens in captivity, some of which moulted more than once.

Giant Plantain-Eater. The sole representative of this genus (*Corythæola cristata*) is the largest of all the family, measuring nearly 3 feet in length, and is remarkable for its fine crest and varied colouring. The upper surface is blue, the head and crest bluer, the tail-feathers yellow with blue bases and a broad bar of black near the end; neck blue with the chin and cheeks white; rest of under surface of body rufous brown; bill yellow with the tip scarlet; eye red. This handsome bird is found all over the forest district of West Africa from Sene-



GIANT PLANTAIN-EATER ($\frac{1}{3}$ nat. size).

gambia to Angola, and extends throughout the Congo region to Equatorial Africa. Mr. Büttikofer says this plantain-eater is confined exclusively to the virgin forest, where it lives in companies of five or six together in the crowns of the tallest trees, generally out of reach of gunshot. It feeds upon a kind of bush-plum and other wild fruits, of which an enormous quantity are sometimes found in its crop.

R. BOWDLER SHARPE.

CHAPTER IX.

THE PICARIAN BIRDS,—concluded.

TROGONS TO OIL-BIRDS.

Families *TROGONIDÆ* to *STEATORNITHIDÆ*.

THE trogons, remarkable for their brilliant coloration and soft plumage, constitute not only a distinct family (*Trogonidæ*) but are likewise regarded as representing a special suborder (*Heterodactyli*), mainly distinguished from the Picarian families described in the preceding chapters by the structure of the tendons of the foot. In these birds the second toe is turned backwards, and the third and fourth toes are moved by the splitting of one tendon, while a second tendon is likewise divided into two branches to supply the first and second toes. They are further characterised by having the palate of the slit (schizognathous) type; and the feather-tract on the back is continuous in place of being forked. Then, again, we may notice that the hinder border of the breast-bone has four notches; the intestine is provided with a pair of blind appendages (cæca); the oil-gland is naked, and the after-shafts of the feathers of the body are remarkable for their length. Behind the head is a patch of loose skin, and the whole skin is of such a fragile and delicate nature, while the feathers are so loosely attached, that the preservation of these birds tries to the utmost the skill of the taxidermist. As regards their geographical distribution, trogons are found in the Oriental region, Africa south of the Sahara, and Central and South America; one species alone (*Trogon ambiguus*) being stated to range as far north as Texas and Arizona. Very numerous in Central and South America, in Africa, though widely distributed, they are but poorly represented in species; but they again become more abundant in the Oriental region, although not ranging eastwards of the islands of Java and Borneo. Fossil trogons have been discovered in Tertiary deposits in Southern France, belonging to the upper part of the Oligocene period. Of the eight genera into which the family is divided, five occur in Central and South America (among these being the typical *Trogon*); and it is noteworthy that the latter and one other genus are exclusively island forms, the one being confined to San Domingo and the other to Cuba. The three African trogons are comprised in a single genus (*Hapaloderma*); but there are two Oriental genera, one of which (*Hapalarpactes*) is peculiar to Java and Sumatra.

Long-Tailed
Trogons.

Of these magnificently-plumaged American representatives of the family there are four species, among which we may specially notice

Giant Plantain-Eater. The sole representative of this genus (*Corythæola cristata*) is the largest of all the family, measuring nearly 3 feet in length, and is remarkable for its fine crest and varied colouring. The upper surface is blue, the head and crest bluer, the tail-feathers yellow with blue bases and a broad bar of black near the end; neck blue with the chin and cheeks white; rest of under surface of body rufous brown; bill yellow with the tip scarlet; eye red. This handsome bird is found all over the forest district of West Africa from Sen-



GIANT PLANTAIN-EATER ($\frac{1}{2}$ nat. size).

gambia to Angola, and extends throughout the Congo region to Equatorial Africa. Mr. Büttikofer says this plantain-eater is confined exclusively to the virgin forest, where it lives in companies of five or six together in the crowns of the tallest trees, generally out of reach of gunshot. It feeds upon a kind of bush-plum and other wild fruits, of which an enormous quantity are sometimes found in its crop.

R. BOWDLER SHARPE.

CHAPTER IX.

THE PICARIAN BIRDS,—concluded.

TROGONS TO OIL-BIRDS.

Families *TROGONIDÆ* to *STEATORNITHIDÆ*.

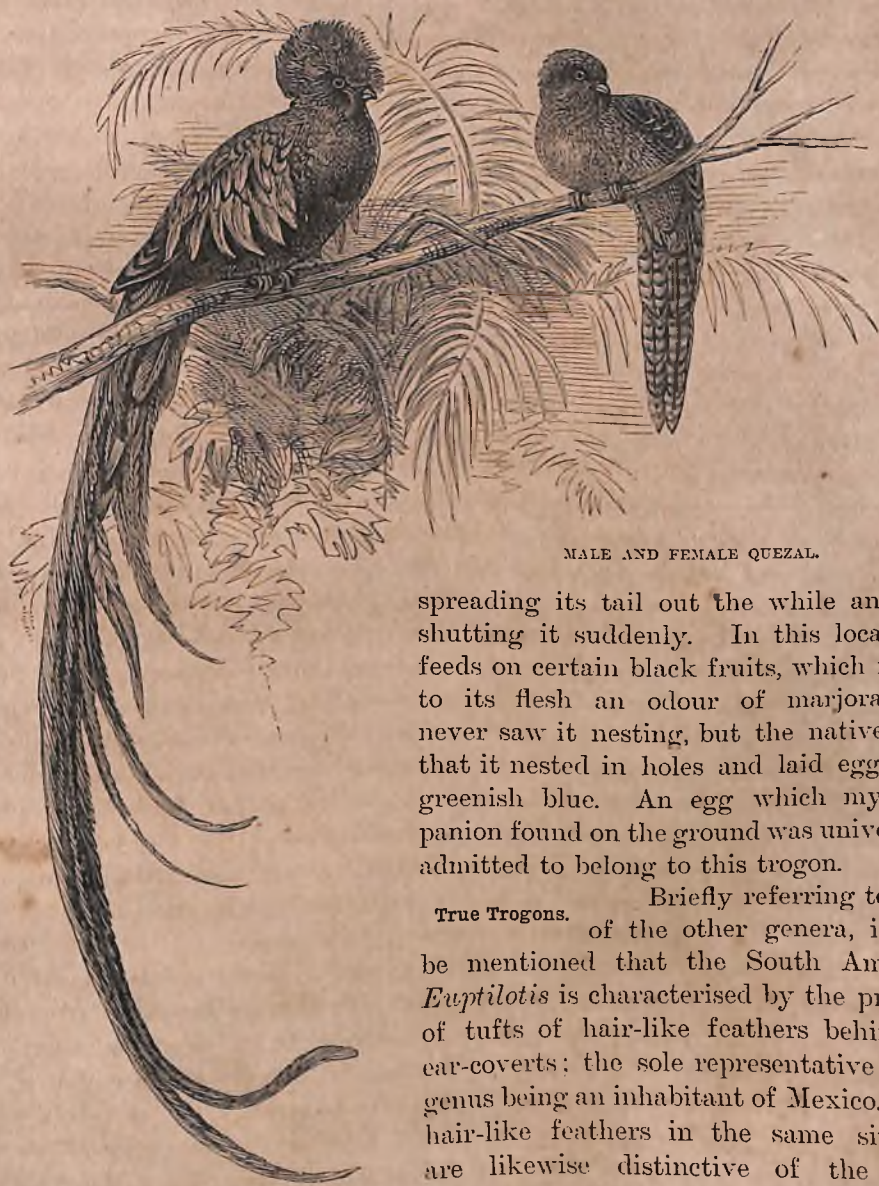
THE trogons, remarkable for their brilliant coloration and soft plumage, constitute not only a distinct family (*Trogonidæ*) but are likewise regarded as representing a special suborder (*Heterodactyli*), mainly distinguished from the Picarian families described in the preceding chapters by the structure of the tendons of the foot. In these birds the second toe is turned backwards, and the third and fourth toes are moved by the splitting of one tendon, while a second tendon is likewise divided into two branches to supply the first and second toes. They are further characterised by having the palate of the slit (schizognathous) type; and the feather-tract on the back is continuous in place of being forked. Then, again, we may notice that the hinder border of the breast-bone has four notches; the intestine is provided with a pair of blind appendages (cæca); the oil-gland is naked, and the after-shafts of the feathers of the body are remarkable for their length. Behind the head is a patch of loose skin, and the whole skin is of such a fragile and delicate nature, while the feathers are so loosely attached, that the preservation of these birds tries to the utmost the skill of the taxidermist. As regards their geographical distribution, trogons are found in the Oriental region, Africa south of the Sahara, and Central and South America; one species alone (*Trogon ambiguus*) being stated to range as far north as Texas and Arizona. Very numerous in Central and South America, in Africa, though widely distributed, they are but poorly represented in species; but they again become more abundant in the Oriental region, although not ranging eastwards of the islands of Java and Borneo. Fossil trogons have been discovered in Tertiary deposits in Southern France, belonging to the upper part of the Oligocene period. Of the eight genera into which the family is divided, five occur in Central and South America (among these being the typical *Trogon*); and it is noteworthy that the latter and one other genus are exclusively island forms, the one being confined to San Domingo and the other to Cuba. The three African trogons are comprised in a single genus (*Hapaloderma*); but there are two Oriental genera, one of which (*Hapalarpactes*) is peculiar to Java and Sumatra.

Long-Tailed
Trogons.

Of these magnificently-plumaged American representatives of the family there are four species, among which we may specially notice

the quezal (*Pharomacrus mocinno*) of Guatemala. Every naturalist who has had the good fortune to see this bird in its wild state describes it as extremely beautiful, and even when preserved, its plumage differs from that of its congeners in its retention of the original coloration; a skin which has been exposed to the light in the British Museum for some half a century still being almost as brilliant as when first mounted. In the other species, on the contrary, the bright yellow or crimson of the breast fades with sad rapidity. The range of the quezal extends from Guatemala to Panama, but as considerable numbers of the skins of these birds are sent yearly to Europe as plumes for bonnets, the species has become very scarce. Ornamented with a large rounded crest on the head, the male bird has the ground-colour of the plumage a brilliant metallic green, while the throat and chest are likewise metallic green, as are also the wings and upper tail-coverts; the two central plumes of the latter being enormously developed, and fully four times as long as the tail; while the rest of the underparts, from the chest downwards, are deep blood-red. The median wing-coverts are metallic green, and so produced as to form elegant drooping plumes; while the outer tail-feathers are white with black bases. The female is much less brightly coloured than her mate, having a brownish breast and the bill black instead of yellow. The head is golden-green, and the outer tail-feathers are white barred with black. Mr. Salvin gives an interesting account of his hunting the quezal in Guatemala. After a difficult march through the forest, the way barred by swollen torrents and fallen trees, he at last managed to get within sight of one of the birds, which had been attracted by his guide imitating its notes. This imitation is not difficult, since the whistle is described as "a low double note, *whe-oo, whe-oo*, uttered softly at first, and then gradually swelling into a loud but not unmelodious cry; this is succeeded by a long note which begins low, and, after swelling, dies away as it began." The other cries of the bird are harsh, discordant, and not so easily imitated. When detected, the bird was observed sitting almost motionless on its perch, merely moving its head slowly from side to side, with the tail somewhat raised and occasionally jerked open, and again as rapidly closed, thus causing a vibration of its long upper-coverts. In spite of the length of the streaming tail-feathers, which appear to form no bar to its progress, the flight of this trogon is straight and rapid. Of the golden-headed trogon (*P. auriceps*), of Peru, Mr. Stolzmann writes that it is exclusively a bird of the forests, frequenting the lower branches of the highest trees at a considerable distance from the ground. It is generally seen in pairs, but sometimes two or three pairs may be met with together. "I was struck," he writes, "with the vertical position which it assumes on the large horizontal boughs, and I observed by the aid of my field-glasses that, instead of perching on the upper surface of the branch, it remains attached to the side of the latter, just as woodpeckers glue themselves to the trunks and vertical branches of trees. Its flight is rapid but weak. It feeds on fruits, especially on nectandras; and in the stomach of one I found a nectandra-fruit so large as to fill the whole stomach. I suppose, therefore, that the trogon, like the guacharo, rejects the nut after having digested the flesh, because otherwise some time must elapse before it could swallow another fruit. The species has two cries, both well

known to me; one like a mocking laugh is seldom heard: the other is a plaintive *ha-hau*, with the second syllable much prolonged. It has a ventriloquial quality and often deceives the hearer, who fancies that the bird is ever so far off, whereas it is close at hand all the while. At Cuterro I had a good opportunity of observing its singular way of clinging in a vertical position to the trees.



MALE AND FEMALE QUEZAL.

spreading its tail out the while and then shutting it suddenly. In this locality it feeds on certain black fruits, which impart to its flesh an odour of marjoram. I never saw it nesting, but the natives said that it nested in holes and laid eggs of a greenish blue. An egg which my companion found on the ground was universally admitted to belong to this trogon.

Briefly referring to some True Trogons. of the other genera, it may be mentioned that the South American *Euptilotis* is characterised by the presence of tufts of hair-like feathers behind the ear-coverts; the sole representative of the genus being an inhabitant of Mexico. Long hair-like feathers in the same situation are likewise distinctive of the single species of *Tmetotrogon*, which is confined

to the island of San Domingo; while in the Cuban *Prionotelus*, of which there is also but one species, the tail-feathers are deeply notched. With the single exception of a species (*T. ambiguus*) occurring just within the southern limits of the United States, the members of the typical genus *Trogon* are restricted to

Central and South America, where they are represented by some twenty-four species, ranging as far south as Southern Brazil and Paraguay. They are all birds of moderate size, with metallic blue or green colours above, and the breast and abdomen either bright yellow, scarlet, or blood-red. The females differ from the males in their duller plumage and the colour of the tail; the latter being either chestnut, grey, or blackish, whereas in the males it is as brilliant as the rest of the upper-parts, being either green, blue, or purple. The habits of these trogons seem everywhere to be the same; the birds affecting forest-districts, and feeding almost entirely on fruit and berries. They are described as rather stupid, and not even startled by the report of a gun, so that a whole flock may be shot out of the same tree. Most of the species go about in pairs, but are occasionally seen in small flocks, sometimes frequenting the lower branches of trees, but more often the middle and higher levels, where they sit motionless, or utter their curious notes at intervals. Mr. Richmond mentions that when in Nicaragua, a trogon flew into his house; but in most parts of South America these birds are inhabitants only of the virgin forests, extending their range to a considerable altitude on some of the mountains. In Peru, Mr. Stolzmann met with several species, on some of which he has given short notes. The only example of *T. caligatus* obtained during his travels was shot from a considerable height on a tree, when he had heard its cry repeated at intervals for the space of a couple of hours; it resembled the words *cou-cou-cou-cou-co-co-co-co*, the second half being uttered in a lower tone than the first. Of another kind (*T. melanurus*), his companion, Mr. Jelski, writes that it was not rare, and allowed of an easy approach, flying off to take up another perch in the neighbourhood of its previous one, always uttering its note *cou-cou-cou-cou-cou*. Its flight resembles that of a magpie, and the beating of the wings is distinctly heard; from time to time it called *ke-ke-ke*, lowering the tail at the same time, seldom flying more than a distance of fifty paces at a time, and preferring the lower branches of the trees. In Costa Rica, Mr. Nutting met with three species of trogons, which seem to differ somewhat in habits. Of the Massena trogon (*T. massena*) he writes: "I have never seen the species associating in flocks as the others do. On the contrary, it seems to be rather a silent bird, preferring the deep recesses of the tropical forests. Its note is a kind of clucking noise, hard to describe; and its native name is *Aula*. In common with all the species of the genus, it seems to be rather a stupid bird, hardly ever taking alarm at the approach of man"; the black-headed trogon (*T. melanocephalus*), very abundant in Costa Rica, being often seen in flocks of a dozen or more, and commonly found in the dry open woods away from water. It has a sort of chattering note, low and soft. In the same situations is also found *T. caligatus*, which is the only species giving utterance to a clear, distinct whistle.

In Africa the trogons are represented by three species belonging to the genus *Hapaloderma*, and characterised by the naked space behind the eye, as also by the colour of the tail, which is the same in both sexes, the three central pairs of tail-feathers being purplish or greenish, without any black bands at the end of the central ones. The Narina trogon (*H. narina*) ranges from Bogosland in North-Eastern Africa throughout East Africa to Natal, extend-

ing as far west as the forests of the Knysna district. On the west coast, from Fanti to the Gabun, we meet with Ussher's trogon (*H. constantia*); while in East Africa, from the Zanzibar forest region into Kikuyu, is found the banded trogon

(*H. vittatum*). Very little has been noted about the habits of these birds, but Mr. Layard states that the Narina trogon is a very shy species, only found in the forest districts; its food consisting of fruit and insects; while its cry is a loud moaning note, *heot*, which has been compared to the bark of a poodle with a cold. This trogon is reported to nest in hollow trees, where it lays four white eggs.



NARINA TROGON.

The Indian Trogons. The Indian trogons, constituting the genus *Harpactes*, are beautifully plumaged birds, distinguished by the bare sides of the face, and the chest-

nut tail, barred with black at the tip, of both sexes. The genus is represented by eleven species, some of which measure as much as a foot in length; while all are characterised by their brilliant coloration. One of the best known is the red-headed trogon (*H. erythrocephalus*), characterised by the chestnut breast, the deep crimson head, neck, and under-parts, and the black wings, in which the primaries are edged with white, while the wing-coverts and inner secondaries are finely vermiculated with white; the gape and region of the eye being bare and of a purplish blue colour, while the bill is bluish with a black tip, the feet pinkish, and the eye dull red. The female is not quite so bright in colour as the male, the lower-parts being duller; the back as well as the neck and breast reddish brown, and the vermiculations on the

wing-coverts buff instead of white. The habits of this trogon differ from those of its American allies, for Mr. Oates says that its food consists entirely of insects, on which it swoops after the manner of a flycatcher. It affects thick forests, and, although solitary in its habits, is so common in some of the hill forests that a dozen or more

may frequently be seen together. The eggs are three or four in number, of a very pale buff colour, and laid on the bare wood in some hollow of a decayed tree.

THE COLIES.

Family *COLIIDÆ*.

The colies bring us to another group of the Picarian order, technically known as the Coraciiformes, often conveniently spoken of (for want of a better name) as the fissirostral group. With the single exception of the humming-birds, all the members of the group have a similar arrangement of the tendons on the lower



LONG-TAILED COLY OR MOUSE-BIRD.

surface of the foot; the first toe being supplied by a branch of one tendon, while the fourth is served by a different one. As a rule, the palate is of the desmognathous type; although in some cases it is of the modification characterising the perching birds. The colies themselves are exclusively African, and are remarkable for the structure of their feet, in which all four toes are directed forwards, although it is probable that the first can be turned backwards at will. The breast-bone is characterised by the presence of four notches; the oil-gland is naked; the intestine is devoid of blind appendages; and there are ten tail-feathers. The whole of the colies are included in the single genus *Colius*, which is represented by half a score of species. To the colonist of South Africa, colies are commonly known by the name of mouse-birds, and they are reported to be good eating. They have a rapid flight, like that of a parrot, with very quick beats of the wings; and are generally found in flocks of six or eight individuals, which when disturbed

fly off together. Their food generally consists of fruit and berries, occasionally insects being taken, when their other sustenance is scanty.

At the Cape the white-backed coly (*C. capensis*) is not uncommon in gardens during the fruit-season, ranging about in small families of from six to eight individuals. They fly with a rapid, though laboured flight, generally at a lower level than the object at which they aim, and on nearing it they rise upward with a sudden abrupt curve. They creep about the branches like parrots, and hang, head downwards, without inconvenience; indeed, it is said that they invariably sleep in this position, many of them congregated together in a ball. In Natal Mr. Ayres states that the white-backed coly lives entirely on fruits, as does Mr. Andersson, who gives some information as to the flight and nesting-habits of the species. The flight, he says, is short and feeble, seldom extending beyond the nearest bush or tree, on reaching which the bird perches on one of the lower branches, and then gradually glides and creeps upwards through the foliage, using both bill and feet for that purpose. The nest he found in a small bush; it was composed externally of grass and twigs, lined internally with soft grass; the eggs were white, and three in number. Another well-known representative of the genus is the South African coly (*C. striatus*), which is brown above with numerous dusky cross-lines on the plumage, the head being crested and a little more ashy, while the forehead and lores are reddish, the sides of the face, throat, and breast ashy brown, the latter with blackish cross-lines; the rest of the under surface being ochrey buff. The total length of the typical form is about 14 inches; but there is considerable local variation in this respect. Large at the Cape, the bird becomes smaller as it approaches Abyssinia, but is of about the same size in Senegambia, and then gradually decreases in size in its west coast habitats: this variation in size being an invariable rule with African birds. The South African coly breeds in Natal, building its nest in the thick fork of a mimosa or other low tree, well sheltered by creepers and foliage above.

THE HUMMING-BIRDS.

Family *TROCHILIDÆ*.

Mainly confined to Central and South America, where they range from the steaming tropical forests of Brazil to the cold and barren rocks of Tierra del Fuego, but also extending into Mexico, humming-birds are now regarded, in spite of their difference in form and habits, as near allies of the swifts. To a certain extent, indeed, the difference in the two groups is not so strongly marked in the young as in the adult condition, seeing that, while in the full-grown humming-bird the beak is always long and slender, in the nestling it is short and wide like that of a swift. In the structure of their palate, according to recent researches, both groups conform to the Passerine type. Having the keel of the breast-bone well developed, in accordance with their marvellous power of sustained flight, the humming-birds are characterised by the presence of ten feathers in the tail, and the same number of primary quills in the wing; while the secondaries are reduced to six, and are thus very different to those of the perching birds. The three forwardly-directed toes are

supplied by as many branches of one tendon, while another serves the backwardly-directed first toe. The most remarkable peculiarity of the humming-birds is in the structure of the tongue, this organ being extensile, with its supporting bones carried backwards over the hinder part of the skull.

Habits. Although adorned with such brilliant metallic colours, the members of this family do not display their tinselled plumage to any great advantage during flight; many observers having remarked how little of the brilliancy of the bird's body is apparent when it is darting through the trees or hovering in front of a flower. This is due to the extremely rapid motions of a humming-bird's wing, the beats of which are almost invisible from their



CHIMBORAZAN HILL-STAR ($\frac{1}{3}$ nat. size).

rapidity. Professor Newton has well described the impression conveyed by the bird's flight when he writes that, "one is admiring the clustering stars of a scarlet *Cordia*, the snowy cornucopias of a *Portlandia*, or some other brilliant and beautiful flower, when between one's eye and the blossoms suddenly appears a small, dark object, suspended, as it were, between four short black threads, meeting each other in a cross. For an instant it shows in front of the flower; an instant more it steadies itself, and one fancies the space between each pair of threads occupied by a grey film; again another instant, and, emitting a momentary flash of emerald and sapphire light, it is vanishing, lessening in the distance as it shoots away, to a speck that the eye cannot take note of—and all this so rapidly that the word on one's lips is still unspoken, scarcely the thought in one's mind changed." Mr. Gould, who specially studied the ways of humming-birds during his visit to

America, says that their flight is unlike that of any bird he had ever seen, and quite different from what he had expected—in fact, exactly the opposite. When poised before any object, the tremulous motion of the wings is so rapid that the eye cannot follow it, and a hazy semicircle of indistinctness on each side of the bird is all that is perceptible. Their actions strongly reminded him of a piece of machinery acted upon by a powerful spring, and although frequent intermissions of rest are taken during the day, the bird may be said to live in the air—an element in which it performs every kind of evolution with the utmost ease, frequently rising perpendicularly, flying backward, pirouetting or dancing off, as it were. Mr. Gosse observes that humming-birds have more or less the habit of pausing in the air and throwing the body into rapid and odd contortions, and he noticed this especially with the long-tailed humming-bird, on account of the effect which such motions have on the beautiful long feathers of the tail. He affirms that in these evolutions the birds are engaged in catching insects in the air, and he was close enough to them to see the tiny flies, and to hear the snapping of the bird's bill as it captured them. It will be noticed above that Gould speaks of the capacity of humming-birds for flying backwards. This power has frequently been doubted, and Mr. Terry observes that "the Duke of Argyll lays it down that no bird can ever fly backwards. He mentions the humming-bird as appearing to do so, but maintains that in reality it falls rather than flies, when, for instance, it comes out of a tubular flower. But, while watching the motions of a humming-bird, it occurred to me to test the dictum of the Duke; and, unless my eyes were altogether at fault, the bird did actually fly backwards. It was probing, one after another, the blossoms of a petunia-bed, and more than once, when the flower happened to be low down, it plainly rose rather than fell as it backed away from it." Mr. Ridgway likewise says that he has observed the same thing, but he has noticed that the backward motion is greatly assisted by a forward flirt of the expanded tail, as the bird shifts from place to place or from one part of a tree to another, sometimes descending, at others ascending. "It often towers up above the trees," writes the last-named author, "and then shoots off, like a little meteor, at a right angle; at other times it quietly buzzes away among the flowers near the ground; at one moment it is poised over a diminutive weed, at the next it is seen at a distance of forty yards, whither it has vanished with the quickness of thought. During the heat of the day the shady retreats beneath the trees are very frequently visited; in the morning and evening the sunny banks, the verandas, and other exposed situations are more frequently resorted to."

Humming-birds, as a rule, do not possess any kind of song, and their few notes are of a twittering character. Mr. F. Stephens, describing the "feeding"-note of Costa's humming-bird, says that the female, when feeding, keeps up a pretty constant vocal noise, which somewhat resembles the buzz of the wings, and that the feeding-note of the male is finer and not so frequent. "I think," he adds, "that the males are the only ones who sing. The song is sweet and very low, but if it is perfectly quiet around it can be distinctly heard for a distance of ten yards. As might be expected from the size of the bird, it is in a very high key, something like the sound produced by whistling between the teeth, very low, yet at a high pitch. It might be called a warble, and I have heard it kept up for

several minutes at a time. On such occasions I have never been able to find a female in the vicinity, and have come to the conclusion that it was sung for the individual's own amusement. There is still another hummer-note—that of the chase. They are very fond of chasing one another, sometimes for sport, often for spite. This note also resembles the feeding-note, but is louder and possesses a



HUMMING-BIRD AND NEST.

chippering character, sometimes almost like the sound produced by lightly and rapidly smacking the lips together. I can detect but little difference between the sexes, and it appears much the same whether the chase is in sport or anger. Furthermore, it is often made by the pursued as well as by the pursuer. At such times I am always reminded of a lot of schoolboys playing 'tag.' If a hummer is perched and a person passes near, it starts off, uttering a note similar to that made while feeding; but, should it be a female which you have frightened from her nest, she will go off silently." Mr. Ridgway mentions only two other records of the song of the humming-birds, quoting Gosse, to the effect that the tiny *mellisuga* of Jamaica sings, for ten minutes at a time, a sweet but monotonous little song; while De Oca has observed a similar fact with regard to the wedge-tailed sabre-wing. Mr. Ridgway adds that "although the muffled buzzing or

humming noise, which has given this family of birds its distinctive name, is the sound usually accompanying the flight of humming-birds, the males of some species accompany their flight by a most remarkable noise, of an entirely different character. While among the mountains of Utah, in 1869, the writer was for a long time mystified by a shrill screeching noise, something like that produced by a rapidly revolving circular saw when rubbed by a splinter. This noise was evidently in the air, but I could not trace its origin, until I discovered a humming-bird passing

through the air overhead in a curious undulating kind of flight. I afterwards heard the same sound produced by males of the same species (the broad-tailed humming-bird) when they were driving other birds away from the vicinity of their nests. At such times they would ascend almost perpendicularly to a considerable height, and then descend with the quickness of a flash at the object of their animosity, which was, perhaps, more frightened or annoyed at the accompanying noise than by the attack itself. Mr. F. Stephens calls this the "courtship-song," but from the circumstance that, in the broad-tailed humming-bird at least, it is often produced by solitary individuals while wending their way between distant points, I hardly think that it can be so considered. Mr. Stephens writes of Costa's humming-bird that "the female is sitting on a twig in a low bush, not on an exposed twig, as is often the case when she is merely resting; but when the male begins she goes farther in, as if she feared that he really intended mischief, while he rises high in the air, and with a headlong swoop comes down, passing her, and, turning with a sharp curve as near her as possible, mounts on high, to repeat the manœuvre again and again. A shrill whistle is heard as he begins to descend starting low and becoming louder and louder, until, as he passes her, it becomes a shriek, which is plainly audible for a distance of a hundred yards or more. As he mounts again it dies away, only to be repeated at the next descent. This is a common manœuvre with the species, the whistle made during the descent being quite low." The nests are tiny little structures, generally made of moss, and covered externally with lichens, which cause them to resemble the surroundings in which they are placed. The eggs are two in number, white, and oval at both ends.

Humming-birds are divided into three sections, the characters for which are not very trenchantly marked, the fact being that these birds form a very homogeneous group, and thus do not lend themselves to any easily recognisable scheme of classification. The number of species described is nearly five hundred, these being divided into one hundred and twenty-seven genera. In these genera every possible variation of form is perceptible, from the longest bill to the tiniest bill, the simplest form of tail to the most elaborate of structures, while the metallic plumage, so characteristic of the humming-birds in general, is absent in not a few of the genera, and the colour of the simplest kind.

**Saw-Beaked
Group.**

The members of this section, as its name implies, are characterised by the serrated cutting-edges of the fore-part of the upper mandible; the corresponding portion of the lower jaw being in some instances similarly notched. The group comprises upwards of five-and-twenty genera, the members of which differ infinitely among themselves as regards form and colour. The sole representative of its genus, the long-tailed Jamaican humming-bird (*Æthurus polytmus*), may be easily recognised by the abnormal conformation of the tail, in which the outermost feather but one on each side is produced to an enormous length. An inhabitant of the island from which it takes its name, its habits have been admirably described by Gosse in the following words:—"The long-tail is a permanent resident in Jamaica, and is not uncommonly seen at all seasons and in all situations. It loves to frequent the margins of woods and roadsides, where it sucks the blossoms of the trees, occasionally descending, however, to the low shrubs. There is one locality where it is abundant, the summit of that range of mountains

just behind Bluefields, and known as the Bluefields Ridge. Behind the peaks which are visible from the sea, at an elevation of about half a mile, there runs through the dense woods a narrow path, just passable for a horse, overrun with beautiful ferns of many graceful forms, and always damp and cool. The whirring made by the vibrating wings of the male polytmus is a shriller sound than that produced by the female, and indicates its proximity before the eye has detected it. The male almost constantly utters a monotonous, quick *chirk*, both while resting



JAMAICA HUMMING-BIRD.

on a twig, and while sucking from flower to flower. They do not invariably probe flowers upon the wing; one may frequently observe them thus engaged, when alighted and sitting with closed wings, and often they partially sustain themselves by clinging with the feet to a leaf while sucking, the wings being expanded and vibrating. The humming-birds in Jamaica do not confine themselves to any particular season for nidification. In almost every month of the year I have either found, or have had brought to me, the nests of polytmus in occupation. Still, as far as my experience goes, they are most numerous in June; while Mr. Hill considers January as the most normal period. It is not improbable that two broods are reared in a season. In the latter part of February, a friend showed me a nest of this species in a singular situation, but which I afterwards found to be quite in accordance with its usual habits. It was at Bognie, situated on the Bluefields Mountain, but at some distance from the scene above described. On the 12th of November, we took, in Bluefields morass, the nest of a polytmus, containing two eggs, one of which had the chick considerably advanced, the other was

freshly laid. The nest was placed on a hanging twig of a black mangrove tree, the twig passing perpendicularly through the side, and out at the bottom. It is mainly composed of silk-cotton very closely pressed, mixed with the still more glossy cotton asclepias, particularly round the edge; the seed remaining attached to some of the filaments."

White-Crowned Humming-Bird. Two species of the curious genus *Microchera* are known to science; the one confined to the mountains of Western Panama, and the other (*M. parvirostris*) taking its place in Nicaragua and Costa Rica. Both are remarkable for their snow-white crowns and tiny dimensions, being only about $2\frac{1}{2}$ inches in length. According to its describer, Mr. Merrill, the latter is not so persistent in its flight as most of the humming-birds, and rests more frequently,

this habit being probably induced by the shortness of its wings. The first specimen seen was perched on a twig preening its feathers, and, for a few moments, the observer was doubtful whether such a tiny creature could really be a bird. Another he noticed bathing, and watched its movements for some time before shooting it. "The little creature," he says, "would poise itself about three feet or so above the surface of the water, and then, as quick as thought, would dart downwards, so as to dip its head in the placid pool, then up again to its original position, quite as quickly as it had descended. These movements of darting up and down, it would repeat in rapid succession, which produced more than a moderate disturbance on the surface of the water, for such a diminutive creature. After a considerable number of dippings it alighted on a twig near at hand, and commenced pluming its feathers."

Intermediate Group. The forty-eight genera included under this section are characterized by having the sheath of the upper mandible of the bill very feebly serrated towards the end of the cutting-edge. As with the previous section, all kinds of forms are included within its limits, from the lovely hill-stars (*Diplogena*) to the duller-coloured amazilia. The hill-stars, which inhabit the Andes from Ecuador to Bolivia, are remarkable for their brilliant crown-spots, and are among the largest members of the family, extracting the nectar from flowers in a leisurely manner. Stolzmann indeed relates that he has even seen them perched on the dead branch of a tree, flying out into the air, after the manner of a flycatcher. In this division are likewise included the lovely comets (*Sappho*), with their long coppery or red tails and green throats; these birds extending from the interior of Argentina to Chili, Bolivia, and Central Peru.

Fork-Tailed Humming-Birds. Forming a genus known as *Lesbia*, these elegant birds are found in the Andes, from Colombia and Venezuela to Bolivia; and are dark green in colour, with a short bill, very nearly straight, while they are specially distinguished by their very long, forked tails, in which the feathers are even narrower than in the comets (*Sappho*). Mr. Stolzmann found one of the species (*L. gracilis*) at the height of from seven thousand five hundred to ten thousand feet on the Andes of Peru, where it was apparently migratory, as he noticed it to be common at Tambillo in December and January, whereas in June not one was to be seen. The same naturalist is the rediscoverer of the wonderful *Loddigesia* (mentioned below); and he noticed that the fork-tailed species had a great antipathy to the racket-tailed *Loddigesia*, which it was always driving away from the flowers. Its voice is quite characteristic, a *tsi-tsi-tsi*, very loudly uttered, and in a descending scale, and on visiting flowers it makes a sort of clapping noise, like that produced by pigeons when striking their wings together over their backs.

Smooth-Beaked Group. Although resembling the last in their variety of form and coloration, this group differs in the absence of serrations in the cutting-edges of the beak. As our first representatives of the group may be noticed the curved-billed hermits (*Eutoxeres*), of which there are four species, all remarkable for the strong curvature of the beak, which describes fully one-third of a circle. The plumage is dull, and devoid of metallic sheen; while the tail is rounded, with the extremities of the feathers pointed. In Peru one of these

humming-birds (*E. condamini*) has been observed feeding from the flowers of a plant, in which the curved form of the corolla exactly corresponded with the curvature of the bill of the bird, while at the same time the bald patch on the centre of the crown of the latter affords a fair field for the pistils to smear, as the bird probes the flower. The plant in question is abundant on the sides of the paths, and is always covered with plenty of flowers; but although the bird is often met with, it cannot be called plentiful. It stops but a short time on the flower, and is therefore not very easy to procure. In the stomach remains of different species of gnats have been observed. In Salvin's hermit (*E. salvini*), ranging from Costa Rica to Panama, the head is wholly feathered; while the species also differs from the last in having no buff colour on the outer tail-feathers, which have likewise no white tips; there is also no blue patch on the neck. Mr. Merrill, who met with the species in Panama, writes that "one day, while hunting a short distance from the camp for humming-birds, I was startled by the swift approach of a small object through the close thicket, which darted like a rifle-bullet past me, with a loud hum and buzzing of wings. Indeed it was this great noise which accompanied its flight, being so much greater than I had ever heard before from any of these winged meteors of the southern forests, that especially attracted my attention as something uncommon. The bird continued its flight but a short distance beyond the spot where I stood, when it suddenly stopped in its rapid course directly in front of a flower. There for a moment poising itself in this position, it darted upon the flower in a peculiar manner; in fact, the movements of this little creature which now followed were exceedingly curious to me. Instead of inserting its beak into the calyx by advancing in a direct line towards the flower, as customary with this class of birds according to my limited observations, this one performed a curvilinear movement, at first stooping forward while it introduced its bill into the calyx, and then, when apparently the beak had reached the desired locality in the flower, its body suddenly dropped downwards, so that it seemed as if it was suspended from the flowers by its beak. That this was not actually the case, the continued rapid movement of its wings demonstrated beyond a doubt. In this position it remained for the ordinary length of time, and then by performing these movements, in the reverse order and direction, it freed itself from the flower, and afterwards proceeded to the adjoining one, when the same operation was repeated. The flower was that of a species of palm, the blossoms of which are attached alternately on either side to a pendent stalk. Each flower resembles an inverted Roman helmet, and is attached, as it were, by the point of the crest to the stalk. It is a fleshy mass of a deep crimson colour, and the cavity of the calyx extends in a tortuous manner downwards towards the attachment of the flower to the stalk."

The True Hermits. The members of the genus *Phaethornis* are dull-plumaged birds, of a fair size generally, and remarkable for their wedge-shaped tails, the feathers of which are mostly tipped with white or buff. The bill is long and curved, but not to the same extent as in the last genus. Sixteen species of hermits are known, ranging from Mexico, throughout Central America to Southern Brazil and Bolivia. The nest is an elongated structure, placed at the extremity of one side of long-pointed leaves, as if for protection from the attacks of monkeys and other animals. The hermits are plentifully represented in Brazil, where they

inhabit the gloomy forests, feeding chiefly on insects, instead of courting the sunshine and sucking the honey from flowers. Mr. Stolzmann states that in Peru the grey-throated hermit (*P. griseigularis*), instead of inhabiting the hot and moist forests, like the other species of the genus, frequents dry and arid valleys, where it seeks the densest thickets and sometimes banana-plantations. While this observer was passing near some thick bushes, he was once arrested by the sound of a very shrill note, repeated at intervals, which struck him at first as the utterance of a tanager, and he searched in vain to find the bird. Baffled, he at last lay down at the bottom of the thicket, and after some minutes discovered a tiny bird perched on a branch quite close to the ground. Here was the meeting-place of the hermits, and the observer at length found four or five of these birds seated at a short distance from each other, at intervals uttering their whistle, while sometimes one would take a short flight round, and then hasten back to the same place. Subsequently he heard the birds on several occasions in the same thicket, uttering their characteristic cry. At another place exactly the same curious habits were observed in an allied species (*P. superciliosus*). Mr. Stolzmann also says that the hermits often come in front of an intruder, and remain suspended in the air, examining him all the time with marked curiosity.



PRETRE'S HERMIT.

The Sword-Bill Humming-Bird. In the single species of the genus *Docimastes* we meet with the most extreme development of bill among the humming-birds, since it is here equal to the length of the whole bird, measuring, at least, as much as 4 inches. The home of this bird is in the Andes, from Venezuela and Colombia to Peru; and the long bill is specially developed to enable its owner to extract insects from elongated tubular flowers. In some parts of Peru, visited by the Polish travellers, Jelski and Stolzmann, the sword-bill was by no means common, although tubular flowers were met with in abundance, and the bird need fear no rivals, since no others of its kindred could probe these long tubes. Jelski states that he found the species frequenting a *Jacksonia* with a long red corolla; the bird hovering for a moment before the flower, inserting its beak rapidly, and then withdrawing two or three inches, when it again shot the bill into the same flower: this manœuvre being repeated many times on the same blossom. The bird is also said sometimes to pierce the side of the flower with its lance-like bill to get at the honey within. According to Mr. Salvin, the female has a longer bill than the male, this organ reaching a length of 7 inches in the hen bird, whose colours are a little less brilliant than those of her mate.

Rivoli Humming-Bird. A long straight beak, a forked tail nearly uniform in colour, without any white in it, and a brilliant coloration—to wit, a body of bronzy green, a crown of rich metallic violet, a throat of glittering green, and an under surface changing with the light from velvety black to green—are the characters distinguishing the single species of the genus *Eugenes*, called after the Duc de Rivoli, first found in the highlands of Guatemala, and extending northwards to Mexico and to Southern Arizona. In the first-named country this bird was seen by Mr. Salvin, who writes “that it is a most pugnacious bird. Many a time have I thought to secure a fine male, which I had perhaps been following from tree to tree, and had at last seen quietly perched on a leafless twig, when my deadly intention has been frustrated by one less so in fact, but to all appearances equally so in will. Another humming-bird rushes in, knocks the one I covet off his perch, and the two go fighting and screaming away at a pace hardly to be followed by the eye. Another time this flying fight is sustained in mid-air, the belligerents mounting higher and higher till the one worsted in battle darts away seeking shelter, followed by the victor, who never relinquishes the pursuit till the vanquished, by doubling and hiding, succeeds in making his escape. These fierce raids are not waged alone between members of the same species. *Eugenes fulgens* attacks with equal ferocity *Amazilia dumerili*, and, animated by no high-souled generosity, scruples not to tilt with the little *Trochilus colubris*. I know of hardly any species which shows itself more brilliantly than this on the wing, yet it is not to the mid-day sun that it exhibits its splendour. When the southerly winds bring clouds and driving mists between the volcanoes of Agua and Fuego, and all is as in a November fog in England, except that the yellow element is wanting, then it is that *Eugenes fulgens* appears in numbers: *Amazilia devillei*, instead of a few scattered birds, is to be seen in every tree; and *Trochilus colubris* in great abundance. Such animation awakes in humming-bird life as would hardly be credited by one who had passed the same spot an hour or two before; and the flying to and fro, the humming of wings, momentary and prolonged combats, and the incessant battle-cries seem almost enough to turn the head of a lover of these things.” The nesting of this species in Arizona is described by Mr. Poling, who relates that he was resting under a pine-tree, when he heard the noise of a humming-bird’s wing close to his head, and on looking up he found a female Rivoli humming-bird making perpendicular dives at him. When he moved away, the bird alighted on a dead twig, and at last, when about fifty feet up the tree, she made a dart for a limb, and there at a distance of ten feet from the trunk was the nest, which was secured only with difficulty.

King Humming-Birds. Two beautiful species alone represent the genus *Topaza*, one being *T. pella* of Guiana, in which the outer tail-feathers are cinnamon; while the second is *T. pyra*, from the Rio Negro and Eastern Ecuador distinguished by the purplish black tint of the same feathers. Both species are characterised by the tail-feather on each side of the middle pair being elongated, curving outwards, and then crossing its fellow, as shown in the illustration.

Hill-Stars. In the humming-birds commonly designated hill-stars (*Oreotrochilus*), the beak is relatively short and curved, while the toes are proportionately large, and the tail is squared, with narrow feathers. These birds

are inhabitants of the higher Andes from Ecuador to Chili, each species having a peculiar and restricted range. Thus, *O. pichincha* and *O. chimborazo* occur only in Ecuador, the former being confined to the volcanoes of Pichincha and Cotopaxi, and the latter to that of Chimborazo; *O. adela* lives on the Andes of Bolivia, *O. leucopleurus* on those of Chili, while *O. melanogaster* and *O. estella* inhabit the Andes of Peru, the latter also occurring on those of Bolivia. The Chimborazan species, of



GUIANAN KING HUMMING-BIRD ($\frac{2}{3}$ nat. size).

which an illustration is given on p. 22, is olive-green, with the whole of the head, including the crown and the throat, deep glittering violet-blue, the rest of the under surface of the body being white, with the middle of the abdomen and flanks blackish brown. Most of these hill-stars have a patch of black or chestnut along the abdomen, and the Chimborazan species differs from its ally only in having the centre of the throat green instead of being entirely blue. The pichincha hill-star must be a bird which presents many curious features in its economy, if any naturalist could study and write its history, the few notes which have been published about it fully warranting this supposition. Mr. L. Fraser states that

he observed this bird clinging to rocks, a habit which, as he justly observes, explains the use of the longer feet and claws. He believes that these birds build their nests under overhanging ledges of rock, and breed in companies, the size of the nest being very large, equalling that of a man's head. The nest itself is comprised of wool, vicunia's hair, moss, and feathers, while at the top of this great mass is a little cup-shaped depression in which the eggs are deposited. One curious nest was found by Professor Jameson of Quito, suspended to a rope hanging from the ceiling of a deserted house. When one side of the nest is lighter than the other, the birds restore the equilibrium by adding a small stone or a square of earth to the other side, so that the eggs run no danger of falling out.

Giant Humming-Bird.

The largest known member of the family is the sole representative of the genus *Patagona*, and attains a length of $8\frac{1}{2}$ inches, while the wing measures between 5 and 6 inches. This bird is found along the Andes from Chili northwards to Ecuador, and is easily recognised by its large size and somewhat sombre coloration; while it is further distinguished by its strong feet, and the white band on the rump, which sharply contrasts with the rest of the plumage of the back. The flight is also peculiar, for although, according to Darwin, the bird hovers over flowers, it does so with a very slow and deliberate movement, quite unlike the vibratory one common to most species. When hovering by a flower, he says, its tail is constantly expanded and shut like a fan, the body being kept in a nearly vertical position; while he further mentions that he never saw any other bird where the force of its wings appeared, as in a butterfly, so powerful in proportion to the weight of its body. Mr. Ridgway adds that the flight of this great humming-bird is quite as noiseless as that of a butterfly. In Peru the species is not rare in the ravines, where several may often be met with together. In its flight it presents considerable resemblance to a swift, and only differs in its more subdued motions, though it often glides through the air without a movement of the wings. It visits a certain species of *Jacksonia*, and the head of every specimen is tinged with yellow from this plant. It has also a habit of mounting into the air, beating its wings in a vertical position, and returning to its perch. The only note is a subdued whistle.

Racket-Tailed

Humming-Bird. Unmistakable on account of its relatively large tail and conspicuous crest, the beautiful and curious racket-tailed humming-bird (*Loddigesia mirabilis*) is one of the smallest representatives of the whole family. In the tail, while the two outermost feathers are long and pointed, the second pair are produced in a wire-like form, crossing each other near the middle of their length, and terminating in a large racket-like expansion of a beautiful purple hue. First described from a single specimen in 1847, the species was not met with again till 1880, when some fine examples were obtained from Mr. Stolzmann. The original specimen came from Upper Amazonia, from the same locality where Stolzmann's examples were obtained. It appears to be confined to the valley of the Utcubamba, a little river on the right of the Marañon system, at an elevation of some eight thousand feet. The country is open, with here and there a little valley more richly clothed with vegetation, while an occasional clump of trees survives, remains of the ancient forest which once was everywhere throughout the region. Dense thickets abound, and a species of *Alstromeria*, of a red colour, is

its favourite flower, and wherever this occurs the humming-bird may be observed, and as it is in flower from August to November, and as another humming-bird (*Lesbia gracilis*) does not affect this tree, the present bird thrives. It is one of the most active of the family, seldom taking rest, the females being especially lively. The adult males are more rarely seen than the hens and younger males, but they are beautiful objects when seen in front of the calyx of a flower, the tail with its two rackets being depressed, while the bird is hovering with the spatules in close proximity to each other. When in flight, the humming noise produced by the wings is great by reason of the short wings of the bird, and is more pronounced in the male than in the female.

One of the most curious habits connected with this humming-bird is that of assembling. Eight or ten males, mostly young ones, were observed by Stolzmann near Tamiapampa to collect in a bare and desolate plateau on which were no flowers at all, the assembly being apparently merely for manœuvres. Two young males would first stop in the air opposite to one another, with their bodies held vertically, opening their tails and springing first to one side and then to the other, uttering a little cry each time the tail was opened, which the observer likened to the noise of flipping a finger-nail or snapping a watch-case. As a rule, this



RACKET-TAILED HUMMING-BIRD.

aerial dance is shared by two young males only, but sometimes several take part in it, and the note of the female bird is almost always to be heard in the vicinity. Sometimes one of the young males hung below a thin branch while another one manœuvred above him, spreading his tail and "snapping." Suddenly in a flash the positions are reversed, and the suspended bird takes the place of the dancer. The old males perform curious antics with the tail, and sometimes actually bring the two rackets close to the crown. Stolzmann has also observed the bird drinking water at a little cascade, of which there are plenty in the country inhabited by the *Loddigesia*; this being doubtless the only way in which the bird can appease its thirst. The cry of the young male and of the female is a *tsi-tsi-tsi*, rapidly repeated while the bird is visiting flowers or executing the manœuvres described above; when seated they are silent, and the voice of the male has not yet been heard.

Double-Crested
Humming-Bird.

This beautiful little species (*Heliactin cornuta*) is distinguished by the glittering tufts over the eyes and wedge-shaped tail, the feathers of which are narrowed at the end into a blunt point. The colour is a shining grass-green, metallic greenish blue on the crown, and inclining to golden on the

back; the tufts at the side of the head being metallic purple, shading off into golden and then to metallic green; while the sides of the head and throat are black, the under surface of the body pure white, the flanks green, and all but the centre feathers white, with their outer webs greyish. The total length is only 4 inches. The female is duller in colour than the male, and has a green crown, while the sides of the face are dusky, the throat pale buff, and the tail-feathers



TUFTED COQUETTE ($\frac{3}{4}$ nat. size).

white with a subterminal band of black. The home of this species is in Brazil, where the bird is said to be not uncommon in some portions of the interior, although little is known of its habits.

This is a very easily recognised group of humming-birds by **The Coquettes.** reason of the crested head, and the little spangled frills which are very conspicuous on each side of the neck. Twelve species are known, and the range of the genus extends from Southern Mexico, throughout the greater part of South America to Bolivia and Southern Brazil, but not including Ecuador or Peru. One of the most beautiful species is the tufted coquette (*Lophornis ornatus*), which inhabits the Island of Trinidad and the opposite mainland of Venezuela, whence it extends into Guiana. It measures not quite 3 inches in length, the bill half an inch, and the wing 1.6. The upper surface is of a glittering golden-green,

with a buffish white band across the rump; the crest is long and of a dark cinnamon colour; the throat is glittering green bordered with cinnamon, and the neck-frill is also cinnamon, the feathers tipped with a round spot of glittering green; the abdomen is grey, the sides of the body and under tail-coverts shining green, the feathers edged with pale cinnamon; the tail is cinnamon, the lateral feathers broadly, the rest narrowly, edged with golden-green externally; and the bill flesh-colour, with a black tip. Scarcely anything has been recorded of the habits of the coquettes. Of one of the Central American species (*L. helence*) Mr. Salvin writes that its flight is very rapid, and hardly to be followed by the eye as it darts from flower to flower; and its cry is peculiarly shrill, and unlike that of any other humming-bird.

THE SWIFTS.

Family *MICROPODIDÆ*.¹

Allied in some respects to the humming-birds, and in others to the goat-suckers, the swifts are readily distinguished from the former by their short and wide beak, while from the latter they are differentiated by the palate being constructed after the Passerine type. The short beak is curved towards the tip, and is very broad at the base, so that the gape is of great extent. As in the humming-birds, the tail-feathers are ten in number; whereas in the swallows, which curiously resemble the swifts in external appearance, there are twelve of these feathers. Of primary quills there are ten; and the secondaries are likewise reduced, their number never exceeding nine. The breast-bone resembles that of the humming-birds, being free from notches in its hinder border; but the upper wing-bone, or humerus, is unique on account of its extreme shortness and width. The swifts may be divided into three subfamilies, the first of which (*Micropodinae*) is represented typically by

In common with two others out of the five genera included in the subfamily, the true swifts have the metatarsus covered with feathers, and the number of joints in the third and fourth toes reduced to three; while the first toe is capable of being turned forwards like the others. Among the species the Alpine swift (*Micropus melba*) is of large size. It is of a general mouse-brown colour, with rather darker wings and tail; the throat and under surface of the body being white, with slight indications of dusky shaft-hues to the feathers, while there is a broad band of brown across the fore-neck. The length is $8\frac{1}{2}$ inches, and the wing also measures the same in length. This swift inhabits the countries bordering the Mediterranean as far north as the Alps, and extending throughout Persia to the Himalaya, but wintering slightly to the southward; while in Africa it is replaced by the allied *M. africanus* extending from Shoa to the Cape. According to Messrs. Fatio and Studer, the Alpine swifts arrive in spring, towards the end of March or the beginning of April, and depart at the end of October; although considerable difference takes place in the time of arrival in various years, the backward or forward state of the season appearing to

¹ This family is commonly known as the *Cypselida*, but as the name *Cypselus* is a synonym of *Micropus*, the latter must be taken as the source of the family name.—EDITOR.

influence the time of their arrival and departure to a considerable degree. In the town of Berne these swifts frequent the tower of the cathedral. A few arrive at the beginning of April, and after a short inspection of their old home disappear. In a few days, however, some few return, and their number is increased day by day until more than two hundred individuals make the cathedral-tower their home. When they first come, the swifts are in good condition, and it



COMMON AND ALPINE SWIFTS ($\frac{1}{2}$ nat. size).

is well that they are so, as insects are few at that time of year, especially if April happen to be a bad month. At this time they may be seen sitting in rows, hungry and waiting for a more propitious season; and if they should attempt a flight, they circle round the cathedral, without the harsh cries generally uttered during their gambols. Every spring individuals are picked up which have succumbed to the cold, but on the approach of fine weather the cathedral-tower becomes the centre of great animation. These swifts are very regular in their habits, at the dawn of day leaving their roosting-places to seek their food in mid-air, and continuing their flight until about noon, after which they are not seen. They rest until about

five or six o'clock, and then recommence the chase until night-time; sometimes, on warm nights, flying till as late as nine o'clock: and even during the night their cries are loud enough to inconvenience persons living in the neighbourhood. Their nests are placed in all kinds of situations in the cathedral, in holes, spouts, or on the arches in the interior; while some of the birds, probably driven away by the inhabitants of the tower, have taken up their abode in a house in one of the most frequented streets of the town. When once on the ground, these swifts, like their congeners, are unable to rise, their long wings and short feet rendering it impossible for them to mount in the air again, though they are able to cling to the rough surfaces of rocks or stones. From this disability the swifts place their nests at a higher level than the point of exit, so that they are able to fall at once into mid-air. For the same reason the materials for the nest are collected from any place except the ground. These consist of hair, wool, dead leaves, etc., and especially fragments of paper, the latter being supplied to the birds by the keeper of the tower, who throws them into the air, when they are seized by the swifts, and carried off to their nests. All the materials are cemented with the birds' saliva to form the nest: and the eggs, although usually two, may be three in number.

Common Swift.

One of the latest of the summer visitors to Europe, this species, (*M. apus*), which is figured on the left side of the illustration on p. 36, is almost entirely black in colour, the only exception being the white throat. In length it measures about 7 inches. Wintering in South Africa and Madagascar, the common swift is represented in the Mediterranean regions by the pale swift (*M. murinus*), which accompanies it in winter to the Cape. Much that has been written concerning the Alpine swift will apply to the present species; the nesting-habits of both being similar. The flight of the common swift is, however, somewhat less rapid than that of its Alpine cousin, although far swifter than that of any other bird frequenting the British Isles. Indeed the manner in which a swift twists and turns in the air is often suggestive of the flight of a bat rather than that of a bird.

Pied Swift.

Differing from the true swifts of the Old World by its feathered toes, soft plumage, and nearly square tail, the pied swift (*Aeronautes melanoleucas*), which ranges from the South-Western United States to Guatemala, constitutes a genus by itself. Writing of its habits, Dr. Shufeldt observes: "On the Chugwater Creek, Wyoming, we passed some very high and imposing chalk cliffs which constitute the more striking and prominent features of the landscape, as the country about them is low and unbroken, being quite prairie-like in character. The head of one of these large chalk-bluffs, as it stood out against the clear blue sky and far above me, actually looked, with the cloud of white-throated swifts swarming about it, like some great beehive from which the inhabitants had been suddenly aroused. These birds were far above the range of my fowling-piece, though one, now and then, dipped down with the most inconceivable velocity and in a graceful curve over my head, as if to obtain a better view of me. A snap-shot brought down one of these more accommodating individuals, whose curiosity cost his life, and gave me not only a beautiful specimen, but the opportunity to examine in the flesh, for the first time, one of the then rarest birds in American collections. During the past eight years I have only

caught glimpses of single specimens of this bird here and there, and sometimes in most unexpected places. Once, far out on the open prairie, in the north-western part of the United States, a magnificent adult swift of this species shot by me with the velocity of a meteor, his white flank-patches contrasting conspicuously with his black-brown body and wings. It was not, however, until I came to Fort Wingate that the opportunity was really afforded me to more intimately study and observe this swift in its favourite haunts; for all through North-Western New Mexico occur deep, even-walled cañons of rock, to which *M. melanoleucas* resorts to rear its young. Early in the spring of 1885 (April) I found some two dozen pairs of them in just such a cañon about three miles west of Fort Wingate. The walls of this magnificent gorge are of solid rock, being nearly three hundred feet deep in some places, and for the most part roughly perpendicular, though frequently arching over and outwards at their summits. It was within the deep and crack-like fissures seen in the walls of the eaves of these latter recesses, away high up on either side of this rocky chasm, that the swift resorted to lay its eggs. So wisely had every pair of these birds chosen the cleft wherein their nests were hidden that all my plans and attempts to secure a set of eggs proved futile. . . . From the extent of their wings the birds of this family appear formed to live in the air, where, in fact, they pass the most of their time, gliding about in extensive circles without effort, and apparently little motion of the wings. This ease of flight stands them in good need in their migratory movements, allowing them readily to pass into warmer climes. During pleasant weather they find their insect-prey in the upper air, but when cloudy or rainy we find them skimming the ground in their pursuit. When on the ground, the shortness and weakness of their legs, added to their length of wing, incapacitates them from again rising in the air; hence I have several times seen the European species (*M. apus*) picked up in the streets of Geneva, Switzerland, having fallen there during a quarrel with its fellows. When they wish to take rest during the day, which is rare, they always alight on some elevated point, whence they can throw themselves into the air and take to wing. Though numbers were flying about the rocks near Tucson, I heard them utter no note. Sociable among themselves, gathering in large flocks, they never mingle with their nearly related brethren the swallows. They generally construct their nests in the crevices of rocks or the holes in old buildings; many species have secretory glands, exuding a glutinous substance with which to fasten them firmly. The eggs, from four to six in number, are pure white, and of an elongated form."

Feather-Toed Swifts. The two species constituting this genus, although resembling the pied swift in the feathering of the toes, differ in the form of the tail, the outer feathers of which are pointed. The Cayenne species (*Panyptila cayennensis*) ranges through Colombia, Guiana, and Anazonia; while Salvin's swift (*P. sancti-hieromini*) inhabits Guatemala. The latter is an unusually beautiful bird for such a dull-coloured family; its general hue being silky black, with a narrow white collar round the hinder part of the neck; while the wings and tail also show a good deal of white at the bases of the feathers. Writing of a nest devoid of eggs, which he found in Guatemala, Mr. Salvin observes that "in this nest we see the saliva of the bird used as an adhesive

material in nest-building, as in the genus *Collocalia* of the Old World, but differently applied. At first sight the saliva appears to have been used merely to secure the foundation of the nest (if the term may be used inversely) to the overhanging projection of rock upon which the rest of the structure is woven, as in the nests of the *Icteridæ*; but, upon closer examination, it will be seen that the saliva has been applied to secure every one of the seeds used in the construction of the nest, and in no other way could so firm and durable a structure be obtained. Another curious feature will be noticed in this nest, which is the false entrance at the side. I remember to have seen a similar thing in other nests. They appear to be placed there to deceive some enemy, such as a snake or lizard, to the attacks of which the parent bird and its offspring would, during the time of incubation, be more exposed. It would be interesting to know how the materials for the nest were gathered, whether from the plant itself, or caught in the air by the bird as the seeds were carried by the wind."

The seven small species constituting this genus belong to the second subfamily (*Chaeturinae*), characterised by the elongated wings, and the generally spiny tail, in which the shafts of the feathers are prolonged beyond the barbs so as to resemble needles. The needle-tailed swifts, as the members of the typical genus (*Chaetura*) are called, are indeed unrivalled in their rapidity of flight. From the other members of the group the edible swifts differ by the absence of the spiny character in the tail; their chief claim to our interest being their peculiar nests, which form an article of food in the East. Formed chiefly from the birds' saliva, these nests are firmly attached to the walls of caverns. Mr. C. Hose has discovered that the different species of the genus build distinctive nests; the valuable white nests, which are free from moss, being formed by *Collocalia fuciphaga*. Writing of the habits of this species in Ceylon, Colonel Legge states that the breeding-season lasts from March till June, and that the nests form large colonies. Many of these are known, from seeing the birds haunt the vicinity of certain precipitous hills, but few have been visited and examined, on account of their general inaccessibility. The narrator then describes his visit to a cave on the 22nd of May, when nearly all the nests contained young, two being the average number. "It is noteworthy that the partially-fledged young, which were procured on this occasion for me, and which I kept for the night, scrambled out on the exterior of the nests, and slept in an upright position with the bill pointing straight up. This is evidently the normal mode of roosting resorted to by this species. The interior of this cave, with its numbers of active tenants, presented a singular appearance. The bottom was filled with a vast deposit of liquid guano, reaching, I was informed, to a depth of thirty feet, and composed of droppings, old nests, and dead young fallen from above, the whole mingled into a loathsome mass with the water lodged in the crevice, and causing an awful stench, which would have been intolerable for a moment even, had not the hundreds of frightened little birds, as they screamed and whirled in and out the gloomy cave with a hum like a storm in a ship's rigging, powerfully excited my interest, and produced a long examination of the colony. This guano-deposit is a source of considerable profit to the estate, the hospitable

manager of which informed us that he had manured one hundred acres of coffee with it during that season."

Tree-Swifts. A third subfamily (*Macropteryginae*) is represented by the five species of the genus *Macropteryx*, which ranges from India, through Burma and the Malayan Archipelago, to the Solomon Islands. They present such marked differences from the rest of the swifts that they have been



LONG-WINGED TREE-SWIFT ($\frac{1}{2}$ nat. size).

separated as a distinct family.

The plumage is much softer than in the majority of the swifts, and thus shows an approach to that of the goatsuckers. The sexes are different in colour, and the young very distinct from the adults; whereas in the other swifts there is very little difference between the plumage of the young and the old birds. The head is generally crested, and some of the species have elongated whisker-streaks of white. The metatarsus is shorter than the third toe, which is not the case in other swifts, while the hinder margin of the breast-bone has two distinct perforations; in addition to which the nesting-habits are quite peculiar. Writing on this subject, Mr. K. Thompson observes that "it is not in the high or deep forest that the bird breeds, but in scattered jungle, usually covering low stony hills and ridges. The nest in this particular case was in a tree quite by itself, with only a few others in the neighbourhood scattered about here and there. My attention was directed to the male bird, who was trying his best to dislodge a

dove from a tree near to the one on which I ultimately found the nest. I knew that there must be a nest somewhere near, and soon caught sight of the female sitting transversely across a thin dead bough, the tiny nest, glued on to the side of this branch, being as usual scarcely perceptible from below. I have seen two other nests of this swift in this neighbourhood, each containing a tolerably well-fledged young one. The nests in these instances also were placed on *Boswellia* trees. To the best of my belief they never lay more than one egg in the nest." Mr. Hume adds that "the stem to which the nest was attached is about 0.8

inch in diameter; against the side of this the nest is glued, so that the upper margin of the nest is on a level with the upper surface of the branch. The nest itself is half of a rather deep saucer, 1.75 inches in diameter, and about 0.6 in depth internally. The nest is entirely composed of thin flakes of bark, cemented together by the bird's saliva, and is about an eighth of an inch in thickness. The egg is a very elongated oval, obtuse at both ends, and with little or no gloss. It is white, with a slight greyish blue tinge, and measures 0.94 in length by 0.61 in breadth."

THE NIGHTJARS.

Family CAPRIMULGIDÆ.

Like the swifts, these birds have very wide and gaping mouths; while their plumage is mottled and vermiculated, very much resembling that of the owls, near which group they have been placed in many classifications. Beyond the resemblance of their plumage, and the fact that they are crepuscular birds, coming out to hunt for their prey in the twilight, there is, however, little in common between the two groups; the former being birds of prey, devouring chiefly animal food and laying white eggs, mostly in a concealed position in the hole of a tree; whereas the eggs of the nightjars are laid in the open, and are more or less spotted and marked. The number of both the primary quills and tail-feathers in the nightjars is ten; the palate is of the Passerine (ægithognathous) type; and the third toe has a comb-like appendage to the claw, similar to that of the herons and barn-owls. The group may be divided into the two subfamilies *Caprimulginae* and *Nyctibiinae*, of which the latter contains only the single genus *Nyctibius*, while the former comprises upwards of eighteen genera, with ninety-five species.

In common with the rest of their kind, the true nightjars have the broad beak thickly beset with strong bristles of considerable length; while they are specially distinguished by the difference in the sexes; the males having a large patch of white on the quills and at the end of the tail-feathers, which are either absent altogether in the females, or are replaced by rufous ones. The nestlings are thickly covered with down, and form an exception to the general rule of young Picarian birds, which are naked when hatched. To this genus belong most of the species of nightjars, including the British *Caprimulgus europæus*. They are found nearly all over the world, inhabiting both hemispheres, but never going very far north; and the only locality where they appear to be wanting is in some of the Eastern Pacific Islands. Of the two European species, the common nightjar shown in the upper figure of our illustration is a migrant from Africa, wintering in the Cape, and passing south apparently by the Nile Valley and East Africa, as it has not yet been recorded from the west coast. It visits Europe in summer, and breeds throughout the greater portion of the Continent, reaching to the latitude of Archangel, and to about 63° north latitude in Scandinavia. The plumage is of a dark, ashy-grey colour, closely vermiculated with black; the scapulars are longitudinally streaked with black and ochraceous buff; quills with a rufous-buff spot on both webs, the three outer primaries with a large white spot on the inner web; two

outer tail-feathers also with a large white spot at the end of the inner web; under surface ochraceous buff, with blackish bars on the abdomen and the under-wing and tail-coverts; the breast marked like the upper surface of the body; and the throat blackish, narrowly barred with rufous buff, and spotted with white. The total length is $10\frac{1}{2}$ inches. The red-necked nightjar (*C. ruficollis*) is a larger bird, measuring 12 inches in length. It has large white spots on the quills and outer tail-feathers, but differs in having the hind-neck rufous, forming a broad



COMMON AND RED-NECKED NIGHTJARS ($\frac{2}{3}$ nat. size).

collar, which has gained the species its familiar name of red-necked. It inhabits the countries of South-Western Europe and Northern Africa, nesting in Spain, Algeria, and Morocco; migrating occasionally into Southern France; and it has even reached Great Britain on one occasion, but its winter-quarters are unknown. The food of the nightjar consists entirely of insects, in pursuit of which the bird may be seen flying over the heather or the fields in the twilight, often, as it flies, producing a clapping noise, apparently by striking its wings together above its back, like a pigeon. The "churring" note which the birds make is familiar to all

dwellers in the country, and hence its name of churn-owl, by which it is known in many districts. Waterton has recorded the notes of one of the species in Demerara as represented by the words, *work away! work, work, work away!* Another calls *who are you? who, who are you?* while another cries mournfully, *willy-come-go! willy, willy, willy-come-go!* and a fourth, the one represented in the accompanying figure (*C. virginianus*), tells you to *whip-poor-will! whip-poor-will!* in tones wonderfully clear and startling.

Leona Nightjar. The beautiful and rare bird (*Macrodipteryx macrodipterus*), thus named is but seldom obtained in its full perfection of plumage, since the peculiar, long-shaped primary, which forms the distinguishing character of the genus, is often missing or not developed. The male of the Leona nightjar has the ninth primary quill developed to an extraordinary length, with the shaft



VIRGINIAN NIGHTJAR (¾ nat. size).

of the feather bare and ending in a racket, so that, as the bird flies, the wing has a long pennant, or streamer, on each side. This is probably only developed in the breeding-season, and is not found in the female. The species is only found in Africa, where it occurs in Western Abyssinia, and on the west coast from Senegambia to the River Niger. Two other members of the genus are known.

Standard-Winged Nightjar. As in the preceding genus, this nightjar (*Cosmetornis vexillarius*) has an elongation of the primary quills, of which the seventh and eighth are greatly developed, while the ninth is prolonged into a streamer which floats behind the bird as it flies. The shaft, however, is not bare as in the Leona nightjar, but feathered throughout its whole extent. This bird is an inhabitant of Africa, and its range extends from Equatorial Africa westwards to the Benue River and Fernando Po, and south throughout Eastern Africa to the Zambesi and Damaraland. The following account of this nightjar has been published by Sir J. Kirk, who met with it in Nyasaland, and writes that it "was

first observed about three hundred miles up the Zambesi, a little above Tete, on the Keihrabassa rapids in November 1858, and was there decidedly common. It was again met with on the western side of Lake Nyasa where, in September and October, it was very plentiful, being seen in flocks of from fifteen to twenty. It was also common at Chibisa on the Shiré, in latitude 16° south. It was only during the months from October to January that the singular prolongation of the wing-feathers was observed; these are peculiar to the males. Like other nightjars,



STANDARD-WINGED NIGHTJAR ($\frac{1}{2}$ nat. size).

the habits of these birds are crepuscular. When startled during the daytime from the ground, where they always rest, they fly swiftly for a little distance, and again settle, but are extremely difficult to follow with the eye. Not so the males in full plumage. In their case there is no difficulty; their flight is evidently retarded, and they become prominent objects from the long streamers waving behind them. A deviation from the usual habits of the bird was observed when cruising on the Nyasa Lake. On two occasions, being overtaken in a gale, and riding out a short but dangerous sea, which set in and raised a surf on the shore, through which it was impossible to land, the male birds came off in flocks of about fifteen and flew over the surface of the water. On no other occasion have I seen them take wing of their own accord, or keep on the wing during the day."

Fork-Tailed
Nightjars.

South America is the home of a group of nightjars remarkable for their enormously developed forked tails: while in Africa there is

also a genus (*Scotornis*) which has an elongated tail, longer than the body of the bird itself, the feathers gradually decreasing in length till the outside ones are the shortest. In South America, the genus under consideration has the outer tail-feathers produced, and the two central ones also, the next pair being the shortest. In *Macropsalis*, however, the outside pair of tail-feathers are produced to an enormous length and form a train, the feathers gradually reduced in size towards the middle of the tail, the two centre ones being the shortest. Of the Argentine fork-tailed nightjar (*Hydropsalis furcifer*), Durnford states that it is not uncommon near Buenos Aires in spring and autumn, living on the ground in damp situations where the grass is long and thick enough to afford some slight cover, and is generally observed in parties of four or five individuals. Its flight is noiseless, and performed by jerky, erratic movements. In Entre Rios, Mr. J. B. Barrows found it common in summer, arriving in August and leaving in May; and he states that "while hunting capivaras and armadillos by moonlight, I had frequently good opportunities for watching its movements. Its flight is nearly as irregular and as noiseless as that of a butterfly, while its beautiful tail is opened and shut in the same manner as with the scissor-tailed flycatcher. Alighting frequently on the ground, or on stones or roots, it keeps up a continual but very soft clucking, which is the only note uttered. It was most often seen in open grassy or sandy spots in the woods, especially along the margins of the streams. By day it sits close on the ground, and, if disturbed, only flies a few yards, though it evidently sees



ARGENTINE FORK-TAILED NIGHTJAR ($\frac{1}{3}$ nat. size).

well." Mr. O. N. Aplin found the eggs of this species in Uruguay; they were of a creamy pink colour, delicately marked with lines and veins of pinkish lilac, something after the manner of bunting's eggs. "On the 17th of March," he writes, "I saw a male with the long tail-feathers settle on a post of a wire fence which passed through part of the *monté*;¹ it sat lengthwise to the line of fence. The curious long swallow-tail of the male does not seem to incommode it at all, as the bird can turn and twist about in its rapid gliding flight in a wonderful way, and accomplishes the difficult aerial navigation of the thorny *monté* with all the ease and grace of our nightjar in an oak-wood."

Nacunda Night-jar. The single representative of this genus (*Podager nacunda*) differs from all the preceding, in the slight development of the bristles of the gape, as well as by the shortness of the tail, which only equals about half the length of the wing. The general plumage is of the usual mottled hue, but the tail is distinctly barred; while the primary quills are conspicuously white, and the secondaries lighter brown, with blackish brown bars and vermiculations; the central tail-feathers being like the back, with broad white tips to the outer ones; the abdomen and under tail-coverts white; the lores and upper throat reddish, with blackish brown bars; the chin almost uniform rust-colour; and the lower throat very dark brown, the breast being similar to the upper-parts. The length is $11\frac{1}{2}$ inches. Mr. W. H. Hudson writes that "the specific name of this goatsucker is from the Guarané word *nacundá*, which Azara tells us is the Indian nickname for any person with a very large mouth. In the Argentine country it has several names, being called *dormibu* (sleepy-head), or *duerme-duerme* (sleep-sleep), also *gallina riega* (blind hen). It is a large handsome bird, and differs from its congeners in being gregarious, and in never perching on trees or entering woods. It is an inhabitant of the open pampas. In Buenos Aires and also in Paraguay, according to Azara, it is a summer visitor, arriving at the end of September and leaving at the end of February. In the love-season, the male is sometimes heard uttering a song or call, with notes of a hollow mysterious character; at other times they are absolutely silent, except when disturbed in the daytime, and then each bird, when taking flight, emits the syllable *kuf* in a hollow voice. When flushed, the bird rushes away with a wild, zigzag flight, close to the ground, then suddenly drops like a stone, disappearing at the same moment from sight as effectually as if the earth had swallowed it up, so perfect is the protective resemblance in the colouring of the upper plumage to the ground. In the evening, they begin to fly about earlier than most *Caprimulgi*, hawking after insects like swallows, skimming over the surface of the ground and water with a swift, irregular flight; possibly the habit of sitting in open places, exposed to the full glare of the sun, has made them somewhat less nocturnal than other species that seek the shelter of thick woods or herbage during the hours of light. After the breeding-season they are sometimes found in flocks of forty or fifty individuals, and will spend months on the same spot, returning to it in equal numbers every year. One summer a flock of about two hundred individuals frequented a meadow near my house, and one day I observed them rise up very early in the evening and begin soaring about like a troop of swallows preparing to

¹ The Argentine term for the small woods surrounding so many of the settlements on the pampas.

migrate. I watched them for upwards of an hour; but they did not scatter as on previous evenings to seek for food, and after a while they began to rise higher and higher, still keeping close together, until they disappeared from sight. Next morning I found that they had gone."

With these large and mainly South American nightjars we come to the sole representatives of the second subfamily. They are characterised by the plumage being more mottled than in the true nightjars, and the extreme shortness of the metatarsus, which is inferior in length to all the toes, as well as by the absence of the comb on the third toe. Moreover, the sides of the



GREAT WOOD-NIGHTJAR ($\frac{1}{3}$ nat. size).

body and breast carry large "powder-down" patches, which do not exist in the typical subfamily. Of these birds there are six species, which range from Mexico to Brazil, and are also represented in Jamaica. The note of these nightjars is described as being more extraordinary than that of any other bird. Waterton, for instance, writes that "a goatsucker inhabits Demerara, about the size of an English wood-owl, whose voice is so remarkable that, when once heard, it is not easily to be forgotten. A stranger would never believe it to be the cry of a bird, but would say it was the departing voice of a midnight murdered victim, or the last wailing of poor Niobe for her children, before she was turned to stone. Suppose a person in hopeless sorrow, beginning with a high loud note—*Ha ha!* *ha ha!* *ha!*—each note lower and lower till the last is scarcely heard, pausing a

moment or two between each exclamation, and you will have some idea of the moaning of the great goatsucker of Demerara." Mr. Stolzmann, too, states that in Peru the great wood-nightjar (*Nyctibius grandis*) has a curious habit of perching upon dead branches, so as to look like a knot or prolongation of the bough, so that it takes an experienced eye to detect them. "Its cry," he writes, "is one of the most extraordinary of any bird I know, and consists of five notes, descending gradually one-fifth in the scale, and producing an uncanny impression during moonlight nights."

THE TODIES.

Family *TODIDÆ*.

Curious little green and red birds, commonly known as todies, constitute the family *Todidae*, all the members of which are included in the single genus *Todus*. They are represented only by five species, four of which respectively inhabit the islands of Cuba, Jamaica, San Domingo, and Porto Rico, while the fifth (*T. pulcherrimus*) has been stated to come from Jamaica, although its real home is still unknown. In these birds the beak is long and flattened, the palate of the desmognathous type, the breast-bone has four closed perforations on its hinder border, and the oil-gland is tufted; while there are twelve tail-feathers, and the first toe is present. The habits of the todies are said to be very much like those of flycatchers, but Mr. Scott states that sometimes they hunt insects in trees and bushes after the manner of the American warblers. He found them to be entirely insect-eaters, and no vegetable remains were met with in the stomach of those he has dissected. The todies are becoming rarer in Jamaica, owing to the introduction of the mungoose into the island, as the burrows on which the eggs are laid are very shallow and easily robbed by the animal. Of the Jamaica tody (*T. viridis*) Mr. Taylor writes that it "appears to be very generally dispersed throughout the island, and may even be said to be common in most parts. In all localities that I have visited, whether on the mountains at high elevations or among the woods of the plains, it has appeared equally abundant at all seasons. Banks of ravines and gullies, where the fringing forest is of dense and varied but slender growth, hedges with deep banks, woods and thickets bordering many roadways, and especially the steep, narrow bridle-paths that wind up the mountain-sides, where the banks are high, may be mentioned as some favoured haunts. But of all localities there are few, perhaps, where these birds occur constantly in such numbers, or which offer more perfect situations for nesting, than the gullies before mentioned. Many of these dry water-courses, that during prolonged rains become transformed into rushing, impassable torrents, are of considerable extent, and their sandy beds may be traced for miles inland. One gully, in particular, where most of my observations on the habits of the todies have been made, has a wide and tortuous course, and banks that vary in places from low, weed-covered mounds to precipitous cliffs of clay, between ten and twenty feet in height. In their choice of a situation for nesting, the birds are somewhat particular, preference being given to low, overhanging, weed-covered banks, where the soil is light and friable. The tunnels are rarely, if ever, in

high situations, but, on the contrary, may frequently be found at the sides of the shallow ditches and hollows that are commonly formed in soft soil during heavy rains. I have often surprised the todies at work. In beginning a tunnel, they cling in an awkward manner to the face of the cliff or bank, fluttering their wings frequently, as if for support. So far as I have been able to observe, in digging they appear to employ the beak only, and I once took a tody that had



JAMAICA TODY (nat. size).

almost the entire half or side of the upper mandible worn away; this, however, was during a period of drought, when all vegetation was burnt and shrivelled, and the earth hard and unyielding. In most cases the whole work of excavation would seem to be performed by the birds, yet I have noticed (in the gullies at least) that those portions of the banks usually selected for nesting are nearly always riddled with holes and cavities of different depths. Whether the birds ever take possession of one of these, or enlarge others to suit their needs, I have not discovered; but such a proceeding would seem highly probable in view of the labour

which the work of excavation frequently entails. When digging into some of these holes in a search for the true nest of a tody, I often find them in the occupation of strange tenants, such as field-mice, lizards, and spiders. The latter, black, repulsive-looking objects, are of common occurrence, especially in the depressions formed by the falling away of stones, etc., so that some little caution is necessary in prosecuting a search for the eggs of the bird. The burrows run horizontally and to a considerable depth, but invariably (so far as my experience goes) turn at right angles at a few inches from the entrance. The tunnel terminates in a somewhat rounded cell, where, upon a little heap or bed of fine soft earth, without any lining whatever, the eggs are laid. These are usually three or four in number, almost globular, glossy, and of a beautiful pearly white, except that, when fresh, the contents impart a delicate pink tinge to the shell. They are, in fact, miniature kingfisher's eggs. The tameness of the tody is well known, but, as Gosse well remarks, this seems rather the tameness of indifference than of confidence. I have accomplished the capture of specimens with a butterfly-net at different times with little difficulty, and frequently a tody has permitted so near an approach that I have been tempted to put out my hand in the hope of taking it. The todies keep in pairs, if not constantly, for the greater part of a season at least, and during nidification seem to range over a very circumscribed space. Their food appears to consist exclusively of small insects, which they usually pursue and take after a short flight, returning constantly to the same twig, where they will patiently sit and watch, with head drawn in and beak pointing obliquely upwards, the plumage much puffed out; the wings meanwhile being flirled by a continuous, rapid, vibratory movement."

THE MOTMOTS.

Family *MOMOTIDÆ*.

Exclusively confined to Central and South America, the motmots, of which there are seven genera, are closely allied to the kingfishers and bee-eaters of the Old World, and are by no means unlike the latter in external appearance, most of them having a long tail, with the central feathers produced beyond the others. The first toe is always present; the hinder margin of the breast-bone has four notches, which are converted into perforations; and there are no cæca to the intestines. The bill is serrated, its saw-like notches being doubtless of use to the birds when they nip off the webs of their tail-feathers. Both in the wild state and in confinement, as soon as the central feathers of the tail begin to grow beyond the line of the others, the birds commence to nibble the web away, leaving a bare shaft for an inch or an inch and a half, with a large racket at the end of the central pair. In one instance, quoted by Mr. Salvin, the two middle tail-feathers had not grown symmetrically, one being more developed than the other. The bird was evidently puzzled to find the central feather, which its instinct warned it to nibble, and it began operations on several of the other feathers, until in time the middle one grew out beyond the others, and showed which was the proper one to snip. There are seventeen species of motmots, distributed among seven genera, all of them having long tails, with the exception

of *Hylomanes*, which is a bird of small size, recalling the todies in general appearance.

True Motmots.

As a well-known example of the typical genus we select the Mexican motmot (*Momotus lessoni*), a species with the general colour of the plumage green; this tint including the tail-feathers, which become blue towards their extremities, where they are tipped with black. On the crown of the head is a patch of black, bordered with silvery blue, which passes into turquoise-blue, with an inclination to purple on the nape; the eyebrow, forehead, and cheeks are likewise black, the latter being ornamented with a band of turquoise-blue above and below; the under surface is olive-brown, becoming greener on the abdomen, and inclining to emerald-green on the throat; while on the fore-neck is a tuft of black feathers edged with greenish blue. In length this handsome bird measures about $15\frac{1}{2}$ inches from the beak to the tip of the tail. Writing of its habits, Mr. A. K. Cherrie observes that "the nests are built in the ground, some bank, such as the side of a stream, being selected. The entrance tunnel extends back horizontally sometimes for a distance of six feet. At about half its length there is a sharp bend upward for some six inches, then the course is again horizontal as far as the chamber occupied by the nest. The nest space is twelve or fourteen inches in diameter, being round, and about six inches high, with level floor and ceiling. A few rather coarse dry twigs are strewn over the floor. The eggs I am not acquainted with. Mr.



BRAZILIAN MOTMOT ($\frac{1}{2}$ nat. size).

José C. Zeledon, to whom I am indebted for the above notes, also tells me that if one of these nests be opened at about the time the young are ready to leave the nest, it is found to be one of the dirtiest, most foul-smelling places that can be imagined. At the time the young leave the nest, they are able to fly pretty well. They have the same colours as the adults, but the bill is much shorter, more depressed, and the edges without serration. The tail is shorter than the wings, and nearly square. The eye is sepia-brown, not chestnut, as in the old bird. . . . With the first utterances of the notes of the adults, the peculiar jerky motions of the tail commenced. It was most amusing to watch the four birds sitting in a row together, almost motionless, only giving the tail first a jerk to this side, then to that, now up and now down, to see it hold for the space of a minute almost at right angles to the body, and then go with a whisk to the other side, the birds all the time uttering their peculiar cooing notes."

Broad-Beaked In the single representative of this genus (*Eumomota super-*
Motmot. *ciliaris*) the beak is very much flattened, and has a grooved ridge on the culmer with hair-like rictal bristles. The tail is long and exceeds the wing in length, and has a broad racket at the end. The colour of the species is grass-green, with the mantle cinnamon, the crown grass-green with a broad white eyebrow, shading off behind into silvery cobalt; at the base of the cheeks a few spots of silvery blue; the under-parts are rusty, inclining to grass-green on the fore-neck and breast, and to oily green on the sides of the face and throat, in the centre of which is a black streak, bordered on each side with silvery blue feathers. This species, which has a total length of 15 inches, inhabits Central America from Yucatan to Costa Rica, where these birds are locally known by the name of torovoces. "In the breeding-season," writes Mr. R. Owen, "these birds are in full song, if their croaking note may be so termed, and are as noisy and busy then as they are mute and torpid during the rest of the year. I do not know of any sound that will convey a better idea of the note than that produced by the laboured respiration occurring after each time the air is exhausted in the lungs by the spasms of the whooping-cough. The nest of the torovoz is subterranean, and is usually found in the banks of rivers, or of water-courses which empty into them. The excavation is horizontal, and at a distance from the surface, varying with the depth of the barranco or bank in which it is situated. The size of the orifice is sufficient to allow the bare arm to be introduced, the shape being round and regular for three or at most nine feet, where the shaft terminates in a circular chamber about eight inches in diameter and five inches high. In this chamber the eggs, usually four in number, are deposited upon the bare soil. The banks of the river which winds through the plain of San Geronimo are full of excavations made by this bird—that is to say, in such places where the soil is light and the bank chops down perpendicularly. It is a simple matter to hit upon those which are inhabited, as the entrance to the abandoned ones will be found perfectly smooth, whereas the mouth of those which contain eggs or young is ploughed up in two parallel furrows made by the old bird when passing in and out. The torovoz is exceedingly tame, and, when started from its nest, will, perched upon a bough a few yards distant, watch the demolition of its habitation with a degree of attention and fancied security more easily imagined than described."

THE BEE-EATERS.

Family *MEROPIDÆ*.

The bee-eaters constitute a well-marked group confined to the Old World, their place in America being taken by the motmots and jacamars. They have a long and curved bill, with a well-marked ridge along the culmen; the feet are syndactylous, like those of the kingfishers, with the soles very broad, and the third

COMMON BEE-EATER ($\frac{2}{3}$ nat. size).

and fourth toes united almost for their entire length, while the second is joined to the third for its basal joint only. The tail-feathers are ten in number; the palate is bridged (desmognathous); and the breast-bone has four notches on its hinder margin; while there are also certain other osteological characters distinguishing the group, into the consideration of which it would be out of place to enter here. Of the five genera by which the family is represented, two (*Meropogon* and *Nyctiornis*), both of which are Asiatic, are distinguished by a tuft of overhanging plumes on the breast, which are wanting in the other three. Of the latter, the swallow-tailed bee-eaters (*Dichrocercus*) and square-tailed bee-eaters (*Melittophagus*) are confined to Africa, while the true bee-eaters (*Merops*) inhabit all the four great continents of the Old World. As a rule, the bee-eaters lay glossy white eggs in a

nest situate at the end of a long tunnel excavated by the birds themselves, although the two species of *Nyctiornis* are stated to nest in trees.

Swallow-Tailed

Bee-Eaters.

Distinguished by the absence of a tuft on the breast and the forked swallow-like tail, in which the central feathers lack the elongation characterising the other members of the family, the African swallow-tailed bee-eaters (*Dichrocercus*) are represented by two species, one of which (*D. furcatus*) comes from the western side of the continent, while the other (*D. hirundineus*) is a southern form. The latter is distinguished by having the forehead and eyebrow of the same green hue as the rest of the head, instead of being blue; while the general colour of the upper-parts is golden-green; the wings being green, and their primary quills light chestnut with black tips, forming a terminal band to the wing-feathers; the upper tail-coverts and the central tail-feathers are blue, the remainder golden-olive tipped with white, before which is a shade of black; a black streak runs along the sides of the head; the cheeks and throat are orange-yellow, followed by a black band; the breast is green; the abdomen and under tail-coverts blue; the bill black; the feet dusky grey; and the iris crimson. The whole length is 8·5; that of the wing being 3·95; and that of the tail 4·0 inches. The sexes are alike in colour. This bee-eater inhabits the Cape Colony and South Africa generally, extending on the east as far north as the Zanzibar region, and on the west to Damaraland and Benguela. In habits this species is like the other bee-eaters, hawking for food in the open, and capturing insects in full flight. It seems, however, to fly at a lesser altitude than some of its larger relations, and nests in sandy banks, making a tunnel of about three feet in length, the entrance to the tunnel being very small, not more than two inches wide, but opening out into a slightly wider chamber at the end.

Square-Tailed

Bee-Eaters.

The square-tailed bee-eaters (*Melittophagus*) are all of small size, measuring only from 6 to 9 inches in length, and mostly confined to Africa, although two species range into India and the countries east of the Bay of Bengal as far as Java. Thirteen in number, these bee-eaters are easily recognised by their squared tails; their general coloration being of the peculiar green hue common to the group, although with considerable contrasts of blue and yellow, some also having a black band on the throat. While the African species frequents water-courses, the little bee-eater (*M. pusillus*) prefers reedy marshes and swamps, where it perches on low bushes and trees. On the other hand, the white-fronted species (*M. albifrons*) selects higher trees in the neighbourhood of water. A well-known member of the genus is the chestnut-headed bee-eater (*M. swinhoei*), in which the lower back and upper tail-coverts are silvery blue; the primary quills having their inner surface rufous with a blue bar at the end; while the tail is greenish blue; the head and mantle chestnut; the throat yellow, with a black band inferiorly; the under surface of the body emerald-green; the breast and flanks marked with yellow, and the abdomen and under tail-coverts blue. This pretty species is found in the Indian Peninsula and Ceylon, extending through the Burmese countries to Siam and Cochin China, and southwards to the Malay Peninsula. The eggs, like those of the rest of the family, are pure white, and four or six in number, the holes in which they are laid being tunnelled in sandy soil by the

birds themselves, either in a retired bank of a river or in the sides of a road, and the tunnels varying in length from one foot to seven feet, with the chamber at the end larger than the rest of the excavation. The direction of the passage is not always straight, Davison stating that he has found some of them, after a depth of twelve or eighteen inches turning off almost at a right angle, while others took an almost circular direction. There is no nest in the chamber, and the eggs are laid on the bare floor of the chamber, which is about six inches in diameter.

True Bee-Eaters.

Of somewhat larger size than the last, the true bee-eaters (*Merops*) are represented by seventeen species, all distinguished by the central tail-feathers being elongated beyond the others. Of these, eight are peculiar to Africa, while two (*M. persicus* and *M. viridis*) inhabit both Africa and India; Arabia owning two species, namely, *M. cyanophrys* from Aden, and *M. muscatensis* from Muscat. In Europe *M. apiaster* is common in summer, *M. philippinus* abounds from the Indian Peninsula to Southern China and even extends over the greater part of Malaysia, while *M. ornatus* is Australian. Two (*M. bicolor* and *M. sumatranus*) are confined to the Indian region, and one of the handsomest species is *M. breveri* from the Gabun and the Congo in West Africa. The common bee-eater (*M. apiaster*) is a rather large species, measuring 10 inches in length, with the wings 5.9, and the tail 4.5 inches. The head and mantle are chestnut, the back and scapulars creamy buff, the lower back washed with blue like the upper tail-coverts; the lesser wing-coverts are green, but the rest are chestnut like the secondaries, which are tipped with black; the quills are blue with blackish tips; the tail green with blue edges, the central feathers almost entirely blue; the cheeks are blue in front, white behind, the crown chestnut, with a white band on the forehead, followed by a blue line joining a narrow blue eyebrow; the throat is yellow, with a black band across the lower part; the rest of the under surface greenish blue; the bill black; the feet greyish brown; and the iris yellow. The sexes are alike in colour, but the young are paler, having a green eyebrow, with the black bar on the lower throat, and show a general wash of green over the head, mantle, and back. This bee-eater visits Southern Europe regularly every summer, and is found as far east as Turkestan, Kashmir, and Sind; breeding in Afghanistan and plentifully in Kashmir. Its habits are like those of other bee-eaters, the bird taking its food on the wing, and being very destructive to bees in certain parts of Southern Europe, visiting the hives and capturing the insects as they fly out and in. In winter it visits all parts of Africa, and is even said to rear a second brood in its winter home. Several species of European birds are, indeed, reported to nest in the southern countries where they winter, but although these records must be received with caution, in the case of the common bee-eater the evidence is certainly remarkable, for Mr. Layard says that not only did he receive information of the breeding of the species, but he himself found it nesting in large numbers on the Berg River in September and October. He observes that "it does not always select a bank into which to bore the hole destined for its nest, for we found one flat piece of sandy ground perforated with numberless holes, into which the birds were diving and scrambling like so many rats."

**Celebean
Bee-Eater.**

In the island of Celebes is found a peculiar species (*Mesopogon forsteni*), characterised by having the two central tail-feathers elongated, as in the genus *Merops*, but with a bunch of overhanging plumes on the breast. The colour of the bird is green, the quills being dusky at the ends, the central tail-feathers green, but the rest chestnut with green edges; the head, throat, and breast are deep ultramarine; the hind-neck maroon-brown; the abdomen dusky blackish washed with green; under tail-coverts chestnut with green margins; the total length is 13 inches. The species is only found, according to Dr. Meyer, in dense forests difficult of access, where it inhabits the highest trees, and has the manners and ways of other bee-eaters.



BLUE-BEARDED BEE-EATER ($\frac{1}{2}$ nat. size).

**The Bearded
Bee-Eaters.**

The two species constituting the genus *Nyctiornis* are distinguished not only by the tufts of feathers on the breast, but also by the squared tail and densely feathered nostrils. The blue-bearded bee-eater (*N. asheroni*) is an Indian bird, extending east to Siam, but replaced in Tenasserim and the Malay region by the scarlet-bearded bee-eater (*N. amietta*), a beautiful species, with the long feathers of the throat scarlet instead of blue, and the forehead lilac instead of bluish green. This species is said by Mr. Whitehead to be fairly common in parts of Borneo, frequenting the high forest, where it sits solitary on the lower boughs of trees, making short flights after insects. Although there is one statement as to its eggs having been taken from a tunnel, the blue-bearded bee-eater is believed to nest in holes in trees, having been seen to fly out of such cavities in Tenasserim.



HOOPoes

THE HOOPoes.

Family UPUPIDÆ.

The beautiful birds known from their cry as hoopoes form, with the wood-hoopoes, a group having no very close allies, and are regarded, like each of the last few preceding families, as constituting a suborder by themselves. They have, indeed, been considered as nearly related to the perching birds, from which they are, however, sharply distinguished by the bridged structure of the palate, as well as by the presence of two deep notches in the hinder border of the breast-bone. They are further characterised by a perforation in the fore-part of the latter bone, which allows the two metacarpoid bones to meet in the middle line; a similar condition obtaining in the bee-eaters and hornbills. Indeed, it is the latter birds, which at first sight appear so different, that seem to be the nearest allies to the hoopoes, both these groups displaying very remarkable nesting-habits, and also having certain structural features in common. The whole of the members of the present family are included in the single genus *Upupa*, and are desert-loving birds, inhabiting suitable localities in Africa, the greater part of Asia, and temperate Europe, and specially distinguished by the sandy hue of their plumage, which is devoid of any metallic gloss, the squared form of the tail, and the open and rounded nostrils. They are represented by six species, three of which are exclusively confined to Africa and Madagascar; while the Indian hoopoe (*U. indica*) ranges from the country from which it takes its name to Burma, and on the western limits of its range apparently interbreeds with the common European species.

The latter species (*U. epops*), which is the one represented in our coloured Plate, has its plumage of a general sandy brown colour, with black-and-white bands. Conspicuous from the crest of erectile plumes adorning the head, the hoopoe has the secondary quills black with four white bars of equal width; the rump is white; the primary quills are black with a broad band of white; the lesser wing-coverts being of the same sandy hue as the back, while the median series is black tipped with buff. The dark vinous crest-feathers are tipped with black, bordered inferiorly by a line of white; the flanks have blackish streaks; the under tail-coverts are white; the tail is black with a broad white band, somewhat bent downwards on the outer feathers; while the beak is black, with a flesh-coloured base, and the feet are likewise black. In total length the bird measures about a foot. The range of this species apparently extends from Southern Sweden and Central and Southern Europe generally, to Japan. Its winter home appears to be in Senegambia, South-Eastern Africa, and the peninsula of India. In the latter area it probably intergrades with the resident species, which has no white subterminal bar on the crest-feathers, although many intermediate specimens are met with, showing an indication of a more or less perfect white bar, and are doubtless the result of crossing. The sexes of the common hoopoe are alike in colour, and the young birds resemble the adults but have a more fluffy plumage. Breeding as a rule in hollow trees, the hoopoe is now become rare in those parts of the Continent where the country has been denuded

of timber. Like the hornbills, the female has the habit of sitting very closely on her eggs, during which period she is fed by her mate. Lord Lilford writes that hoopoes generally "prefer a hole in a hollow ash or willow for nesting in;" but I have seen a nest on the ground under a large stone, others in holes on the sunny side of mud or brick walls, one in a fissure of limestone rock, and one in a small cavern. The eggs when first laid are of a beautiful pale greenish blue, but soon become stained and dirty, so that the average hoopoe's egg is of a dirty yellow colour. Swinhoe, again, writing from China, observes that "many years ago a pair of hoopoes took possession of a hole in the city wall at Amoy, near my house. The hen sat close until the young were hatched, the male frequently supplying her with food during the day. Hoopoes have often bred in the holes of exposed Chinese coffins; the natives hence have an objection to them, and brand them as the 'coffin-bird.' The young, when hatched, are naked, but soon get covered with small blue quills, which yield the feathers. The little creature has a short bill, and crouches forward, making a hissing noise. It looks a strange compound of the young wryneck and kingfisher. They do not stand upright till nearly fledged. Their crests develop at once, but their bills do not acquire their full length till the following year." A correspondent of Blyth's at Calcutta, who was one of the first to draw attention to the circumstance of the nesting hen being fed by the cock, writes that two pairs of these birds, nesting in his veranda, became so tame that his presence never disturbed them in the least; and he twice saw the males with the females just at the bottom of the steps, and within ten yards of where he was sitting. "I was therefore," he continues, "thoroughly familiar with them, and can assert most positively that for a number of days I never saw the female of either pair out. I did not pay any attention at first to the circumstance of there being only two flying about, until I observed both males going up to the nest with gnats in their bills, giving a call, and then putting their heads inside for the hens to take the food. The feeding-times were morning and evening, at regular hours—the former about seven or eight o'clock, and again in the afternoon about four o'clock. I have seen the males getting the gnats, etc., close under the very steps I was sitting on, and almost within two yards of my chair, then flying up, giving a call, and coming down again directly the food was taken. The nests were at opposite ends of the veranda, and only one of the broods came out. I saw some time ago a notice in the *Field*, mentioning the dirty state of the nest, before this could have been caused by the young; and, if my idea is correct, the explanation is simple. I never saw the males go inside the holes in which the nests were, and I never saw either of the females outside during the time they were hatching, though of course it is possible they may have gone out. If I should live, I will, next spring, observe more carefully; but it was a good while before I noticed the absence of the females this year. Last year I had one nest only in the veranda, and another in the veranda of my office. The hoopoe, I know, breeds in France; and possibly you may be able to find out if any notice of this fact has been taken." And in a second communication he adds: "In continuation of my letter of last year, I may mention that there were again this spring two hoopoe's nests in my veranda, and in the same place. I find that the hens do leave the nest once or twice a day, but I have

never seen them stay out longer than to give time to get rid of their droppings, and I have never seen either of them on the ground when out. Generally speaking, they perch on a tree near at hand, and after sitting a few moments for the purpose mentioned, fly back to the nest. Two or three times one of the hens flew out, passed her dropping whilst on the wing, and returned to the nest without having settled anywhere. They are fed most indefatigably by the cocks, and the number of grubs, small worms, and so forth, destroyed by them is very great." As already mentioned, the name hoopoe is doubtless derived from the note of the bird, rather than from the fact of its possessing a remarkable crest, whence may come the French title, "la huppe." Swinhoe writes that the notes are produced "by puffing out the sides of its neck, and hammering on the ground at the production of each note, thereby exhausting the air at the end of the series of three notes, which makes up its song. Before it repeats its call it repeats the puffing of the neck, with a slight gurgling noise. When it is able to strike its bill, the sound is the correct *hoo-hoo-hoo*, but when perched on a rope, and only jerking out the song with nods of the head, the notes most resemble the syllables, *hoh-hoh-hoh*!"

THE WOOD-HOOPOES.

Family *IRRISORIDÆ*.

From the members of the preceding family the wood-hoopoes are distinguished by the more or less marked metallic gloss on their plumage, the long, wedge-shaped form of the tail, which exceeds the wing in length, and the elongated nostrils, which are partly concealed by an overhanging flap. These birds are represented by three genera, all of which are confined to Africa, and differ from one another merely in the degree of curvature of the beak and the contour of the nostrils. The species which we select as our example of the family is the purple-tailed wood-hoopoe (*Irrisor viridis*), which is a bird of considerable size, measuring about $14\frac{1}{2}$ inches in total length. The colour of the upper surface of the plumage is metallic green, somewhat inclining to bronze on the back, and with a steely blue tinge on the hinder part of the head and neck; while the feathers of the lower portion of the back, as well as the upper tail-coverts, are bluish black edged with dark copper. The wings are steel-blue, their primary coverts being tipped with white, while the lesser coverts are edged with copper, and the primary quills crossed with a band of white consisting of twin spots, the outer one smaller than the inner one; the tail is purple, shot with violet, all but the central feathers with an oblique subterminal bar of white; the under surface glossy steel-blue; the breast and upper part of the abdomen shining metallic-green; the lower abdomen and under tail-coverts glossy purplish black; the bill and feet scarlet, and the iris dark hazel. This species is an inhabitant of South Africa, whence it ranges as far north as Angola on the west, and to Mombasa on the east coast. In North-Eastern Africa, and on the west coast from Senegambia to the Niger, its place is taken by the allied species, *I. erythrorhynchus*, distinguished by having the tail greenish blue instead of purple. In habits all the wood-hoopoes are very shy and wary, and very active and erratic in their movements, always

frequenting trees, and seldom descending to the ground. They are said to breed in hollow trees and lay white eggs, and the nests have the same offensive smell as those of the ordinary hoopoes. Mr. Ayres says that the birds themselves have a very powerful and disagreeable smell, and he has seen them creeping about the trunks and branches of trees, after the manner of woodpeckers, and feeding on cockroaches, which they take from the crevices of rough-barked trees. They are



PURPLE-TAILED WOOD-HOOPOE ($\frac{1}{3}$ nat. size).

generally seen in flocks, probably consisting of family parties, and they have a loud and harsh cry, which has caused the name of kachela or chatterer, to be given to them by the Dutch colonists.

THE HORNBILLS.

Family BUCEROTIDÆ.

The hornbills, which form a suborder as well as a family by themselves, derive their name from the great development of the bill, which is mostly hollow, and furnished with a casque of greater or less prominence, although the latter appendage is sometimes represented merely by a straight and compressed keel. Moreover, in the case of the solid-casqued hornbill (*Rhinoplax*), the whole of this

portion of the beak is solid, and the entire skull consequently very heavy, whereas in the other species it is remarkable for its lightness. The palate is of the bridged type, and the upper part of the breast-bone has the same perforation as in the hoopoes and bee-eaters. The spinal feather-tract is not defined on the neck, and the tendons of the foot are split into branches, of which one leads to the first toe and another to the second, while the third and fourth toes are served by one and the same tendon. The tail-feathers, as in most of the Picarian birds, are ten in number. The egg is white, and the young are hatched in a naked and helpless condition. Confined to the Old World, the hornbills are found in Africa and the Indian region, extending through the Malay countries to Celebes, and thence to



HEAD OF WEST AFRICAN TRUMPETER-HORNBILL.
(From Selater, *Proc. Zool. Soc.*, 1871.)

New Guinea and the western islands of the Solomon group. They are divisible into three subfamilies, the ground-hornbills (*Bucoracinae*), true hornbills (*Bucerotinae*), and solid-casqued hornbills (*Rhinoplacinae*).

These curious and vulture-like hornbills, constituting the first subfamily, are peculiar to Africa, and have a hollow casque, while the back of the neck and middle of the back are both feathered, and the metatarsus is long, even to the extent of twice the length of the middle toe and claw. The group is represented only by two species, namely, the Abyssinian hornbill (*Bucorax abyssinicus*) from Western and North-Eastern Africa, and the South African hornbill (*B. cafer*) from South Africa, extending on the west to Angola, and on the east to the Pangani River and even as far as the Suk country in Equatoria. These two species differ in the form of the casque, that of the Abyssinian bird being very evidently open in front, while the South African species has the casque closed, or nearly so. The Abyssinian form measures upwards of 3 feet in length, with a wing of 24 inches, and has the entire plumage black, excepting the primary quills, which are white. The bill and casque are

black, with a red patch on the lower mandible, and the feet are dusky black; while the bare parts of the face are red, with the exception of the naked skin round the eye and on the middle of the throat, which is blue. The female has the bare skin of the throat and region of the eye purple. In North-Eastern Africa this hornbill is said to be found in the wooded steppes and on the mountains up to a height of four thousand feet, though more common between



ABYSSINIAN GROUND-HORNBILL ($\frac{1}{2}$ nat. size).

one and two thousand feet. After the breeding-season they assemble in small flocks, when as many as ten or a dozen are seen together. Of the habits of the South African ground-hornbill more is recorded. Known to the Boers as the *bromvogel*, this species is regarded as a *fetich* among many of the native tribes, being a rain-omen with the Kaffirs, who believe that if one of these hornbills is killed there will be rain for a long time, and who, therefore, in times of drought will throw one of the birds into a vley, in order that rain may follow. Colonel Bowker says that the bird is so offensive that the native idea is

that the throwing of its body into the water will "make the river sick," and that "the only way of getting rid of this is to wash it away to the sea, which can only be done by heavy rains and flooding of the river." These hornbills seem to be practically omnivorous, and devour great numbers of beetles, worms, mice, small birds, etc. They generally associate in small companies, and when a snake is discovered, they come round it, holding their wing stretched out and flapping the reptile with it until it is irritated and seizes hold of the feathers, when all the birds crowd round it and peck it, until it looses its hold: this manœuvre being repeated till the snake is dead. If the latter advances, the birds fold both wings in front of them, so as to form a shield, thus covering their head and other vulnerable parts. Mr. Ayres says that their call-note, *coo-coo*, can be heard at a distance of two miles. The nests are placed in the holes of trees, or in hollows formed by three or four branches striking off from the same spot.

Rhinoceros-Hornbills. The rhinoceros-hornbills form the typical representatives of the second subfamily *Bucerotinae*, all of which are more arboreal in their habits than the last group, in consequence of which the metatarsus is proportionately shorter, not exceeding the third toe and its claw in length. The subfamily may be divided into two sections, according to the form of the tail. The first section in which the tail is squared, includes the African trumpeter-hornbills (*Bycanistes*), of which the head is figured on p. 61, the members of the present genus, as well as several smaller forms, such as *Penelopides* of the Philippines and Celebes, and *Lophoceros* of Africa; the latter genus containing the smallest member of the family, measuring only 15 inches in length. The common rhinoceros-hornbill (*Buceros rhinoceros*), inhabiting the Malay Peninsula and the islands of Sumatra and Borneo, is of large size, measuring nearly 4 feet in length. The colour is black, with a slight gloss of steel-blue or dark green; the rump and upper tail-coverts being white, as is also the tail, which has a broad bar of black just before the tip; while the under surface of the body is black, with the exception of the lower abdomen, thighs, and under tail-coverts. The bill has a large casque, with the fore-part turned up into a horn-like protuberance, whence the bird's name of rhinoceros. The colour of the bill is whitish yellow, black at the base, the casque lake-red, shading off below into orange near the base, which is black; and there is also a black line from the side of the nostrils to the fore-part of the casque. The feet are yellowish green, and the iris deep lake. The female resembles the male in colour, but has no black base, and no black median line along the side of the casque. In the young birds there is no fully-developed casque, but only a small orange-coloured excrescence on the top of the upper mandible. In Java another species is found (*B. sylvestris*) with a nearly straight casque. In many places this great bird is kept in a state of semi-domestication, and Mr. Burbidge writing of one which he saw thus kept in North-Eastern Borneo, observes that "the rhinoceros-hornbill is very often seen in a state of domesticity, enjoying at the same time perfect liberty. When very young they are taken from the nest, and accommodated with a bit of old cloth in a basket as a bed, being fed on rice and soft fruits, until they are strong enough to wander about; they sit on their haunches, wheezing and shrieking all day long, and continually clamouring for food. Their beauty is about equal to that of a very fat badly-plucked goose.

If well fed, however, they soon gain strength and assume their plumage; and then they flap about the house and steal or beg for food. At one place where I stayed collecting for some time, a native, in whose house I had established myself, had reared a very fine specimen of this bird. It was the most voracious brute I ever saw. It was omnivorous, and nothing came amiss to it or seemed to disagree with it. It was a fine full-grown male, and a jolly fellow into the bargain. Very often he would descend from a tall camphor-wood tree, which stood a hundred yards or so from the house, in the jungle, to the top of which he was fond of going to sun his wings and clean himself after a meal. When he was very hungry, it was only by tying a string to his leg, and moving him to the side of the house, that he could be prevented from eating off the same plate as myself, or putting his great horned head into the rice-dish or curry-bowl. Bones of a fowl, curried or not, were gobbled up instantly; and the wonder was to me how he managed to bolt big bones and tough biscuits without choking himself. Whatever was thrown anywhere near his head was sure to fall into his open bill; indeed, I never saw a dog that could catch food in his mouth better; everything was caught on the point of his great bill, and then tossed into the air, being again caught and swallowed; this tossing was always performed. Bones, the entire bodies of small birds from which the skins had been removed for preserving, lumps of bread, biscuits, fruit, fish, or wet rice, shavings, and even nodules of moist earth, all seemed equally welcome; and after taking in a cargo of provisions which would have formed an ample meal for a pig twenty times his own weight, he would 'saw the air' with his great wings, and having gained his favourite perch on the tall camphor-tree, would sun himself and plume his wings, and shriek until he became hungry rather than hoarse."

Great Pied Hornbill. This species (*Dichoceros bicornis*) is the largest of the hornbills, measuring nearly 5 feet in length, with a great casque, concave on the top, and nearly square, rising into well-marked corners on the fore-part. The colour is black with white bases and tips to the greater wing-coverts and quills; the tail being white with a broad band of black just before the tips of the feathers; while the bill and the casque are yellow, inclining to orange-red on the top of the latter, with some black marks at the base of the bill and along the margins of the casque; and the naked skin round the eye is fleshy pink, and the iris blood-red. This hornbill, remarkable for its clumsy-looking bill, inhabits the hills of Southern India, the Himalaya, and their continuation in the Burmese countries to Siam, ranging southward through Tenasserim and the Malay Peninsula to Sumatra. It is the only representative of its genus; and, as in the other species of giant hornbills, there is a difference in the sexes, displaying itself not in plumage, but in the colour of the bill. Thus in the female there is no black on the casque; while the bare skin of the face is reddish, and the eye is white, instead of red. Mr. Hume has published notes on the nesting of the present species, and it is interesting to note that many observers in India must have discovered the fact of the strange nesting-habits of the hornbills previous to Livingstone, who is generally credited with having been the first to draw attention to the incarceration of the female bird during the period of incubation. Colonel Tickell, for instance, writing in 1855 of the nesting of the great pied hornbill in Tenasserim, says:—"On my way back

to Moulmein from Mooleyit, when halting at Kyik, I heard by the merest chance from the Karen villagers that a large hornbill was sitting on its nest in a tree close to the village, and that for several years past the same pair of birds had resorted to that spot for breeding. I accordingly lost no time in going to the place the next morning, and was shown a hole high up in the trunk of a moderately large straight tree, branchless for about fifty feet from the ground, in which I was



TWO-HORNED HORNBILL.

told the female lay concealed. The hole was covered with a thick layer of mud, all but a small space, through which she could thrust the end of her bill, and so receive food from the male. One of the villagers at length ascended with great labour by means of bamboo-pegs driven into the trunk, and commenced digging out the clay from the hole. While so employed, the female kept uttering her rattling sonorous cries, and the male remained perched on a neighbouring tree, sometimes flying to and fro, and coming close to us. Of him the natives appeared to entertain great dread, saying that he was sure to assault them; and it was with

some difficulty that I prevented them from shooting him before they continued their attack on the nest. When the hole was sufficiently enlarged, the man who had ascended thrust in his arm, but was so soundly bitten by the female, whose cries had become perfectly desperate, that he quickly withdrew it, narrowly escaping a tumble from his frail footing. After wrapping his hands in some folds of cloth, he succeeded with some trouble in extracting the bird, a miserable-looking object enough, wasted and dirty. She was handed down and let loose on the ground, where she hopped about, unable to fly, and menacing the bystanders with her bill, and at length ascended a small tree, where she remained, being too stiff to use her wings. At the bottom of the hole, nearly three feet from the orifice, was a solitary egg, resting upon mud, fragments of bark and feathers." The number of eggs laid by hornbills seems to vary, sometimes only one being met with, while at other times four or even five are found in the nest; the present species, apparently, never laying more than four. The female seems to assist in the matting-in of the nest-hole, using leaf-mould and earth, mixed with her own droppings and various decaying vegetable substances, so that the nests are often filthy and give forth an intolerable stench. In all probability the real reason for the retirement of the female hornbill into the recess of a tree, is that the bird is about to moult, and that this process is completed while concealed in the tree. Thus the emaciated condition of some of the birds, when liberated, could be accounted for, while their subsequent fat condition and good plumage would be the result of the completed moult. The hole is doubtless plastered up as a defence against enemies, of which the hornbills have plenty. The formidable bill of the birds is useful as a weapon of defence, as well as being of the needful shape to serve as a trowel for plastering up the hole of the tree.

Wedge-Tailed Hornbills. The wedge-tailed hornbills, as the members of the second section of the typical subfamily are collectively termed, comprise several genera distinguished from the first section by the elongation of the central pair of feathers in the tail. In the case of the genus *Berenicornis* of Malaysia, as well as in the West African *Ortholophus*, the tail is very much elongated, and forms a graceful appendage of graduated feathers, which have conspicuous white tips. To this section of the hornbills belong the members of the genus *Lophoceros*, which is peculiar to Africa, and contains seventeen species. They are all small birds, compared with the general run of the species of *Bucerotidae*, and their mode of life seems to be somewhat different from those of the big hornbills of the east, though they have the same habit of plastering up the female in a tree at the season of incubation. They are often found on the ground, and feed on berries, seeds, and insects; Mr. Andersson stating that he has found considerable quantities of sand in their stomachs, picked up by the birds when on the ground. Of the yellow-billed hornbill (*L. melanoleucas*) the above-named naturalist remarks that it "is the most common of the hornbills in the middle of the southern parts of Damaraland. It is found singly or in pairs, and, being a comparatively fearless bird, is easily killed, especially during the heat of the day, when it invariably perches on or near the top of a lofty tree (where such are to be found), and will remain for hours in this situation, keeping up, with short intermissions, a kind of subdued chattering note of *tõe tõe tõe tõe tõe tõe tõe tõe*, in a tone not unlike the quick yelping of young

puppies, and accompanied at intervals by a flapping and raising of the wings and an alternate lowering and erecting of the head." The yellow-billed hornbill is about 21 inches in length, and has a tail about 9 inches long. It is easily distinguished by its yellow bill and by the feathers on the chest being white edged with black. It is found all over South Africa. Another species of *Lophoceros*, namely, the South-African grey hornbill (*L. epirhinus*), is easily recognised by the pale buff line down the centre of the back, and by having white shafts to the



YELLOW-BILLED HORNBILL.

central pair of tail-feathers; the head and neck are grey, with a broad white eyebrow; the beak is brown, and the quills are tipped with white; the under surface of the body is white, with the chest brownish grey. Length, 20 inches; wing, 9 inches. This species, Mr. Ayres says, is a great fruit-eater, and lives in small companies. He states that he was once much surprised to hear one of these birds, perched on the top of a small tree, singing very prettily with the voice of a thrush. "I could scarcely believe my ears," he observes, "until I had watched the bird for a considerable time; at last he flew away, and the woods were

silent." Mr. Andersson says that he has found this hornbill in Damaraland and the lake-regions of South-Western Africa. It is seen in small families, rarely exceeding six in number. "In common with the rest of the genus it appears to suffer very much from the heat during the most trying season of the year, when it may be found perched at noon in the shadiest part of the forest, gasping as if for breath. When on the wing this species occasionally utters short, piercing cries."

With regard to the Malayan wedge-tailed hornbill (*Anorhinus galeritus*) a curious experience is related by Mr. Whitehead, who found a nest of the species in Northern Borneo. He shot three of the birds before he became aware that there was a nest-hole in the tree, but, on being assured of the fact, he sent one of his boys to climb up and let the old female out. When the native went to do this, he found two or three birds engaged in feeding her and her young one. Mr. Whitehead says that the hole is firmly fastened up with gutta, dirt, and various gums, and the same hole is frequently used, judging by the heaps of excrement at the foot of the tree. He also considers that the plastering of the hole is necessary to protect the helpless birds against the attacks of monkeys, and the huge tree-climbing monitor lizards, which cause immense destruction among the feathered population of the forests.

Solid Billed Hornbill. In marked contrast to the light and cell-filled casques of the other members of the family, the beak of the solid-billed hornbill (*Rhinoplax vigil*) has, as already mentioned, a perfectly solid casque; on which account this bird is referred to a separate subfamily. In this species the beak has the consistence and appearance of ivory, and is indeed carved by the Chinese in the same way. The species in question is an inhabitant of Southern Tenasserim, the Malayan Peninsula, and the islands of Sumatra and Borneo. In addition to its solid bill, it is remarkable for having the whole of the throat and back of the neck bare. The length of the bird is nearly $5\frac{1}{2}$ feet, the tail alone being almost 3 feet long. The general colour is brown, the quills black with white tips, and the tail brown tipped with white, the tips being preceded by a black band. The two central feathers are more than double the length of the next pair, and the outer pair are entirely white. The under surface of the body is white, the breast being brown, the bill yellow, with the posterior portion red, like the bare throat and neck, while the feet and iris are also red. Davison, who found this species in Southern Tenasserim, where he procured a single specimen after much trouble in the evergreen forests of Bankasori and Malwun, says that it is very shy, which is not to be wondered at, since, whenever one appears near a village, everyone who can shoot or can get hold of a gun is sure to try and kill it, as the heads are in great demand for carving into love-charms, bringing as much as fifty rupees. "The birds," he writes, "confine themselves almost exclusively to the evergreen forests, where they frequent the very highest trees. Their note is very peculiar and can be heard at the distance of a mile or more. It commences with a series of whoops, uttered at intervals of about half a minute for five or ten minutes; then the interval between each whoop grows shorter and shorter, till the *whoop whoop* is repeated very quickly ten or a dozen times, the bird ending up by going into a harsh, quacking laugh. Then there is a pause of ten minutes, or a quarter of an hour or more, and then it recommences. It chiefly utters this call in the

morning and evening, but occasionally also during the day. It never seems to descend to the ground, and it feeds on fruit."

THE KINGFISHERS.

Family *ALCEDINIDÆ*.

It is scarcely possible to name a country in the world where kingfishers of some sort or another are not found. Although they vary greatly in form and



THE KINGFISHER ($\frac{2}{3}$ nat. size).

habits, as a rule they have a long and somewhat pointed bill; but the shape of this organ varies considerably in form, according as the bird is a fish-catcher or a devourer of reptiles and other food than fish. The structure of the foot, however, scarcely changes throughout the group, for every kingfisher is flat-soled and has an anisodactyle foot, with the toes for the most part united together, so that the foot of these birds is by no means unlike that of a hornbill, to which group some of the larger kingfishers make an approach in general appearance. Unlike so many of the Picarian birds, most kingfishers have twelve tail-feathers instead of ten, though a few possess the ordinary Picarian number. As in the hornbills and

rollers, the deep plantar tendons of the foot are peculiar, the tendon which usually supplies the first toe not serving that function in these three families, for the toe in question is connected with the tendon which usually works the three front toes. The eggs of the kingfishers are always laid in the hole of a bank of some kind, or a tree, and are glossy white; while the young birds, when hatched, are naked and helpless, although in a little while they become covered with feathers, each of which is enclosed in a sheath, thus giving the nestling a peculiar bristly appearance. This sheath encloses the feather till it is almost fully grown, and then falls off rapidly, leaving the feathers exposed; although in all kingfishers and their allies the plumage is never very dense. Indeed, in birds which have to plunge into the water a fluffy plumage would be greatly in the way, and hence we have in the kingfishers a closely-fitting body-plumage, which does not get draggled or wet through by the immersion which it has to undergo.

In 1871 the writer divided the kingfishers into two subfamilies, namely, the fish-eating *Alcedininae*, and the insect or reptile-eating *Daceloninae*; and even now the kingfishers seem still to afford an illustration of the utility of considering the habits of the birds as of primary importance. In this instance characters may be found which can be correlated with the difference in the mode of life. Thus the fish-eating kingfishers are equipped for their manner of living by the development of a long and narrow bill, and a tail just long enough to act as a rudder, but not of sufficient length to be in the way. On the other hand, the bush-kingfishers, which feed less on fish and more on insects and reptiles, have the bill not so narrow or compressed, but more flattened, and in some instances even hooked. Then, again, whereas in the typical subfamily there is almost always a perceptible groove along the bill, leaving the upper part of it in the form of a ridge, in the second group the ridge of the bill is either rounded or flattened, and in one or two instances there is even a groove along the middle of its upper surface.

Stork-Billed Kingfishers. This subfamily includes five genera, the members of all of which are essentially fish-catchers, although on occasion they will eat small insects and crustaceans as well as other kinds of food. Two of the genera, viz. *Pelargopsis* and *Ceryle*, although their representatives are thoroughly piscivorous, have long tails, exceeding the length of the wings; but in the other three, viz. *Alcedo*, *Corythornis*, and *Aleyone*, the tail is conspicuously shorter than the wings. The stork-billed kingfishers inhabit the Oriental region, and differ from the species of *Ceryle*, the only other fish-eating genus with a long tail, in having the sexes alike in colour, the bill very sharp and pointed, and the base of the upper edge or culmen flattened and somewhat ridged, instead of being round and smooth. The species of this genus are further characterised by their bright blue backs, thus resembling those of the under-mentioned *Halcyon*, whereas in *Ceryle* there is no bright blue colour. Of the stork-billed kingfishers eleven species are known, their range extending from the Indian Peninsula and Ceylon, through the Burmese and Malayan countries to Java, Sumatra, the Philippines, Borneo, and Celebes. The species which inhabits the last island differs from all the others in having a black bill, whereas in the rest it is coral-red. One of the best known species is the Indian stork-billed kingfisher (*P. gurial*), which is a large bird, measuring 14 inches in length, with a wing of nearly 6½ inches. The general

colour of the plumage is dull green, with a slight shade of blue on the wing-coverts, the outer aspect of the quills and the tail being greenish blue; the head and nape are dark chocolate-brown; round the hind-neck is a collar of pale ochre, and the under surface of the body is of the latter colour; while the bill and feet are dull red. This species is an inhabitant of Ceylon and the greater part of the Indian Peninsula, but it does not reach the north-western provinces, though extending along the Lower Himalaya and the Terai country as far as Masuri and the Dun. Eastwards it ranges to Assam, but is replaced to the south by the Burmese short-billed kingfisher (*P. burmanica*). Generally found along rivers, streams, and backwaters, but only where tolerably shaded by trees, it sits on a branch overhanging the water, and pounces on fish, crabs, and occasionally frogs. Mr. Stuart Baker writes that "this kingfisher is by no means common in the Kachar district, so that I have been able to make but few observations on its breeding and other habits. Personally I have only taken two nests. One of these was placed in a hole about $2\frac{1}{2}$ feet deep, and so large that without much difficulty I was able to put my arm into it and search for the contents. The other burrow was fully 4 feet deep, and the diameter at the entrance about $3\frac{1}{4}$ inches. Both nests were placed in high sandy banks of the Diyung River, upon which and the Jatinga the species is most often met with. The first hole contained four young birds, and the second a single egg. The latter seemed to be rather abnormal in shape, and was smaller at one end than the other. I have never seen the bird fishing on small streams, but it is by no means unusual to find it perched on trees at some distance from water, and it occasionally haunts ravines and other insect-producing places, where there is no water at all. Fish, I believe, form the staple article of its diet, but it varies this with any living thing which is small enough. It is on record that it devours lizards and similar small reptiles, and it is not averse to taking young birds from their nests. Of this latter propensity I have been myself a witness. In Rungpore, in the collector's compound, there stands, or stood some years ago, a large tree full of crevices and holes, and much used as a nesting-place by many mynas and other birds. One morning I was passing under this tree, when I was attracted by the loud shrieking of a *Pelargopsis*, accompanied by the cries of many other birds. The most vehement and excited among these last were a pair of mynas, whose newly-hatched brood were in a large hollow in a big limb some forty feet from the ground, and this had evidently attracted the attention of the bloodthirsty kingfisher. For some time he sat on a branch close to the nest-hole, giving vent every now and then to his loud cries, but taking no notice of the small birds, which came half-heartedly close to him, with the evident wish, but not the pluck, to attack him. Finally, in spite of the frantic shrieks of the parent birds, who ultimately approached quite close to the kingfisher, the latter made a dive into the hollow, and when he came out of it in his powerful beak there struggled a callow young myna. Seating himself comfortably on a branch, he proceeded to swallow it in just the same manner as he would have done a fish; and it may have been the necessity of getting into position before he swallowed his prey which prevented him from completing his meal inside the cramped hollow of the tree. At all events, his action was the saving of the other young birds, for the mynas, rendered furious by the disappearance of one of the youngsters down the throat of the

kingfisher, summoned up courage to attack him in earnest, whereupon he quickly decamped."

Pied Kingfishers. To the members of this genus it is almost impossible to assign a collective English name, for whereas in the Old World they are pied, their Transatlantic cousins are either grey or green. The genus comprises a small assemblage of long-billed and long-tailed kingfishers of fish-catching habits; few of which are such strongly built birds as their short-beaked allies, although some of the Oriental forms are nearly their equals in size. Their great distinctive feature is that the sexes differ in colour or markings; this difference generally displaying itself by the presence in either the male or the female of an additional band on the breast. Seventeen species of these kingfishers are known, twelve of which are American. In colour, most of the latter are glossy green, but four are grey; the best known species being the belted kingfisher (*Ceryle alcyon*) of North America. In the Old World all the species of the genus are either black-and-white, or grey-and-white. One of the largest species is the great pied kingfisher (*C. lugubris*) from the Himalaya and the mountains to the eastward of that chain throughout China to Japan. The head is crested, the crest-feathers being black with white spots, and there is a tuft of white feathers in the centre of the crown, while the rest of the upper surface is banded with grey and white; round the hind-neck runs a broad white collar; the under surface of the body is white, with a chest-band of black and white feathers, and the sides of the body are also barred with black. The female is like the male in colour, but does not show the tinge of rufous on the cheeks and breast-band which are to be seen in the male. The under wing-coverts and axillaries are pale rufous, thus showing the sexual differences which are one of the characters of the genus. Writing of a nest with young found in the North-Western Himalaya, Mr. Hume states that "the entrance was a large hole, fully four inches in diameter, and at the end was a chamber fully ten inches across, in which were four young birds; in the chamber was a quantity of fish-bones and some grass. The eggs are three or four in number, and the birds are in the habit of carrying to their young fishes from six to seven inches in length, and these are always swallowed whole." Mr. Stuart Baker writes that "I have seen but three nests of this bird, the first nest taken was found in July, and was placed at the end of a short tunnel in a bank of one of the biggest rivers in North Kachar, the Diyung. The burrow itself was about two feet long and the egg-chamber was over seventeen inches long by nearly ten broad, the height being almost as much. The eggs, of which there were four, reposed on a quantity of malodorous fish-bones, these extending nearly a couple of inches up the sides of the walls and partially burying the eggs, so this unpleasant material must have been added after the eggs were laid. The soil in which these were found was loose and sandy. The second nest was found by a Naga in a small stream called the Mahor, running between thickly-wooded banks, nowhere much over fifty yards from bank to bank, and, where the nest was taken, under thirty yards across. This nest was in dimensions much the same as that already described, the entrance tunnel being a few inches shorter. The fish-bones also were not so abundant in this nest, doubtless owing to its being newer, as the eggs when found were quite fresh, whereas in the last they were

very hard set, indeed almost on the point of hatching. This hole was made in a rather harder soil than the other, but still not in a clay or really stiff material. The only other nest I have seen was found on the 10th of April 1893, the day before this was written. The female bird I shot as it left the nest, and the male as it came up calling loudly to its mate. The burrow, chamber and all, was complete when found, but was quite empty, containing neither eggs nor nest. The tunnel in this case was not six inches long, and the chamber was about fifteen inches long by about seven broad and six high. The soil in which this nest-hole was excavated was composed of clay and sand mixed, and was decidedly stiff. Judging from the three nests above described, it seems probable that the bird only makes very short burrows. *Halcyon smyrnensis*, *Alcedo ispida*, and many other kinds of kingfishers, would have dug out a hole some four to six feet deep in the ground in which the first nest was taken, and would certainly have made them of over three feet in the other places. In texture and shape the eggs do not differ from the majority of other kingfishers' eggs, although they are unusually small in size. Amongst the bed of bones found in the first and second burrows, there were a good many which must have belonged to fish fully six inches long, but the greater number of them were those of very small fish. The Kacharis tell me that as a rule this bird only lays two or three eggs, and that my finding four was exceptional, but a Kachari's word is not particularly reliable. They are also said to breed principally in May, after the first heavy floods, not, as nearly all other birds which make similar excavations for their eggs do, before the floods. This kingfisher is very common on nearly all the hill-streams of any size, up to about two thousand feet; above this it is much less common; but I have seen it now and then on the Laisung, a little stream at an elevation of about three thousand feet. During the breeding-season it ascends higher up than in the cold weather, during which latter season it is often found well in to the plains, but after April I have not heard of any being met with below about five or six hundred feet. On the Drying Kopili and Zelinga rivers this bird and *C. rudis* meet one another, and for a few miles at their junction both may be met with, but their limits seem to be very distinctly defined, and a straggler of either kind is but seldom met with far beyond them. I believe they are entirely fish-eaters. I have never seen them except on fair-sized streams, and the stomachs of those I have examined contained nothing but fish. Whilst waiting for fish, they perch very low down amongst the scrubby bushes bordering the streams, or else on some overhanging bamboo; but whatever the position selected, it seems nearly always to be one well in shadow, and, instead of sitting on some outside twig or bough, they choose one well inside or under the bush or bamboo clump. In the same manner their love of shade and darkness leads them always to select the shady side of the stream, whenever practicable. As a rule, they are to be found in pairs, seldom singly, for, though the male and female may be some distance apart, they keep within hailing distance of one another. They do not as a rule fly at all fast or far at a time, unless frightened, but on such occasions are capable of flying extremely fast and powerfully, rising high in the air, well out of gunshot, to avoid any danger, and then dropping again when past it, continuing their flight low down close to the water. Their manner of taking prey from the water is by swooping down obliquely towards it, after which

they move further on, seldom returning to their original perch. Occasionally, as they fly along and are attracted by something in the water below them, they will hover momentarily, after the manner of *C. rudis*, and then drop perpendicularly down into it; in these cases, however, they seldom dive to any depth, and do not immerse more than their head and shoulders. The usual cry is much like the typical cry of the family, but it is very loud, and generally uttered in a very quick succession of notes. Besides this cry, it gives a low hoarse croak from time to time when seated in the shadow, which same note is, I think, merely a call to its mate. This sound is very much like the croak uttered by *Batorides javanica*, and I was for some time under the impression that it was made either by that bird or some other small bittern or egret."

Typical Kingfishers. The common European kingfisher (*Alcedo ispida*), of which a figure is given on p. 69, is the best known representative of the short-tailed fish-eating kingfishers; in which section of the family there are three genera, namely, *Alcedo*, *Corythornis*, and *Alecyone*. Of these, the latter is exclusively Australian, and is characterised by having only three toes; while the second is confined to Africa and Madagascar, and is distinguished by its well-developed crest. The members of the genus under consideration are likewise crested, although to a smaller degree, the feathers giving a pointed form to the structure. Confined to the Old World, these kingfishers are represented by eleven species, three of which are African, five Indian, and two Moluccan, while the remaining one is the common kingfisher, extending all over Europe and North-Western Asia, and represented in Siberia and the Oriental region by a smaller and brighter form, sometimes separated, as *A. bengalensis*. The common kingfisher is a beautiful bird, of a greenish blue colour; with the back brilliant cobalt-blue; the crown greenish blue banded with dusky black. Above the lores is a rufous sheath; the ear-coverts are orange-rufous, succeeded by a band of white feathers on the sides of the neck; the cheeks light blue, with dusky blackish bars; the throat buffy white; the remainder of the under surface rich orange-rufous, with a patch of greenish blue on the sides of the upper breast; the bill black; the feet coral-red; and the iris brown; the total length being $7\frac{1}{2}$ inches. The female, which is a trifle smaller, may be distinguished by having a red base to the lower mandible. In England, owing to the protection which has been afforded to birds on the Thames and other rivers, the kingfisher is now more often observed than it was a few years ago, when it was much sought after for decorating ladies' bonnets. Especially in the autumn, when a considerable migration takes place, kingfishers may be noticed on the rivers in the south of England, and there are few more beautiful sights than one of these birds skimming over the water. Seated under overhanging willows or on an exposed bough or stump, the kingfisher watches patiently for the approach of its prey, when it dives like a flash of lightning under the water. It is, however, by no means always successful in capturing the fish, not unfrequently missing its stroke. Sometimes it may be seen hovering over the water like a kestrel, and dropping like a stone on a fish, when the fish comes near enough; while at other times it will perch on an overhanging reed, in order to take its dive after its prey. The latter comprises insects as well as fish; and on the sea-coast, where the bird remains for some time

before commencing its migration across the channel, the kingfisher will feed on small crabs. Although so exclusively a water-bird, at most times of the year, the nest is not unfrequently found at some distance from any river. A few years ago, for instance, we were shown a nest with seven eggs, situated in the middle of a wood bordering the Thames, and fully a quarter of a mile from the water. This distance had to be traversed by the parent birds every time they brought a fish to their young; and it was a curious sight to see one of these brilliant birds flying like a meteor through the green foliage of the trees. The nest had been tunnelled under the roots of a fallen tree, which had excavated a deep hole in a sandy bank as it fell, and in this instance the tunnel was by no means straight, but was carried over and under the roots which barred the progress of the bird in a direct line. Dawson Rowley maintained that the kingfisher not only bored its own hole in the banks, but that the fish-bones found in the chamber at the end of the tunnel are placed there by the birds with the idea of forming a nest. There is, however, quite as often no nest whatever, the eggs being laid on the floor of the chamber.

In Africa the beautiful little crested kingfishers (*Corythornis*) take the place of the common species. Like the latter, these birds feed on fish and small crustaceans, boring a hole into some sandy bank in which to lay their eggs, which are four or six in number, on a small platform of fish-bones. The three-toed Australian kingfishers (*Alecyone*) seem to have very similar habits.

This group brings us to the second subfamily (*Daceloninae*), **Three-Toed Insectivorous Kingfishers.** all the members of which, although by no means disdaining a fish-diet and thus frequenting rivers, are more exclusively inhabitants of forest and bush-clad country, where they subsist mainly on small reptiles, insects, crustaceans, and such-like creatures. The subfamily is characterised by the frequent large development of the tail; while the beak is either rounded or flattened, according as the fish-eating habit is more or less predominant. Although forest-hunting, the members of the four genera, *Ceyx*, *Ceycopsis*, *Ispidina*, and *Myioceyx*, are, however, characterised by having their tails as short as in the typical kingfishers. The first of these genera comprises a number of brilliantly-coloured kingfishers of small size, inhabiting India and the countries to the east of the Bay of Bengal, throughout the whole of the Malayan Archipelago as far as Northern Australia. While many of them have the plumage of a brilliant red, shot with a lilac gloss, and with blue on the wings and scapulars, some of the Malayan and Papuan forms are mostly blue or black, with brilliant cobalt or silvery lower shades. One of the most striking of the red group is the Indian three-toed kingfisher (*Ceyx tridactyla*), in which the back is black with a mark of deep blue or purple, while the lower back is glossed with lilac: the wing-coverts being black edged with blue; the tail cinnamon-rufous; the head rufous marked with lilac; the ear-coverts and cheeks orange-yellow, the underparts also orange-yellow; the bill and feet deep vermilion; and the iris brown. The total length is $5\frac{1}{2}$ inches. This pretty little bird inhabits the forest-districts of Southern India and Ceylon, and is found from Nipal eastwards through the Burmese countries down the Malayan Peninsula. Mr. Stuart Baker states that it is fairly common in Kachar, and is more of a fish-eater than the Malayan species which are forest-birds, living chiefly on insects. This kingfisher, indeed, lives

chiefly on fish and water insects, with an occasional shrimp or fresh-water prawn. Its cry is a shrill, piping note, not unlike that of the common kingfisher, but shriller and less powerful, and not apparently uttered except on the wing. It has a very powerful flight, and is capable of great speed, darting along the stream like a ruby meteor. Even when the bird is not disturbed, but is merely moving from place to place, its flight is very swift. When it feeds, it returns again and again to the same perch, and keeps to a confined area, being found day after day about the same



LAUGHING KINGFISHER ($\frac{1}{3}$ nat. size).

spot, from which it seldom flies more than a mile. Mr. Baker has watched the birds making their tunnel into a sandy bank, and believes that the earth is pecked away by the bird's bill and the sand ejected by a backward motion of its feet.

Laughing Kingfishers. Inhabitants of Australia and the Papuan Islands, these birds are best known by the laughing kingfisher (*Dacelo gigantea*), or laughing jackass, as it is termed by the Australian settlers, which is a large bird, measuring 17 inches in total length, with a wing of $8\frac{1}{2}$, and a tail of $6\frac{1}{2}$ inches. The general colour is brown, with the lower back greenish blue; the median wing-coverts

being also washed with greenish blue; while the head is strongly crested brown in colour with rufous frecklings on the fore-part, and the long crest-feathers edged with white. There is a very broad white eyebrow extending backwards and joining a collar on the neck; the tail is rufous with irregular black bars; and the under surface of the body is white with a few margins of brown on the chest-feathers, more distinct on the flanks. The female is like the male, but is rather more rufous on the head. Gould states that this kingfisher "frequents every variety of situation—the luxuriant bushes stretching along the coast, the more thinly-timbered forest, the belts of trees studding the parched plains, and the brushes of the higher ranges being alike favoured with its presence; over all these localities it is rather thinly distributed, being nowhere very numerous. Its food, which is of a mixed character, consists exclusively of animal substances. Reptiles, insects, and crabs, however, appear to be its favourite diet; it devours lizards with avidity, and it is not an unfrequent sight to see it bearing off a snake in its bill, to be eaten at leisure; it also preys on small mammals. I recollect shooting one of these birds in South Australia, in order to secure a fine rat which I saw hanging from its bill, and which proved to be a rare species." The laughing kingfisher breeds during August and September, and generally selects a hole in a large gum-tree for the purpose, where it deposits its beautiful pearl-white eggs on the decomposed wood at the bottom. When the young are hatched, it defends its breeding-place with great courage and daring, darting down upon any intruder who may attempt to ascend the tree. The other species of the genus are remarkable for the difference in the colour of the tail, which is blue in the male and rufous in the female. Closely allied to the "jackasses" are the curious hook-billed kingfishers (*Melidora macrorhina*), distinguished by a complete notch near the end of the upper mandible, which thus ends in a hook.

Wood

The most numerous group in the subfamily, these **Kingfishers**. birds have been called king-hunters, to distinguish them from the kingfishers, inasmuch as many of the species do not fish at all. The genus contains upwards of sixty species, all of which are distinguished from the laughing kingfishers by their more rounded wings and more compressed bill, which has a groove along the sides of the upper mandible. The best known species is, perhaps, the white-breasted kingfisher (*Halcyon smyrnensis*), a bird of large size, measuring nearly a foot in length with a wing of $4\frac{1}{2}$ inches or more. It is found all over India and Burma, extending eastwards as far as China, while it also occurs in Palestine and Asia Minor in the west. The bill is red, the general colour chestnut-red, with the lower back bright greenish blue, the scapulars being also bright greenish blue; and the throat and breast pure white. This species generally makes its nest by burrowing in a sandy bank, the length of the tunnel varying from one to over three feet. Mr. Hume mentions an instance of a nest-hole being found in Rajputana in a well, at least a hundred feet below the surface. In India this bird is found in all kinds of situations, often far away from water. In Kachar, Mr. Stuart Baker has found the nest composed of a few layers of loose moss with which the bird fills up a crevice in a rock. In most instances, however, there is no attempt at a nest, the eggs being deposited on the floor of the chamber at the end of the tunnel. Mr. Baker says that fish form a very minor part of the bird's

diet, the principal part of which consists of locusts and crickets; and these it takes by swooping down on them from some perch, as if diving after fish, and seizing them from the bushes and grass, without halting in its flight. It also captures prawns, small crabs, and water insects from stagnant pools, and he has once or twice seen it take cicalas from the trunk of a tree. These kingfishers are very plentiful in Africa, one of the most beautiful species being the African white-breasted kingfisher (*H. semicærulea*), which has an entirely red bill, and is easily



AFRICAN WHITE-BREASTED KINGFISHER ($\frac{2}{3}$ nat. size).

distinguished by its ashy white head and chestnut breast and under wing-coverts; the back being black, with the lower part bright blue, while the outer surfaces of the wings and tail are blue; and the throat and chest ashy white like the head. The length of the bird is about 8 inches, and the wing 4 inches. This species is found over the greater part of Africa, as far as the Zanzibar district on the east, and to Angola on the west, being replaced in Southern Africa by an allied species (*H. pallidiventris*), and by *H. erythrogaster* in the Cape Verde Islands. Von Hügel states that in North-Eastern Africa he found the present species both near

water and in the wooded districts. It feeds on beetles and other insects, but also catches fish, which it seems to prefer.

- Long-Tailed Kingfishers. In the genus *Tanysiptera* the number of tail-feathers is reduced to ten, of which the central ones are greatly elongated, and exceed the body in length, generally ending in a racket-like expansion. Twenty species are known, all of which are inhabitants only of the Moluccas, the Papuan Islands, and the Cape York Peninsula in Northern Australia. Mr. Wallace, who discovered several of the species during his travels in the Malay Archipelago, tells us that he found them in forests and also in rocks by the side of streams. Macgillivray, who found the beautiful *Tanysiptera sylvia* in North-Eastern Australia, states that it frequented the dense bushes and the sunny glades in the woods. The flight is rapid, and it darts away among the dense foliage like an arrow. It is very wary, and sits on the bare branch of a tree, keeping a good lookout, and darting on to some passing insect, and then returning to the same perch. Its cry resembles the words *wheet, wheet, wheet*, and it is said to tunnel into the ant-hills of red clay, which are common in that part of Australia.

THE ROLLERS.

Family *CORACIIDÆ*.

Birds of brilliant coloration, inhabiting most parts of the Old World, in the shape of the body, as well as in the conformation of the beak, the rollers strikingly resemble the crows. The palate is, however, of the bridged type, and the feet are like those of the kingfishers, both in respect of the flat sole and the union of the toes; while there are twelve tail-feathers. The five genera are arranged under two subfamilies. The first subfamily (*Brachypteraciinæ*) is represented by three genera confined to Madagascar, and characterised by the length of the metatarsus, and their terrestrial habits. Of the typical genus, as well as of *Geobiastes*, little has been related, but of *Atelornis* Grandidier states that both species live alone on the ground in the forests; the flight being straight and the birds only perching on the lower branches. Sir Edward Newton says that he only observed these birds in the dusk of the evening near the ground, and remarks that they have a curious way of jerking the tail when alighting on a branch.

True Rollers. In the true rollers the metatarsus is considerably shortened, and the habits of all the species are arboreal. In addition to the true rollers, the second subfamily also includes the broad-billed rollers (*Eurystomus*). In the common roller (*Coracias garrula*) and its allies the bill is long and compressed, being much longer than it is broad at the base; while the members of the genus are of brilliant plumage, and are found all over Africa, Southern Asia and Malaysia, as far as the island of Celebes. The common roller is drab-brown above, the rump greenish blue washed with purple; the wing-coverts blue, the lesser ones purple; the head green with a bluish eyebrow; the base of the forehead sandy buff; the under surface of the body blue; the breast lilac-brown; the sides of the neck and hind-neck purplish lilac; and the wings and tail purplish blue, with a band of silvery cobalt; the total length being 12 inches. Writing

of the habits of this well-known bird, Naumann observes that it "is always restless and uneasy, moving from tree to tree, where it always settles on the summit, or on a dead branch. When undisturbed it is fond of sitting in the sunshine, but during rainy weather is dull and moping. It never hops about among the branches, but flies from branch to branch, now and then descending to the ground, where it hops heavily, and with an awkward demeanour. Its flight is quick, very easy, and much resembles that of a pigeon; in flying straight it flaps the wings quickly; turns and overbalances itself often, and glides or shoots through the air for some



COMMON ROLLER ($\frac{2}{3}$ nat. size).

distance before dropping on to a dead branch. The ordinary voice may be best compared to that of the magpie. Rollers continually give a deep harsh *racker-racker-racker*, which is very quickly uttered when they are squabbling; and with this they mingle a harsh *rräh*. When sitting peaceably, the note is a high *rack* and *rack-rack* and also a plaintive high *kräh*, not unlike that which a young jackdaw sometimes utters; this last is their call-note. These notes very often vary, and the bird is generally heard before he is seen. In fine weather the male rises in the air near where the female is incubating, uttering a single *rack, rack-rack*, etc., until he attains a considerable height, from which he suddenly falls, always turning a somersault, and throwing himself here and there in the

air, uttering quickly the following *räh-räräh-rräh-rrä*, etc. etc., which he always changes to the *ruck* as soon as ever he begins to turn his somersault, and then returns to his seat on a dead branch. This appears to represent his song. The bird chooses a sandy country as its breeding-home, and affects thin woods where old oaks are scattered through, and which are adjacent to open fields and near large forests, particularly of pines, making its nest in hollow oak, ash, or other trees, and lining the interior with roots, straw, feathers, and hair. The male and



ORIENTAL ROLLER ($\frac{1}{2}$ nat. size).

female incubate in turn for the space of not quite three weeks, and when breeding they sit so close that, though at other times very shy, they may be caught on the nest."

**Broad-Billed
Rollers.** These rollers inhabit Africa, Madagascar, India, and China, ranging north to Eastern Siberia and south to the Malay Archipelago and Australia. They have the bill as broad as it is long at the gape. The oriental roller (*Eurystomus orientalis*) has the tail black with a bluish base: the head blackish as well as the mantle: the back green, and the under surface blue, with

the throat streaked with bright purplish blue, forming a gular patch, the total length being eleven inches. It inhabits the Burmese countries, extending down to the Malayan Peninsula and to the islands of Borneo, Java, and the Philippines. Bourdillon, after stating that he was attracted by the chattering of a pair of these rollers, says that "on going to the spot I found them engaged in ejecting from a hole in a stump, about forty feet from the ground, a pair of our hill-mynas. One of the rollers was in the mouth of the hole, and enlarging it by tearing away with its beak the soft rotten wood; the other roller, seated on a tree close by, was doing most of the chattering, making an occasional swoop at the mynas whenever they ventured too close. I watched the birds for some time until the mynas went off, and there and then began building in a pinney tree within the distance of one hundred yards. Ten days after I sent for some hillmen who managed to ascend by tying up sticks with strips of cane, in the way they erect ladders to obtain the wild honey from the tallest trees in the forest. It was past six o'clock in the evening before a man reached the hole in which the birds had bred. He found not the slightest vestige of a nest, but a few chips of rotten wood, upon which were laid the three eggs. These I found to be slightly set. While the man was climbing the tree, the birds behaved in a very ridiculous and excited manner. Seated side by side on a bough, they alternately jerked head and tail, keeping up an incessant harsh chatter, and as the crisis approached, and the man drew nearer their property, they dashed repeatedly at his head."

THE KIROUMBOS.

Family *LEPTOSOMATIDÆ*.

The remarkable birds commonly known by their native name of Kiroumbos are confined to Madagascar and some of the neighbouring islands, and may be regarded as aberrant rollers, although they also exhibit affinities to the under-mentioned frog-mouths, in the possession of "powder-down" patches on the sides of the lower part of the back. Only two members of the family are known, both of which are included in the genus *Leptosoma*. The bill is roller-like, but the nostrils are quite peculiar as regards their situation, being placed in the middle of the upper mandible, and are shut in by a horny plate; while the loreal plumes are curved forward so as to entirely hide the base of the bill. The feet are semi-scansorial, that is to say, the fourth toe is cleft to the base and partly reversible, and the tail-feathers are ten in number. The sexes are different in colour, the male having some considerable metallic sheen, and the upper surface being green glossed with a distinct coppery shade; while the tail is greyish black, glossed with metallic green, and, more slightly, with coppery red. The entire under surface is dark ashy grey, becoming white on the abdomen and under tail-coverts; and the head is crested and of a leaden grey colour, glossed with metallic green and copper; the total length being 16 inches. The female is quite different from the male, being rufous brown above, with the head black, and the sides of the head and back of the neck barred with black; the back spotted with buff and glossed with dull green and copper; the tail brown, blackish towards the tip, which is edged with

rufous; the under surface of body pale fawn colour spotted with greenish black. The Madagascar kiroumbo inhabits the island from which it takes its name, as well as Mayotte and Anjouan Islands, but in the great Comoro Island is replaced by the smaller *L. gracile*. It is said by Grandidier to live in little parties of ten or twelve individuals on the edges of the woods. As soon as one of the birds is shot, all the others come near the hunter or hover over their dead companions, so that ten or more can be obtained in a quarter of an hour. That the kiroumbo has a certain element of a roller in its composition, is shown by its habit of playing in the air, which Sir Edward Newton describes as follows:—"It plays for some time over the same place, ascending almost perpendicularly, as it were by a jump, to a



MADAGASCAR KIROUMBO ($\frac{1}{2}$ nat. size).

great height, and descending again in a curve nearly to the top of the trees, by almost closing its wings, at the same time uttering a whistle so like that of an eagle that it was doubted for a long time by us whether the bird that performed this wonderful freak was not a raptorial. However, after having watched it several times with our glasses, we satisfied ourselves that it was this species."

THE FROG-MOUTHS.

Family *PODARGIDÆ*.

These curious birds have been usually associated with the nightjars, to which they approximate in their wide mouths and mottled plumage, although they differ

in the more important feature of the palate, being constructed on the desmogathous instead of on the schizognathous type. Accordingly, it seems most probable that their true position is between the kiroumbos and the oil-birds (to be mentioned next). From the former they are distinguished by the absence of an oil-gland, and the presence of only ten feathers in the tail; while from the latter they differ by the absence of the articular surfaces on the rostrum of the hinder part of the palate, known as basipterygoid processes. Unlike the nightjars, these birds have no comb-like appendage to the third toe; while they further differ by building nests, or laying their eggs in hollow trees. Two notches occur in the hinder border of the breast-bone.

Typical Frog- These birds, *Podargus*, are the typical representatives of the first.

Mouths. of the two subfamilies into which the group is divided, this subfamily being distinguished by the narrow, slit-like nostrils, protected by an overhanging membrane, and hidden by plumes and feathers. Powder-down patches occupy each side of the rump, and the metatarsus is shorter than the third toe. The present genus, which is characterised by the pointed tail-feathers, includes five species, all inhabitants of Australia and the adjacent Papuan Islands. Gould describes the Australian species as inanimate and sluggish birds, depending on their supply of food less upon their power of flight than upon the habit they are said to have of traversing the branches of trees on which their favourite insects reside. At intervals during the night they sit about in open places, on rails, stumps of trees, or the roofs of houses. They are strictly nocturnal in their habits, sleeping during the day, and mostly found in pairs, perched near each other on the branches of the gum-trees, in situations not at all sheltered from the beams of the midday sun. "So lethargic are its slumbers," he writes, "that it is almost impossible to arouse it, and I have frequently shot one without disturbing its mate sitting close by; it may also be knocked off with sticks or stones, and is sometimes even taken with the hand. When aroused, it flies lazily off with heavy flapping wings to a neighbouring tree, and again resumes its slumbers till the approach of evening, when it becomes as animated and active as it had been previously dull and stupid." According to Mr. North, in New South Wales, the tawny-shouldered frog-mouth commences to breed in September, and the breeding-season is at its height in October, and continues for the two following months. It builds a flat nest of sticks, loosely placed together on the horizontal branch of any suitable tree. The eggs are three in number, perfectly white, elongated in form, and the shell finely granulate.

Eared Frog-

Mouths. Their smaller size and rounded tail-feathers distinguish these birds from the preceding, while the mode of nesting is also different. The side of the head in some of the species is adorned with ear-tufts, ending in bristly plumes. The sexes also are mostly different in colour, the female being rufous and the male greyer. One of the largest species is the great-eared frog-mouth (*Batrachostomus auritus*), inhabiting the Malay Peninsula, Sumatra, and Borneo. It measures about 16 inches in length, and is chestnut-brown, vermiculated with blackish lines, and whitish bars. On the hind-neck is a collar of buffy white feathers, with a black border, forming bands; median and greater wing-coverts with large spots of white edged with black; throat and breast brown, with

spots and bars of white; and the abdomen pale buff. Nothing has been recorded of its habits; but of the nest of the South Indian frog-mouth Mr. Hume writes that "instead of moss, a few fragments of dead leaves are incorporated, but the material is chiefly a soft felt-like mass, precisely similar to that used by *B. hodgsoni*, but greyish white instead of brown. It is a mere pad with a shallow depression on the outer surface, a broad groove on the base of the nest showing where it had nested on the upper surface of an almost horizontal bough." The egg was white. Mr. Hartert says that the part is formed by the down, taken from the "powder-downs" of the bird itself, and then completed by having the outside



GREAT EARED FROG-MOUTH ($\frac{1}{2}$ nat. size).

interwoven and covered with bits of bark and lichen, so that the nest entirely resembles the branch to which it is attached. The nests of *B. hodgsoni*, which Mr. Hume describes, were about three and a half inches in diameter and three-quarters of an inch in thickness; the lower surface of the pad, where they were in contact with the branch, having a thin coating of moss. The whole of the nest is a compact, brown, felt-like mass, very soft and downy, and composed, as it appears to be, of excessively fine moss rootlets, but withal as soft as the fur of any little mammal. This will doubtless be found to be the powder-down of the bird itself.

Owlet Frog-
Mouths.

These birds differ from the other frog-mouths in having the nostrils situated near the tip of the bill, and being open and prominent.

There are no distinct powder-down patches, and the metatarsus is longer than the middle toe. The loreal bristles are greatly elongated, and give the face a peculiar appearance. Eleven species are known, all found in Australia and the adjacent Moluccan and Papuan Islands, as well as in New Caledonia. The Australian owlet frog-mouth (*Egotheles novae-hollandiae*), which is about $8\frac{1}{2}$ inches in length, has the general colour dusky with whitish vermiculations; the head being darker, with two longitudinal stripes of white and two crescentic marks of white on the hind part and nape; while the under surface of the body



AUSTRALIAN OWLET FROG-MOUTH ($\frac{2}{3}$ nat. size).

is white with dusky vermiculations, and the abdomen and under tail-coverts more or less uniform. This species ranges all over Australia and Tasmania, Gould stating that he found many specimens and procured the eggs, which are four or five in number, pure white, and are laid in the hole of a tree, without any attempt at a nest. "During the day," he says, "the bird resorts to the hollow branches or spouts, as they are called, and the holes of the gum-trees, sallying forth as night approaches in quest of insects, particularly small beetles. Its flight is straight, and not characterised by the sudden turns and descents of the goatsuckers. On driving it from its haunts, I have sometimes observed it to fly direct to a hole in another tree, but more frequently to alight on a neighbouring branch, perching across and never parallel to it. When assailed in its retreat, it emits a



THE HOME OF THE OIL-BIRD.

loud hissing noise, and has the same stooping motion of the head observable in the owls; it also resembles these birds in its erect carriage, the manner in which it sets out the feathers round the ears and neck, and in the power it possesses of turning the head in every direction even over the back, a habit it is constantly practising."

THE OIL-BIRD OR GUACHARO.

Family *STEATORNITHIDÆ*.

Forming a family group by itself, the South American oil-bird (*Steatornis caripensis*) in external appearance is not very unlike a nightjar: to which group it also approximates in habits, only coming out to feed in the dusk of the evening. It is, however, more nearly allied to the frog-mouths, having a similar bridged palate, although differing in certain features of the skeleton. The plumage is less soft than in either the goatsuckers or frog-mouths; while the beak and the form of the wing are not unlike those of the rollers. The tail carries ten feathers, and in the wing the third and fourth primary quills are the longest; while the naked metatarsus does not exceed the third toe in length. In the skull the basal rostrum carries articular basipterygoid processes. Measuring from 17 to 20 inches in total length, the oil-bird is chestnut-brown in general colour. On the upper-parts the plumage is marked by numerous dark cross-bars; the median wing-coverts are ornamented with large white spots, similar spots also occurring on the lateral upper tail-coverts; while the under surface is pale chestnut, with a greyish tinge, each feather being marked with three rhomboidal spots of white bordered with black. The beak is chocolate-brown; the feet are flesh-coloured, with a violet tinge; the claws are grey; and the iris of the eye is black with a narrow dark brown ring. The guacharo is principally known as an inhabitant of the island of Trinidad, where it frequents certain caves, building therein huge nests, having the appearance of large cheeses. The popular name of oil-bird is derived on account of the peculiar covering of the nestlings, which are simply masses of yellow fat. Numbers of the stones of a fruit upon which these birds apparently feed strew the floor of the caves where they dwell. Elsewhere local, the oil-bird is found not only in Trinidad, but also from Guiana and Venezuela to Ecuador and Peru, occurring in the latter countries in valleys at an elevation of some seven thousand feet. In the Tatora district of Peru there are several caverns, situated in a very wild country, clad from the base to the summit of the hills with dense virgin forest, frequented by these birds. According to Dr. Stolzmann, if a gun be fired, or any other loud noise made near these caverns, the birds quit their retreats in the nooks and crannies, flying to the roof with piercing cries; and the only way to obtain specimens is to fire at random in the darkness. This, however, is haphazard work; and in the Ninabamba cavern only eleven birds were killed in return for sixty shots. When the birds are tired out, they gradually retire to their hiding-places, from which no amount of firing or shouting will induce them to again emerge. When undisturbed, the guacharos quit their retreats as the sun is setting, to fly about the forest; some of them rising to a considerable elevation, apparently in pursuit of moths. Their

noiseless flight much resembles that of goatsuckers; but in descending rapidly the wings are frequently raised and held together in a point. Their principal food consists of the fruit of the nectandra trees; these fruits being seized by the birds while in full flight from the tips of the slender boughs which would be too frail to bear the weight of the robbers. For seizing such fruits the hooked and powerful bill of the oil-bird is most admirably adapted. The rapidity with which the guacharos feed is remarkable; two specimens killed by Stolzmann early one evening having their crops empty, whereas one shot a quarter of an hour later had swallowed seven fruits, and a second bagged after another quarter of an hour no less than eleven. The same observer remarks that it would be curious to know what the birds did for the remainder of the night, after having satisfied their appetite, for he has seen them in moonlight evenings on the wing as late as eleven. The note of the guacharo is harsh and disagreeable, and has been compared to the syllables *cri-cri-cirri*; although there is another cry which cannot be rendered in words. From observations on a young bird, in the grey nestling plumage, Stolzmann found that the large nectandra stones are regurgitated after the fleshy covering has been digested. This rejecting process is accomplished without any apparent effort on the part of the bird; a slight movement of the feathers of the throat takes place, the beak opens gently, and the stone appears; while, if any of the fleshy covering still adheres to it, the bird picks it off. The old birds apparently cast up the stones during flight; and although no insects were found in the stomachs of the specimens shot, Stolzmann is of opinion that guacharos are partly insectivorous. Humboldt and Bonpland visited the celebrated cavern of Caripe, from whence these birds take their specific name; and the following account of the visit is taken from a biographical work. "The Indians," it is written, "showed the travellers the nests of the guacharos by fixing a torch to a long pole. These nests were fifty or sixty feet high above their heads, in holes in the shape of funnels, with which the roof of the grotto was pierced like a sieve. The noise increased as the travellers advanced, and the birds were scared by the light of the torches. When this noise ceased for a few minutes, around them they heard at a distance the plaintive cry of the birds roosting in other ramifications of the cavern; and it seemed as if different groups answered each other alternately. The Indians were in the habit of entering this cavern once a year, near midsummer; when they went armed with poles, with which they destroyed the greater part of the nests. At that season several thousand birds were killed; and the old ones, as if to defend their brood, hovered over the heads of the Indians, uttering terrible cries. The young, which fell to the ground, were opened on the spot for their fat. At the period commonly called at Caripe the oil-harvest, the Indians built huts with palm leaves near the entrance, and even in the porch of the cavern. There, with a fire of brushwood, they melted in pots of clay the fat of the young birds just killed; this fat being known by the name of guacharo-butter." The nest is formed of clay; and the eggs, varying from two to four in number, have a thick shell, which is at first chalky white, but by contact with the nest becomes yellowish green.

R. BOWDLER SHARPE.

CHAPTER X.

THE PARROT TRIBE,—Order PSITTACI.

ONE of the most interesting groups of birds is that of the parrots, under which general term may be included not only the true parrots, but likewise the macaws, lorries, love-birds, cockatoos, etc. This general interest is due not only to the beauty of form and gorgeousness of plumage characterising so many members of the group, but likewise to the ease with which they are domesticated, their pleasing manners when in this state, and above all to the extraordinary facility with which they recollect and repeat sentences of human speech. That the memory of parrots is very strongly developed, there can be no sort of doubt; but whether their intellectual powers rank really higher than those of some of the Passerine birds is problematical. The appropriateness to the occasion with which sentences learned by these birds are sometimes uttered is probably mainly or entirely due to association, and in no sense implies any knowledge of the meaning of the phrase. It may be added that the occasions when such phrases are introduced inappropriately are, perhaps, not much less infrequent than when they are apposite.

Parrots form a large group, including considerably more than five hundred species, which present well-marked characters by which its members can be readily distinguished from all other assemblages of birds. Their most obvious external characters are displayed by their feet and bills. In the feet the fourth toe (as in some of the Picarians) is permanently turned backwards, and as the first toe has likewise a similar direction, the whole foot is divided into a front and back portion, each comprising two digits: this type of foot-structure being termed zygodactyle. The covering of the feet takes the form of rough granular scales. As regards the beak, its base is invested with the wax-like protuberance termed the cere, which is frequently feathered, while in form it is short, stout, and strongly hooked at the extremity. In addition to the above, it may be noted that, owing to the presence of a transverse hinge in the skull, the upper half of the beak is movable; while the palate is of the bridged (desmognathous) type. The skull, as shown in the figure in the introductory chapter, is also very generally distinguished by the presence of a complete bony ring surrounding the socket of the eye; and the symphysis of the lower jaw is short, obtuse, and deeply channelled. The tongue is also thick and fleshy, and may be fringed or brush-like at the extremity. Extreme shortness characterises the legs of most of the species, this shortness being most marked in the metatarsus, of which the bone is greatly expanded. The leg-bone, or tibia, generally has no bony bridge at the lower end. The furcula is always weak, and it may be incomplete or even wanting. The feathers are provided with aftershafts; and the number in the tail is, except in one genus, ten. If

an oil-gland is present it is furnished with a tuft of feathers. Finally, the young are born in a nearly naked and completely helpless condition; and the eggs are usually, if not invariably, white.

Distribution and Habits. For the most part parrots are thoroughly arboreal and climbing birds; and are essentially characteristic of the tropical and subtropical regions of the globe. At the present day none inhabit Europe, although the remains of an extinct species, apparently allied to a living West African species, have been obtained from the Miocene rocks of France. In America one species extends as far south as the Straits of Magellan, while another ranges far into the United States; and in the Macquarie Islands of the Australian region, the group extends as far south as the 55th parallel. Although ranging over all the warmer regions of the globe, these birds are very unequally distributed, being poorly re-



COCKATOOS AT HOME.

presented in India, and still more so in Africa, while in Malaysia and Australia they attain their maximum diversity of type, and in South America their greatest numerical development.

All the parrots make their nests in the hollows of trees, where they usually lay from two to three white eggs, although in the case of some of the smaller species the number is often considerably more. Frequently the males take their share in the work of incubation, which generally lasts for about twenty-one days. The young parrots are fed by the parents disgorging half-digested food from their own crops into their open mouths, after the manner of pigeons. The food of the adult consists in most cases of various fruits and nuts. Regarding their general habits, and the important part these birds play in tropical scenery, Mr. Wallace writes as follows: "They usually feed in flocks; they are noisy, and so attract attention; they love gardens, orchards, and open sunny places; they wander about far in search of food, and towards sunset return homewards in noisy flocks or in constant pairs. Their forms and motions are often beautiful and attractive. The immensely

long tails of the macaws, and the more slender tails of the Indian parraquets; the fine crests of the cockatoos; the swift flight of many of the smaller species, and the graceful motions of the little love-birds and allied forms; together with their affectionate natures, aptitude for domestication, and powers of mimicry, combine to render them at once the most conspicuous and the most attractive of all the specially tropical forms of bird-life."

As is so generally the case with arboreal fruit-eating birds, the prevalent colour among the parrots is green. This is, however, frequently relieved by patches, bands, or spots or other hues; while in certain groups or species it is replaced by blue, yellow, cinnamon, crimson, white, and occasionally black. Judging from the characters of the skeleton, it appears to us that the nearest allies of the parrots are the owls. They may, however, have some kinship with the diurnal birds of prey, and possibly with some of the Picarians. According to the arrangement proposed by Count Salvadori, who has paid special attention to this group of birds, the parrots may be divided into five families, of which first is the

NESTOR PARROTS.

Family *NESTORIDÆ*.

Under the common title of nestors may be included a small group of peculiar parrots confined to New Zealand and certain neighbouring islands, all of which belong to a single genus (*Nestor*), and one of which is known to the Maories as the Kea and the other as the Kaka. The nestors belong to an assemblage of three families of the order, characterised by the under surface of the hook of the beak being either smooth or merely marked by some fine longitudinal lines. As a family they are distinguished by the more or less elongated beak being much compressed, and longer than deep, with the middle line (culmen) of its upper moiety marked by a longitudinal groove, while the profile of the symphysis of the lower mandible slopes upwards to the tip with scarcely any curvature. The tip of the tongue is provided with a fringe of fine hairs; and the cere of the beak is partially feathered. All the feathers are soft; those situated at the base of the lower mandibles are hairy, and project forwards; and the rectrices of the tail have pointed shafts projecting beyond the vane. The metatarsus is longer than usual; and the bony ring round the socket of the eye is incomplete. The nestors are represented by four well-defined species, two of which are now extinct. Of these the kea (*Nestor notabilis*), which is restricted to the South Island of New Zealand, has the general hue of the plumage dull olive-green, with black edges to the feathers. There is no yellow band across the breast, and the underparts are olive-brown without any tinge of red: orange-red is, however, present on the under-wing coverts and axillaries. The wing-feathers are dusky brown, the primaries having the outer web bluish, and the inner one toothed with lemon-yellow. The tail is bluish orange, with a broad transverse band of blackish brown near the end: the inner webs of the feathers being toothed with yellow. In size the kea may be compared to a raven: its total length being 19 inches, of which $1\frac{1}{4}$ is taken up by the bill. The kaka (*N. meridionalis*), which inhabits both

islands, and is the species represented in our coloured Plate is a rather smaller bird, readily distinguished by the presence of a red tinge on the abdomen and under wing-coverts, as well as by a wash of golden-yellow on the ear-coverts. It is subject to a considerable amount of local variation. Still smaller, although with a longer beak, is the extinct Phillip Island parrot (*N. productus*), of which a figure is given on p. 95. This bird attained a length of about 15 inches, and was distinguished by the broad yellowish white band across the chest. Also extinct, the Norfolk Island parrot (*N. norfolcensis*), the smallest of the group, was distinguished from the Phillip Island species by the high curvature and length of the bill, which measured $3\frac{1}{2}$ inches, and by the absence of a dark bar on the tail.

Habits.

Confining our attention to the New Zealand representatives of the genus, it may be observed in the first place that the brush-like extremity of the tongue of these birds indicates flower-sucking habits. They are generally found in mountain regions, the kea ascending to elevations of some six thousand feet. The kaka is an eminently social bird, and by far the noisiest of the denizens of the woods of its native islands. "Being seminocturnal in its habits," writes Sir W. Buller, "it generally remains quiet and concealed during the heat of the day. If, however, the sportsman should happen to find a stray one, and to wound instead of killing it, its cries of distress will immediately raise the whole fraternity from their slumbers, and all the kakas within hearing will come to the rescue, and make the forest echo with their discordant cries. Unless, however, disturbed by some exciting cause of this sort, they remain in close cover till the approach of the cooler hours. Then they come forth with noisy clamour, and may be seen, far above the tree-tops, winging their way to some feeding-place; or they may be observed climbing up the rough vine-clad boles of the trees, freely using their powerful mandibles, and assuming every variety of attitude, or diligently tearing open the dead roots of the close epiphytic vegetation in their eager search for insects and their larvæ. In the spring and summer, when the woods are full of wild blossom and berry, these birds have a prodigality of food, and may be seen alternately filling their crops with a variety of juicy berries, or sucking nectar from the crimson flowers of the rata (*Metrosideros*) by means of their brush-fringed tongues. With the earliest streaks of dawn, and while the underwoods are still wrapped in darkness, the wild cry of this bird breaks upon the ear with strange effect." It is from the oft-repeated cry of *kaka-kaka*, that the bird derives its name. In dull weather kakas may often be seen abroad in the daytime, while occasionally flocks may be observed sweeping across a forest glade in the full sunlight. In spite of their slow and measured flight, these birds periodically migrate from one part of the country to another, generally travelling in parties of three or more, and frequently stopping to rest on the bare boughs of some dead forest tree. During the pairing-season the male and female are constantly in each other's company, flying side by side, and calling as they go. The breeding commences in November, the nest being a poor affair, made in the hollow of the trunk of a decayed tree. Here four eggs are usually laid, although it is said that there may sometimes be as many as six; and the young are able to fly early in January. Being an excellent mimic, the kaka is highly esteemed by the Maories as a pet, and, like most parrots, will live many years in captivity.

The habitat of the kea is very different from that of its cousin. In place of being confined to wooded districts, this bird frequents the almost inaccessible rocks of the mountains of the South Island at elevations where only dwarf vegetation is to be found. Here the keas may be seen among the crevices of the rocks when the mountains are shrouded in mist or sleet, or covered with a mantle of snow; while at other

times they may be observed soaring with motionless wings from peak to peak. During the depth of winter these birds are, however, driven to seek their food at lower elevations. The usual cry of the kea has been compared to the mewling of a cat, but a scream not unlike that of the kaka is also uttered at times. The most remarkable feature in connection with the habits of the kea is its carnivorous propensities, which appear to have been developed since the introduction of sheep into the colony, and have led to a great increase in the number of these birds. Sir W. Buller writes that those keas which "frequent the sheep-stations appear to live almost exclusively on flesh. They claim the sheeps' heads that are thrown out from the slaughter-shed, and pick them perfectly clean, leaving nothing but the bones. The plan usually adopted on the stations for alluring this bird, is to expose a fresh sheep-

skin on the roof of a hut; and whilst engaged in tearing up the bait, it is easily approached and snared. Of recent years the keas have gone even farther than this, and now actually kill sheep for themselves, alighting upon the backs of the unfortunate Ruminants, and tearing down through the skin and flesh until they reach the kidneys, the fat of which is greedily devoured. In disposition keas display extreme curiosity, and in the mountains they display so little fear of man that they may easily be knocked over with a stone."



PHILLIP ISLAND PARROT.

THE LORIES AND LORIQUETS.

Family *LORIIDÆ*.

Although agreeing with the nestors in the general structure of their beaks, the beautiful birds known as lories and loriquets, of which there are several genera, differ by the tongue being furnished with a kind of brush instead of a fringe, and also by the middle of the upper mandible being devoid of a groove. The beak,



HEAD AND TONGUE OF LORY.
(From Garrod, *Proc. Zool. Soc.*, 1872.)

which is much compressed and generally longer than deep, has no notch; and the cere decreases in width from the middle line of the head to the sides of the beak. There is great variation in the length of the tail, but it is generally shorter, although occasionally longer than the wing; while in form it may be either graduated or rounded. The wings are sharply pointed (acute), and generally have the first three feathers the longest.

Although unrepresented in New Zealand, the members of the family are confined to the Australasian region, inclusive of Polynesia. They comprise upwards of fourteen genera, of which only a few can be noticed in this work; the dimensions of the species varying from those of a turtle-dove to little more than those of a sparrow. There is one genus (*Oreopsittacus*), represented in New Guinea, in which the tail has fourteen feathers, and thereby differs from that of all the other parrots.

We select as our first example of the family the well-known purple-capped lory (*Lorius domicellus*), from Ceram and Amboyna, which is the typical representative of the genus to which it belongs. All the members of this genus—ten in number—are characterised by the tail being of moderate length and rounded, with the two middle feathers longer than the others. The bill is orange-red, thus distinguishing the group from the black lory and its allies (*Chalcopsittacus*), where it is black; while the green wings serve to differentiate these parrots from the blue-necked lory, and the other members of the genus *Eos*, in which there is a considerable amount of red on the wings. The purple-capped lory measures about a foot in total length, a third of which is taken up by the tail. It is a gorgeously-hued bird, the general ground-colour of the plumage being scarlet, while the breast is adorned with a gorget of gold; the wings are green, with blue at the bend and on the under-coverts; and the tail is red, with a band at the tip, which is dark purple-red above and golden-red below. The feature from which the species takes its popular name is the deep purple cap on the head, which is often of so dark a tint as in some lights to appear almost black.



GOLDEN EAGLE.

Like other lories, this species is a honey-sucker, but as the brush on its tongue is less developed than in some of the other members of the family, it is capable of living on other substances than honey, and is thus more easily kept in captivity. Lories are generally found in small parties of half a dozen or so; and Dr. Guillemard states that in the Moluccas they may frequently be seen devouring the soft fruits of various kinds of figs. They generally lay from three to four eggs on the bare wood in some hollow bough; and the young leave their domicile in about six weeks after the commencement of incubation. The species here figured is remarkable for its gentle and affectionate disposition, as well as for its talking



PURPLE-CAPPED LORY ($\frac{1}{2}$ nat. size).

powers; for which reasons, together with the gorgeousness of its plumage, it is in much request as a pet. Mr. Gedney writes that "as a ventriloquist the purple-cap possesses no equal, and the manner in which he will imitate domestic sounds, throwing his voice to the opposite side of the room, is perfectly startling to a stranger." The black-capped, or tri-coloured lory (*L. lory*), from New Guinea, etc., belongs to the group in which there is no yellow gorget; it has the whole of the abdomen blue, a red throat, green wings, and a black cap.

Loriquets. The loriquets are smaller birds than the lories, with the tail-feathers elongated and gradually tapering to a more or less acute point. In the present genus, of which we take Swainson's loriquet (*Trichoglossus novæ-hollandiæ*) as a well-known example, the prevailing colour of the plumage,

both above and below, is green; the tail-feathers being entirely of this hue, and moderate in length. The two middle feathers of the tail are not greatly elongated; while the four or five first primaries of the wings are not greatly narrowed at their tips. On the forehead the streaks on the shafts of the feathers are more or less blue, while the breast is more or less tinged with red; these two characters serving to distinguish these birds from the members of the allied genus *Psittentulus*. The range of these loriquets extends from New Guinea to Celebes. Swainson's loriquet attains a total length of 12 inches, of which $5\frac{1}{2}$ are taken up by the tail, and is thus one of the largest representatives of the genus. In coloration it is, perhaps, the handsomest of all the Australian parrots; the head and throat



SWAINSON'S LORIQUET ($\frac{1}{2}$ nat. size).

being of a brilliant purplish blue, the nape of the neck greenish yellow, the abdomen blue; and the remainder of the body, together with the upper surface of the wings and tail, green. The under tail-coverts are yellow at the base and green at the tip, while the under wing-coverts are red. A yellow tip characterises the red bill, and the feet are slaty grey. This handsome bird is an inhabitant of East Australia, ranging from Cape York to Victoria, and is likewise found in Tasmania. By the colonists it is commonly termed either the Blue Mountain lory, or the Blue Mountaineer. Like its allies, it is almost exclusively a honey-sucker; and so much honey do they gather, that when shot, as Professor Moseley tell us, it is quite common to see this fluid streaming out of their beaks. They generally associate in small flocks, and during their flight utter loud screaming cries. During their

migrations, according to the "Old Bushman," they may, however, congregate in immense numbers, and may then be seen flying at great heights. With regard to these periodical movements, the same observer writes that these birds are "migrants to and from different districts, and their migrations are regulated by the state of the blossoms of the gums and honeysuckles upon which they feed; not that they ever entirely left our forests, for I rarely at any time went out without seeing a pair or so. But the large flocks of them only come at such times as the trees are full of honey, and depart as suddenly as they come. They are always in larger or smaller flocks, do not associate with the other parrots, and are never seen feeding on the ground." The female lays from three to four eggs; and in their first plumage the young have the breast yellow, with scarcely any tinge of red, while the band on the nape of the neck is scarcely visible. In captivity this parrot is by no means a desirable species, since it is exceedingly noisy and very difficult to keep for long. In this state it will eat insects and seeds, as well as honey and syrup.

The Arfak parrot (*Oreopsittacus arfaki*) already referred to as Arfak Parrot. having fourteen tail-feathers, is a native of the Arfak Mountains in New Guinea, and only measures 6 inches in length. The general colour is dark green, with the cheeks and ear-coverts blue, a tinge of red on the abdomen, the tail-feathers black, with red tips, and the beak black.

Family CYCLOPSITTACIDÆ.

Two genera of parrots from Australia, New Guinea, and the Eastern Malayan Islands, known as *Neopsittacus* and *Cyclopsittacus*, are regarded by Count Salvadori as indicating a distinct family of the order allied to the lories. While agreeing with the two preceding families in having the under surface of the hook of the bill nearly smooth, they differ in that the bill is deeper than long, and much swollen on the sides, the profile of the symphysis of the lower mandible being highly convex. In these respects these parrots serve to connect the lories with the following families. The nature of the tongue is unfortunately still unknown. Perhaps the best known representative of the group is the iris parrot (*N. iris*), from the island of Timor—a small, green parrot, measuring $7\frac{3}{4}$ inches in length, with a yellow-orange bill. There is but one other species of this genus (*N. musschenbroeki*), from New Guinea; all the species of the allied genus *Cyclopsittacus* being distinguished by the dark colour of their beaks.

THE COCKATOOS.

Family CACATUIDÆ.

The remaining groups of the order are distinguished from those already noticed by the nature of the under surface of the hook of the beak. This, in place of being smooth or with fine longitudinal striæ, is marked by a series of bold transverse ridges, running from either side of the middle line in a more or less oblique direction, so as to produce a file-like surface. Moreover, in all cases the tongue is quite simple, being unprovided with any kind of brush or fringe.



COCKATOOS.

The cockatoos are readily distinguished by the presence of a crest of feathers on the head, which is wanting in all the members of the next family, with the exception of the peculiar horned and Uvæan parraquets (*Nymphicus*), respectively from New Caledonia and the island of Uvæa in the Loyalty Group. An absolutely distinctive feature between the two families is, however, to be found in the skull. Thus in all the cockatoos the socket of the eye is surrounded by a complete ring of bone, from the lower border of which is given off a process extending backwards to the hinder part of the skull; whereas in the true parrots (*Psittacidae*) this ring is generally incomplete, while in such instances as it is entire, it lacks the posterior bony process. As minor characters, it may be mentioned that the nostrils open in a cere which is not much swollen, and is generally naked,

although occasionally feathered. The bill is of great depth, and usually very short, the upper mandible being generally much compressed, with its hook at right angles to the axis of the base. In all cases the metatarsus is extremely short.

The cockatoos are characteristic of the whole Australasian region, ranging as far west as the islands of Celebes and Lombok, and also represented in the Philippines; eastwards, however, their range is limited by the Solomon Islands, and they are consequently unknown in New Zealand. With the exception of the aberrant cockatiel (*Callopsittacus*) of Australia, which constitutes a separate subfamily, the whole of the members of the family are characterised by their short and broad tails. Their coloration differs markedly from that of the other groups of the order. In the majority of the species white is the predominant colour, but this may be more or less tinged with red or yellow, more especially in the crest and on the under surface of the tail. In the rose-breasted cockatoo the whole breast is, however, red, while the upper surface of the body, together with the wings and tail, are various shades of grey, while the ganga is all grey with the exception of the red head. In other species the prevalent tint is black or dark blackish brown. All lack the green, so characteristic of the parrots in general, although a tinge of this colour exists on the wings of the ganga.

Great Black
Cockatoo.

The largest of all the cockatoos, and indeed one of the biggest of the whole parrot tribe, is the great black cockatoo (*Microglossus aterrimus*), of the Papuan Islands and North Australia, which is the sole representative of its genus, and may be compared in size to a raven. It differs from all the other members of the family in that the flesh-coloured cheeks are entirely naked; and it takes its generic name from the small size of its tongue, which is



HEAD OF GREAT BLACK COCKATOO, WITH CREST DEPRESSED. (From Guillemard's *Cruise of the Marchesa*.)

slender and worm-like, and thus quite unlike that organ in other parrots. It is further characterised by the upper mandible being much compressed, and narrower than the lower one; while the great elongation and narrowness of the feathers of the crest are also distinctive. In the living state the plumage is of a slaty black tint, powdered with grey; the forehead and lores being deep velvety black; while the feathers of the wings and tail exhibit green reflections. The naked cheeks are pale red, bordered with equally pale yellow, and the bill and feet are black. In length this magnificent, but funereal-looking bird, measures from 29 to

31 inches, some 10 of which are taken up by the tail. The largest specimens come from the mainland of New Guinea, those inhabiting the Aru Islands being considerably smaller. The tongue occupies only a small space in the enormous mouth, and has been compared to a round pink worm with a black head, and is partially extensile. The colour of the naked skin of the face is subject to considerable variation in the living bird, and, at times of excitement, owing to a kind of blushing



GREAT BLACK COCKATOO, WITH CREST ERECTED ($\frac{1}{4}$ nat. size).

process, becomes of a deep blood-red. That the enormously powerful bill of this bird must have some special use is quite evident, and its particular office has been described by Mr. Wallace in the following interesting account of the creature's habits: "The great black cockatoo," writes this observer, "frequents the lower parts of the forest, and is seen singly, or at most two or three together. It flies slowly and noiselessly and may be killed by a comparatively slight wound. It eats various fruits and seeds, but seems more particularly attached to the kernel of the kanary-nut, which grows on a lofty forest-tree (*Canarium commune*), abundant in the islands where



BANKSIAN AND SLENDER-BILLED COCKATOOS.

this bird is found; and the manner in which it gets at these seeds shows a correlation of structure and habits, which would point out the kanary as its special food. The shell of this nut is so excessively hard that only a heavy hammer will crack it; it is somewhat triangular, and the outside is quite smooth. The manner in which the bird opens these nuts is very curious. Taking one endways in its bill, and keeping it firm by a pressure of the tongue, it cuts a transverse notch by a lateral sawing motion of the sharp-edged lower mandible. This done, it takes hold of the nut with its foot, and, biting off a piece of leaf, retains it in the deep notch of the upper mandible, and, again seizing the nut, which is prevented from slipping by the elastic tissue of the leaf, fixes the edge of the lower mandible in the notch, and by a powerful nip breaks off a piece of the shell. Again taking the nut in its claws, it inserts the very long and sharp point of the bill and picks out the kernel, which is seized hold of, morsel by morsel, by the extensile tongue. Thus every detail of form and structure in the extraordinary bill of this bird seems to have its use, and we may easily conceive that the black cockatoos have maintained themselves in competition with their more active and more numerous white allies by their power of existing on a kind of food which no other bird is able to extract from its stony shell." Dr. Guillemard adds that in New Guinea it is extremely difficult to obtain these birds alive, and that when in captivity their movements are slow and clumsy in the extreme. Moreover, as the pectoral muscles are small and meagre, when compared to the enormous head and beak, it is probable that these cockatoos resort to flight as seldom as possible.

Raven-
Cockatoos.

Under the general name of raven-cockatoos may be included a group of seven species, which, while agreeing with the last in their black or brown coloration, are distinguished by their completely-feathered cheeks, the more ordinary form of the beak, and the shorter and broader feathers of the chest. Of this group the Banksian cockatoo (*Calyptorhynchus banksi*), represented in the upper portion of our plate, may be taken as a well-known example. In all these birds the tail-feathers are rather long, with the middle ones shorter than those on the sides, and they are crossed by a light-coloured transverse band. The beak is characterised by its shortness and depth, and its highly-curved profile. The whole seven species are confined to Australia. The Banksian cockatoo belongs to a group of four species in which there is no light-coloured patch on the ear-coverts; while in the adult males the band on the tail is red, although more or less tinged with yellow in the young and perhaps in females of all ages. On the other hand, in the second group, of which the funereal cockatoo (*C. funereus*) is a well-known representative, the ear-coverts are marked by a yellow or white patch, while the tail-band is of one of these two tints at all ages. The Banksian cockatoo, which measures 24 inches in total length, has the general colour of a greenish black, with a vermilion tail-band. It is confined to Eastern Australia. Writing of a South Australian species (*C. xanthonotus*) belonging to the group with a yellow tail-band, the "Old Bushman" observes that it "was common in our forests from about December, when the old and young birds came down from their breeding-places, and remained with us during the winter. They did not breed in our neighbourhood [near Port Phillip]; but I think they went to nest very early, for I once shot a female in May with a large egg in

her. They principally frequent the honeysuckles, but are often in the large gums. The old birds are very shy, and have a loud, hoarse call-note, or cackle. When they first come, they are in large flocks, and they then always frequented the large honeysuckles, over the tops of which they would fly, or rather float through the air, with a wavering kind of flight, toying and playing with each other, after the manner of the rook at home. As the winter advanced, they appeared to separate, and, although you hardly ever see a single bird, they disperse themselves much more generally over the forests. Their principal food appeared to be large seeds and grubs, and they score the young honeysuckles round with their powerful

beaks in search for these latter as if cut with a knife. The young birds are excellent eating." Basing his experience on another species, Dr. Guillemard also vouches for the excellent quality of cockatoo-pie.



HEAD OF DUCORPS' COCKATOO.
(From Selater, *Proc. Zool. Soc.*, 1871.)

The curiously-coloured ganga, or helmeted cockatoo (*Callocephalum galeatum*), of South-Eastern Australia and Tasmania, differs so decidedly from all its allies as to constitute a genus by itself. The tail, as in the two following genera, is of moderate length and nearly even; while the head and crest of the male are of a flaming red, and the general colour of the upper and under-parts grey. The cere is peculiar in being feathered, and, while the beak is horn-coloured, the feet are nearly black. There is a tinge of green on the primaries of the wings. The length of this cockatoo is $13\frac{1}{2}$ inches. It is a shy and

forest-loving species, generally leading a solitary life among the topmost boughs of the tallest gum-trees, on the seeds of which it subsists.

Typical Cockatoo. With the exception of the rose-breasted species, in the typical cockatoos, which are those generally kept as pets, the predominant colour of the plumage is either white or rosy white, while in the whole of them the upper mandible has a short hook curving downwards nearly at a right angle to its base. The species, fifteen in number, range over Australia and the islands to the north as far as the Philippines, and include the most gorgeously-coloured representatives of the family. The crest is subject to considerable variation in form and colour, such variations being of the highest importance in the determination of the various species. In the first place, the genus may be divided into two groups, according to the form of the crest. In one of these two main groups the crest-feathers are slender and terminate in sharp points

which curve forwards. One of the best known representatives of this group is the greater sulphur-crested cockatoo (*Cacatua galerita*) from Australia, in which the feathers of the body are pure white, the cere naked, the crest sulphur-yellow, and the naked skin round the eyes white. This is one of the largest species, measuring from 18 to 20 inches in total length. In the much smaller lesser sulphur-crested cockatoo, in which the length does not exceed 13 inches, the body-feathers are slightly tinged with yellow, while there is also a patch of yellow on the ear-coverts, in addition to that on the crest; this species inhabiting Celebes and some of the neighbouring islands. From both of these the citron-crested cockatoo (*C. citrino-cristatus*), from the island of Timor-Laut, is readily distinguished by the orange-yellow of the crest. Far more gorgeous than all the others is, however, the beautiful Leadbeater's cockatoo (*C. leadbeateri*) of South Australia, in which the crest is vermillion at the base, with a yellow band traversing this coloured area; while the tips of the feathers are white. The cere is also feathered. While the plumage of most of the upper-parts is white, the sides of the head, neck, together with the breast, underparts, and tail-coverts, are tinged with a pale rose-colour, being very bright under the wings. In size this species comes next to the greater sulphur-crest, its total length being about 16 inches.

In the second great group the feathers of the crest, as shown in our figure of the head of Ducorps' cockatoo (*C. ducorpi*) of the Solomon Islands, are broad with rounded tips, which do not curve forwards. In the larger forms, which correspond in size to the greater sulphur-crested species, the feathers of the crest are very long, and the cere is naked. One of the best known forms is the great white-crested cockatoo (*C. alba*), from the Halmahera Group of the Moluccas, in which the whole plumage is white. Readily distinguished by its vermillion crest the rose-crested cockatoo (*C. moluccensis*), which appears to be confined to the islands of Ceram and Amboyna, is represented in the figure on the next page. The remaining species are smaller, and have the cere feathered. Most of them have the under surface of the body white; but the red-breasted cockatoo (*C. roseicapilla*) differs from all the other members of the genus in having the whole of the under surface of the body of a brilliant full rose-colour, and the upper-parts grey, the crown of the head being pale rosy white. It is widely distributed in Australia, and measures 14 inches in total length. The blood-stained cockatoo (*C. sanguinea*) is from North Australia.

Habits.

All the cockatoos of this group are gregarious, some of the species, like the greater sulphur-crest, associating in immense flocks:



HEAD OF BLOOD-STAINED COCKATOO.
(From Slater, *Proc. Zool. Soc.*, 1871.)

and those who have seen these birds soaring over the trees of an Australian forest bear testimony to the beauty of the spectacle. At times they will ascend in the sky, during the full blaze of a tropical noon, far above the range of the unaided human vision, while at others they may be seen scattered so thickly over a field as to give almost the appearance of a coating of snow. Some years ago it was attempted to naturalise these birds in the woods of Norfolk, but the attempt was



ROSE-CRESTED COCKATOO ($\frac{1}{4}$ nat. size).

to a great extent rendered abortive through their wandering habits, whereby many fell victims to the guns of the idlers of the neighbourhood. When flying at such a height in the air as to be invisible to the naked eye, the whereabouts of the flock of great white cockatoos is often revealed on a calm day by the sound of the characteristic cry from which these birds derive their name. This repetition of the syllables *cockatoo-cockato* is the ordinary cry of that species, but the harsh, screaming yell, denoting anger or surprise, is only too well known to all who have kept these birds as pets. Their food consists mainly of seeds, but it is probable

that in the wild state larvæ of insects form a considerable portion of the diet of many of the species, as in captivity they will readily eat both gnats and flesh. Like most of the parrot tribe, cockatoos do little or nothing in the way of nest-making, generally laying their eggs on the bare wood in some hollow tree. The eggs vary from three to four in number, and usually two broods are reared in a year. In those species which have been bred in Europe, the season extends from May till September. Their elegant plumage, graceful movements, and the readiness with which they are tamed, render cockatoos great favourites as domestic pets, although their discordant cries—worse in some species than others—are a most serious drawback. Writing of the great white cockatoo, Mr. W. T. Greene observes that “occasionally one of these birds will learn to pronounce a few words with tolerable distinctness, but their *forte* lies in the imitation of the barking of dogs, the crowing of cocks, the gabbling of turkeys, and the cackling of ducks, hens, and geese; and more particularly in the rendering, with much fidelity but in an exaggerated key, the outcries of a domestic fowl that has just produced an egg. They may be readily taught to throw up their wings, dance on their perch, hold out their foot to shake hands, and bow their heads in salutation of a visitor.” Not unfrequently these birds can be tamed sufficiently to admit their being allowed to wander at large, and the writer is acquainted with an individual of one of the Australian species which is at times let loose in the garden of its owner. Here the bird will generally remain within accessible distance, although it will occasionally fly to the tops of some tall trees. From such an elevated perch “cockie” will generally descend at the call of its mistress, but occasionally it is obdurate, and cannot be recaptured without much trouble. The rose-breasted species assembles in smaller flocks than most of the other kinds, from which it also differs in its fondness for shade, resting quietly in the tree-tops while its white cousins are soaring in the empyrean above during the midday heat. From its splendid colours and engaging ways it would make an attractive pet, were it not that its discordant screams are more piercing and more frequently uttered than are those of its allies.

Slender-Billed Cockatoos. The slender-billed cockatoos, of which there are two species, one (*Lichmetis nasica*) having a wide range in Australia, while the other (*L. pertinax*) is confined to Western Australia, take their name from the great length and slenderness of the upper mandible, which projects obliquely forwards. The former species is represented in the lower figure of the plate on page 104; and measures 15 inches in length, the general colour of the plumage being white. The lores and a narrow band on the forehead are, however, red; while the feathers covering the head, neck, and breast are scarlet at the base, and the under surfaces of the wings and tail are washed with yellow. The crest is small, and confined to the front of the head.

The Cockatiel. The small long-tailed Australian species, known as the cockatiel (*Callopsittacus novæ-hollandiæ*), differs so remarkably in appearance from the other members of the family that it has been considered to be an ally of the grass-parakeets. Nevertheless, as it has the crest and skull of the cockatoos, it is referred by Count Salvadori to the present family. It differs from all the other members of the family in its narrow and pointed tail-feathers, of which the

middle pair are much longer than the others. The male measures about $12\frac{1}{2}$ inches, rather more than half of which is taken up by the tail. Its coloration, without being very striking, is pleasing. The prevailing hue is dark grey,



COCKATIEL.

becoming much paler on the upper tail-coverts; the forehead and cheeks are lemon-yellow, while the feathers of the crest, which cannot be depressed, are yellow at the base and grey above. A bright patch of reddish orange on the ear-coverts occupies the middle of the yellow area, and the median and greater coverts, as well as a portion of the secondaries of the wings, are ornamented with a broad band of white. The female lacks the brilliant head-colours of her consort. The cockatiel is found all over Australia, with the exception of North-Eastern Queensland, and associates in flocks of considerable size. The female lays from five to seven, or even nine eggs, in the incubation of which the male takes a full share. Strong in its flight, the cockatiel is a somewhat restless, and at the same time a noisy bird. Mr. W. T. Greene writes that, "taken when about half-fledged

from the nest, and brought up by hand, or rather by mouth, the young male cockatiel becomes the most charming pet that can be imagined; in point of fact, there is scarcely any accomplishment that he cannot be taught. He will perform all manner of little tricks, such as kissing his mistress, pretending to be dead, flying out of window, and returning at the word of command; and he will also learn to repeat, with great distinctness, not only words, but short sentences, and even to

imitate, in a disconnected and rambling fashion, it is true, the chattering of his compatriot, the budgerigar, or the warbling of his rival the canary." These birds will breed freely in confinement; and they have the advantage of an equable and contented disposition, which enables them to live peaceably with the other inhabitants of an aviary, whether great or small. Indeed, so easy-going in disposition is the cockatiel, that it will frequently allow itself to be hustled about and bullied by its smaller cousin, the budgerigar, the description of which comes later on in the chapter.

THE TYPICAL PARROTS.

Family *PSITTACIDÆ*.

With the exception of the peculiar owl-parrot of New Zealand, the whole of the remaining members of the order are included in a single family, which comprises a far larger number of genera and species than either of the others. The group is one very difficult to define; but, with the exception of the *Uvæan* parrot and a kindred species, all its members are distinguished from the cockatoos by the absence of a crest; while in the skull the ring of bone is generally imperfect, and if complete it always lacks the posterior process characterising that part in the cockatoos. The members of this family have a very wide geographical distribution, ranging over the whole of the tropical regions, and being the only representatives of the order met with in Africa and America. In the Australasian region they are found in association with all the other five families. The family is divided into six subfamilies.



PIGEON PARROT (nat. size).

Subfamily *NASITERNINÆ*.

New Guinea is a country of strange creatures, but none of its living products are more remarkable than the pigmy parrots, some of which are actually smaller than an English sparrow. These birds have their beaks shaped as in the cockatoos, with a broad band-like cere, which becomes

Pigmy Parrots.

narrower in the middle line. They are, however, specially distinguished by their short and squared tails, in which the pointed extremities of the shafts of the feathers project beyond the vanes. When folded, the long wings reach beyond the end of the tail; and the claws are remarkably elongated. The males of these pigmies are most gorgeous in colour, but their consorts show much more sober



RED-CAPPED PIGMY PARROT. (From Guillemand's *Cruise of the Marchesa*.)

tints. Altogether nine species of these parrots are recognised. In the species figured on p. 111 (*Nasiterna pygmaea*), the total length is just over 3 inches, but it is rather more in the red-capped species (*N. bruijnii*).

THE AMERICAN SHARP-TAILED PARROTS.

Subfamily CONURINÆ.

The pigmy parrots constituting a subfamily by themselves, we come now to a second very large subfamily, exclusively confined to the New World, and ranging from Carolina to Patagonia. These parrots, which include the well-known macaws and the smaller conures, are characterised by their graduated and generally long tails, in which each of the feathers tapers to a point, and the middle pair are longer than any of the others. The bill is strong, almost always deeper than long, and generally devoid of any notch; while its usual colour is whitish or pale brown. Except in one genus, the two sexes are alike; and the predominant colour of the plumage is usually green, although in some species blue or yellow. The cere, which may be either naked or feathered, surrounds the whole base of the bill like a band, and the nostrils may be either exposed or concealed among the feathers. In the skull the ring round the socket of the eye is generally complete. As there are no less than fifteen genera in the group, only some of the more interesting can be noticed.



MACAWS.

Hyacinthine
Macaw.

From their large size, the length of their tails, and the gorgeous tints of blue, red, and yellow adorning their plumage, the macaws are the most showy and conspicuous of all the parrots; but they have the disadvantage of being the most noisy of the whole confraternity, and are therefore far from

HYACINTHINE MACAW ($\frac{1}{2}$ nat. size).

desirable in the house. By many writers the whole of them are included in a single genus, but Count Salvadori considers that they may be divided into three generic groups. The hyacinthine macaw (*Anodorhynchus hyacinthinus*), from Central Brazil, of which a figure is given on the left side of our coloured Plate, is the best known representative of a small genus, characterised by the general colour of the plumage being blue both above and below, while the lores are feathered. In the figured species the whole plumage is of a nearly uniform cobalt-blue, becoming a little lighter on the head and neck, and somewhat duller below, while the under surface of the wings and tail is black. In marked contrast to the prevailing azure, stands out the yellow of the naked skin surrounding the eye and at the

base of the lower jaw. The black beak is of unusually large size even for a macaw, and the feet are blackish. The total length of this fine bird is about 34 inches, of which $20\frac{1}{2}$ are taken up by the tail. The hyacinthine macaw is a somewhat rare species, and although inhabiting the dense tropical forests affected by the other macaws, it is said by Azara to differ markedly in regard to its breeding-habits. In place of building in some hollow tree, it is stated to scoop out a burrow on the bank of a river, where it lays a pair of eggs; two broods being reared in a season. These birds—the ararauna of the natives—fly, according to Bates, in pairs, and feed on palm-nuts, which, although so hard as to be difficult to break with a heavy hammer, are crushed to pulp by their beaks. The skulls of the hyacinthine macaw and its congeners differ from those of ordinary macaws in the incompleteness of the bony ring round the eye. The same feature is probably also characteristic of Spix's macaw (*Cyanopsittacus spixi*), which, although agreeing with the ararauna in its blue coloration, differs by the naked lore, on which account it is regarded as representing a distinct genus.

True Macaws.



HEAD OF MACAW.

The true macaws differ from the preceding in the absence of blue on the under part of the body, and also by the completeness of the bony ring in the skull round the eye. In all of them the lores, as well as a larger or smaller area of the cheeks, are devoid of feathers. The range of these splendid birds, which are locally known as araras, extends from Mexico to Bolivia and Paraguay, certain species ranging in the Andes to elevations of some ten thousand feet above the sea.

Of the fourteen recognised species, a few of the better-known will alone be mentioned. Among these the red-and-blue macaw (*Ara macao*), represented on the right side

of our coloured Plate, is one of the handsomest. In this species the general colour of both the upper and under-parts is vermilion red, while the upper wing-coverts are chrome-yellow; the lower part of the back, the rump, upper and lower tail-coverts, together with the quills of the wings being blue. The tail-feathers are scarlet, with more or less blue at their tips (except in the central pair) and on their outer edges, the outermost being almost wholly blue. Beneath, both the tail and wing-feathers are golden-red, while the greater and upper median wing-coverts, as well as the scapulars, are yellow tipped with green. In size this splendid bird attains a total length of 3 feet, nearly 2 of which are taken up by the tail. Its range is large, extending from Mexico to Guiana and the Amazon Valley. In marked contrast to the above, is the coloration of the blue and yellow macaw (*A. ararauna*), depicted at the top of our Plate. In this bird while the upper surface of the body, wings, and tail is blue, almost the whole of the

under-parts are yellow, while the throat is marked by a broad black gorget. The crown of the head is grass-green; and the contrast of the light blue of the feathers of the back with the dark blue of the quills of the wings is very pleasing. This species, which is smaller than the last, is also widely distributed in tropical America, ranging from Panama to the Amazon Valley. A third type of coloration is presented by the still smaller military macaw (*A. militaris*), in which, as in the majority of the species, the prevalent tint is green. The forehead is, however, scarlet, while the lower part of the back, the rump, and the upper tail-coverts are light blue. Blue also appears on the quills of the wings, as well as on the primary and outermost greater wing-coverts; while in the tail the four middle feathers are brownish red tipped with blue above, and the outer ones largely blue. The length of this species is only 27 inches, and its range extends from Mexico to Peru and Bolivia.

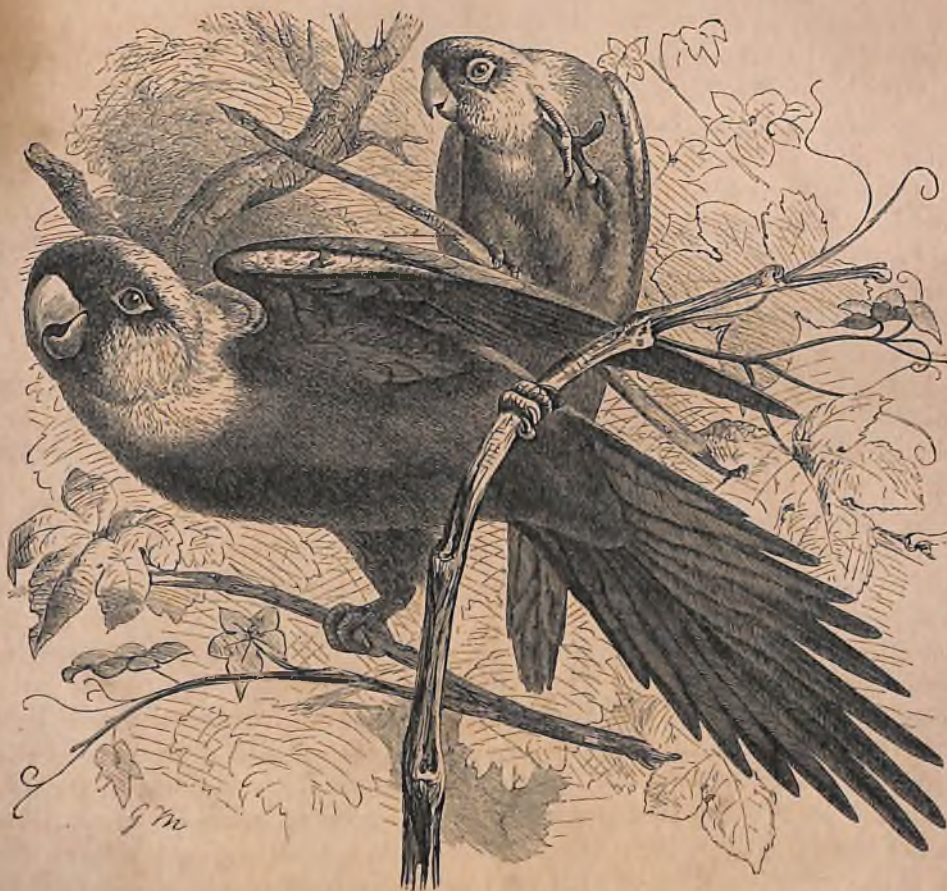
Habits.

All the macaws of this genus are denizens of the dense forests of tropical America, associating in flocks, and feeding on fruits, seeds, and nuts. Bates compares a flock of the red-and-blue species, feeding on the fruits of a palm-tree, to a cluster of flaunting banners suspended beneath its crown. When on the wing, such flocks make the air resound with their loud harsh screams. In the fruit-season, Waterton describes the palms in the neighbourhood of the Macoushi country as being sometimes absolutely covered with these birds; and states that any number may be killed with the blowpipe and arrows. They all nest in the hollows of trees, which they enlarge according to their requirements. The eggs, usually two, but occasionally three in number, are about the size of those of a hen, but less pointed. Both males and females take their share in the incubation, and there are usually two broods in the year. Not unfrequently the whereabouts of a macaw's nest is betrayed by the protruding tail of the sitting bird. Macaws awake from slumber with the first streaks of dawn, and at once commence their deafening clamour; the whole flock generally repairing to some common meeting-place, where they open their wings and warm themselves in the sun's rays. Soon, the flock departs to its feeding-ground, which may be either in the forest or among the cultivated lands. Feeding is continued till about ten o'clock, after which the host repairs to a neighbouring stream to drink and bathe. Towards noon the macaws seek the deepest shade of the forest, where they spend the hottest hours of the day, till the declining sun once again calls them forth. Before settling down to roost for the night, the flock, after the manner of rooks, assembles at the meeting-place—usually some large bare tree. Most of the macaws can be readily tamed, and will live in captivity for long periods. They are, however, but poor talkers, and never give up their pernicious habit of screaming. Moreover, although properly-tamed birds seldom attempt to bite adults, many of them cannot safely be trusted where there are children.

Conures.

Next to the macaws, the best known representatives of this subfamily are the smaller parrots, termed, from the form of the tail, conures, most of which are included in the genus *Conurus*, although our figured example (*C. carolinensis*) is the sole representative of the distinct genus *Conuropsis*. The conures differ from the true macaws by the lore being

feathered; and they are further characterised by the rather swollen form of the beak, which is not in the least degree compressed, while the lower mandible is broad and not grooved. In the typical conures, or those included in the genus *Conurus*, the fourth primary feather of the wing is attenuated, and the nostrils are exposed; whereas in the Carolina conure (*Conuropsis*) the corresponding feather is not narrowed, and the nostrils are concealed among the feathers covering the cere. Various shades of green, yellow, and orange may be described as the prevalent colours of the conures, although there is



CAROLINA CONURE ($\frac{1}{2}$ nat. size).

frequently more or less blue on the quills of the wings, while there may be red on the head and breast; the under-parts are, however, never blue. In the Carolina conure, which measures $12\frac{1}{2}$ inches in length, the general colour is green, becoming yellowish on the under-parts; while the forehead and cheeks are orange-red, and the rest of the head and neck bright yellow. Spots of orange-red with patches of yellow adorn the shoulders; and the outer webs of the quills are bluish green, becoming yellow at the base. The true conures, of which there are no less than twenty-eight species, range from Mexico, through Central America and the West Indies, to Bolivia and Paraguay. Formerly, the Carolina conure had

a more northern range than any other parrot, 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. At one time they were found in enormous flocks, which used to do great damage to the crops, but of late years their numbers have been greatly reduced. Wilson writes that the Carolina conures "are particularly attached to the large sycamores, in the hollows of the trunks and branches of which they generally roost; thirty or forty, and sometimes more, entering at the same hole. Here they cling close to the sides of the tree, holding just by the claws, and also by the bill. They appear to be fond of sleep, and often retire to their holes during the day, probably to take a regular siesta. They are extremely sociable and fond of each other, often scratching each other's heads and necks, and always at night nestling as close as possible to each other, preferring at that time a perpendicular position, supported by their beak and claws." They lay from three to five eggs; and, if taken young, are readily tamed. The golden conure (*C. solstitialis*), of Guiana, is golden-yellow, with the exception of parts of the wings which are green and blue.

Slight-Billed Parraquet. The great length and comparative straightness of the upper mandible of the parrot represented in the illustration on the next page, serves to distinguish it at a glance from all its kindred. This bird is the slight-billed parraquet (*Henicognathus leptorhynchus*), the sole representative of its genus, and restricted to Chili, where it appears to be abundant. It is about 15 inches in total length; and the general colour of its plumage is dull green, becoming somewhat brighter on the top of the head, in which region each feather has a dusky edge. This colour is relieved by dull crimson on the forehead, lores, and round the eyes; and there is a faint patch of dull red on the abdomen, and some amount of bluish tints on the wings. The iris of the eye is orange, while the beak and feet are lead-colour. These parrots are met with in large flocks; which may number hundreds or thousands of individuals, and keep up an incessant screaming. For a part of the year they inhabit the forests, but from October to April they make their appearance in the cultivated districts of Valdivia, for the purpose of feeding on the crops. At this season they appear every morning in large flocks flying from the northward, and returning in the evening. With their long beaks they extract the grains of maize and wheat from the growing crops, and also dig up roots of grass, which form their staple food. Indeed, they are more terrestrial than arboreal in their general habits, although they nest in hollow trees. It is but seldom that these parrots are brought alive to Europe.

Grey-Breasted Parraquet. The grey-breasted parraquet (*Myopsittacus monachus*) belongs to a group of genera, distinguished from the three preceding ones by the bony ring round the eye being incomplete; this particular genus being characterised by the beak being rather swollen at the sides and rounded above, as well as by the tufted oil-gland, and the concealment of the nostrils by the forward projection of the feathers at the base of the beak. The general colour of this parrot is green, with the upper part of the head, lores, cheeks, throat, and breast grey; the under-parts yellowish green, and the primary feathers and wing-coverts blue, edged with green on their outer webs. The bill is reddish white, the iris

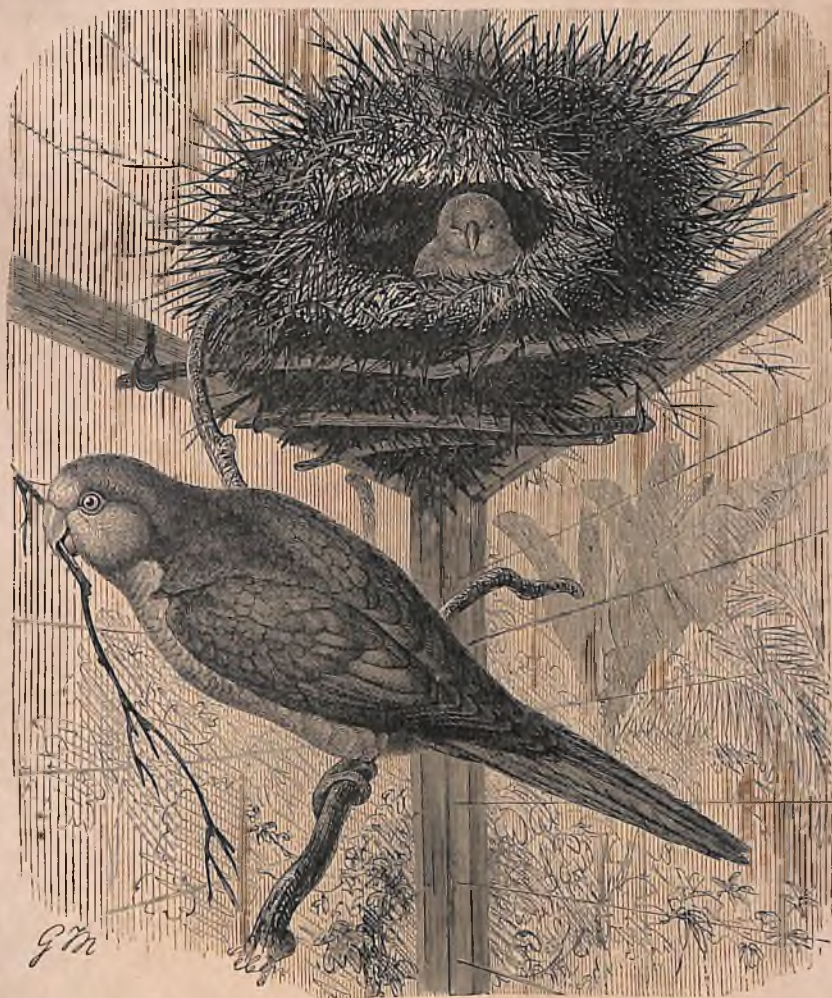
brown, and the foot grey. The total length of the bird is $11\frac{1}{2}$ inches. It is a native of Bolivia, Paraguay, Argentina, and Uruguay. The most interesting point in connection with this parrot is its habit of building nests in trees, whereby it differs from all other members of the order; our illustration representing one of these nests built by a pair in captivity in one corner of their cage. Darwin states that these birds in Parana select tall trees in which to build; and that a number of nests are placed so close together as to form one great mass of sticks. They always associate in immense flocks, and commit



SLIGHT-BILLED PARRAQUET ($\frac{2}{3}$ nat. size).

great ravages on the corn-crops. On this account they are much persecuted by the inhabitants, Darwin relating that as many as two thousand five hundred of these birds were killed near Colonia in the course of a year. In some districts the nests are constructed in the trees growing in swamps, and attain a huge size; each nest generally having several entrances, and being frequented by two or three pairs of birds. On this account the name of swamp-parrot is frequently applied to the species. From observations made on captive specimens, it appears that although the cock aids in building the nest, the work of incubation is performed by the hen alone; the usual number of eggs being two.

Nearly allied to this species are several South American parrots constituting the genus *Bolborhynchus*, distinguished from the one under consideration by the nostrils being exposed and opening in a much swollen cere, from which the name of the genus is derived. These parrots range from Mexico to Northern Chili and the Argentine, a well-known species being the Aymara parraquet (*B. aymara*).



GREY-BREASTED PARRAQUET ($\frac{2}{3}$ nat. size).

Parrotlets. The smallest representatives of this subfamily are the pretty little green and blue birds, which may be termed, from their Latin name, parrotlets, and occupy a position in this section analogous to that held by the love-birds in the parraquet group. The largest of these parrotlets is only $5\frac{1}{2}$ inches in length, while none of the others exceed 5 inches. They differ from all the other members of the subfamily in the relative shortness of their tails, and also in that the two sexes are unlike, while their skeletons are distinguished by the absence of the furcula. They range from Mexico to Bolivia and Brazil, and are divided into three groups, according to the colour of the ramp in the male. In

the first group, as represented by the blue-winged parrotlet (*Psittacula passerina*) the rump is ultramarine blue; in the second (*P. speugeli*) it is turquoise; and in the third (*P. guianensis*) green. We may remark here that the reader will scarcely fail to notice what a number of members of the parrot tribe are restricted to the Southern Hemisphere, where they are especially numerous in South America, Australia, and the Papuan Islands. This has been taken to indicate that these birds constitute an originally southern group, although it is much



BLUE-WINGED PARROTLET.

more probable that they were primarily developed in the Northern Hemisphere.

All-Green Parraquet. Our last example of the subfamily is the all-green or tirika parraquet (*Brotogerys tirica*), representing a genus with several species, distinguished by the long tail, the somewhat compressed form of the beak, in which the nostrils open in a completely naked cere, and the absence of a tufted oil-gland. The species figured on the opposite page is the largest of the genus, measuring 10 inches in total length, whereas some of the others are less than 7. It takes its name from the all-pervading green of the plumage, to which the only exceptions are the blue primaries and primary coverts, a slight tinge of olive-brown on the lesser upper wing-coverts, and of blue on the middle tail-feathers. This species is an inhabitant of Eastern Brazil; the range of the genus extending from that country, Peru and Bolivia, to Central America. In Eastern Brazil the tirika is one of the commonest of the parrot tribe, associating in countless flocks, which may be seen flying from grove to grove, or descending to ravage the rice and maize fields. Their cry is a short, sharp, clear scream. In captivity these parraquets thrive well.

BLUNT-TAILED GREEN PARROTS.

Subfamily PIONINÆ.

The familiar Amazon parrots are among the best known representatives of a large subfamily, containing several American genera and also a single African one. All these parrots are distinguished from the members of the preceding subfamily by their broad and short or moderate tails, which are never of the acuminate and

pointed form characteristic of the conures, and have the tips of the feathers rounded. In the whole of them the cere is entirely naked, and the predominant colour of the plumage green. Usually the tail is about half the length of the wing, and may be either squared or rounded at the end; and the bill is of moderate



ALL-GREEN PARRAQUET ($\frac{1}{2}$ nat. size).

strength, sometimes rather longer than deep. The New World forms are all of them tropical.

Amazon Parrots.

The Amazon parrots, of which there are over forty species, are mostly comparatively large birds, sometimes exceeding 17 inches in length, and range from Mexico to Argentina, although especially characteristic of the great river valley from which they take their name. They are characterised by the tail being of moderate length and rounded, with the under-coverts always green; and also by the absence of a tufted oil-gland, as well as by the completeness of the bony ring round the eye. One of the best known species is the festive amazon (*Chrysotis festiva*), from the Amazon Valley, which is a green bird with a red frontlet, a line of blue above and behind the eye, the back and rump red,

and the bastard-wing, together with the primary wing-coverts and the outer webs of the primaries deep blue. Most of the species are distinguished from one another by the markings of the head and face, while a few differ by their smaller size. They are all essentially forest-dwelling birds, associating in flocks, and feeding upon the fruits of palms and other trees. They usually lay from three to four eggs, and produce but one brood in the year. If taken sufficiently early, the young are extraordinarily tame; and as these birds are very hardy, they are favourites in captivity, more especially as many of them rival the grey parrot in talking and mimicry. Indeed, the festive amazon frequently becomes sufficiently domesticated to be allowed to wander in gardens at large.



HAWK-BILLED PARROT ($\frac{1}{2}$ nat. size).

Hawk-Billed Parrot. One of the most remarkable members of this subfamily is the hawk-billed parrot (*Deroptyus accipitrinus*) of Guiana, the Amazon Valley, and North-East Brazil, which is the sole representative of its genus. It differs from the amazons by the presence of a tufted oil-gland, and by the relatively longer tail, and is specially characterised by the beak being rather short, and deeper than long, but above all by the elongation and breadth of the feathers on the hinder part of the neck, which form an erectile collar or ruff. The coloration of this extraordinary bird is very striking. While the back and upper surface of the wings are green, the head is brown, with hoary streaks on the sides; the elongated feathers of the nape, together with those on the abdomen

and breast are dark red, with blue edges; and the bastard-wing, primaries, and primary-coverts are black. The tail-feathers are green, tinged with blue near the tips; and below both the tail and wings are black. The colour of the bill is dusky horn, the iris is brown, and the feet are black. In length this bird measures about 14 inches. In repose, the elongated feathers of the nape are depressed, and it is only when the bird is excited or angry that the ruff is raised in the manner depicted in our illustration. But little is known of this parrot in its native state, beyond the fact that it is an inhabitant of dense forests, and is far less common than most other species. It is frequently found on the sawari-palms, and its cry is described as of piercing shrillness. The usual number of eggs laid is stated to be four. Although but rarely imported into Europe, the hawk-billed parrot, according to Mr. W. T. Greene, is an admirable bird as a pet, being very hardy, agile and graceful in its movements, readily tamed, and almost as good a talker as the grey parrot.

African Green Parrot. Passing by the other American representatives of the present subfamily, brief mention must be made of the African genus *Pœocephalus*, which contains several medium-sized parrots, with rather short tails, and the bill very short and deep, especially as regards its lower mandible, in which the depth exceeds the length. These parrots are found throughout Africa south of the Sahara, and agree with their American cousins in the general green hue of their plumage; well-known examples being Levaillant's parrot (*P. robustus*) of South Africa; Jardine's parrot (*P. guliemi*) from the West Coast, and the brown-headed parrot (*P. fuscicapillus*) from Zanzibar. In the second of these, while the general hue is green, the feathers of the back are black edged with green, the tail-feathers and primaries black, and the other wing-feathers like those of the back. These colours are relieved by red on the front of the head, the bend of the wings, and legs. The whole length of the bird is about 11 inches. All are readily tamed, and may be often trained to talk fairly well.

Subfamily PSITTACINÆ.

Grey and Black Short-Tailed Parrots. This second group of short-tailed parrots, which are mainly confined to Africa and Madagascar, although represented by one genus in New Guinea, are readily distinguished from the members of the preceding subfamily by their prevalent colour being either grey or black, with or without an admixture of red. The sides of the head are more or less naked, the bill is never red, and in the skull the bony ring round the eye is always incomplete. The cere is broad, but narrows towards the nostrils, which it does not enclose in a swelling; while the bill is without a notch, and has its lower mandible longer than deep. The tail may be either square or rounded, and is sometimes rather more and at others rather less than half the length of the wing.

Grey Parrot. Such a universal favourite as the common grey parrot (*Psittacus erithacus*)—the type of the whole order—scarcely requires description, as its appearance is familiar to all. It may be mentioned, however, that it is characterised by the squared tail being less than half the length of the wing; by

the rather compressed and lengthened bill, and by the papillæ covering the naked portions of the face. The general colour of the plumage is ashy, with a bright red tail. The range of this species extends from the Congo and Guinea coast across Equatorial Africa to the east of Lake Nyasa. In Liberia and lower Sierra Leone it is replaced by *P. timneh*, distinguished by its dark grey plumage, and the dark red of the tail. The best account extant of the habits of the grey parrot in its wild state is one by Mr. J. G. Keulemans, who had an opportunity of studying these birds during a long residence on Prince's Island, where they especially frequent a hill, known as the Pico do Papagaio. Mr. Keulemans writes



THE GREY PARROT ($\frac{2}{3}$ nat. size).

that "these parrots are always found in flocks which go about the island during the day, returning to their own appointed place on the mountain in the evening to roost. Their food consists of fruits, such as the palm-nut, the avocat, the banana, goyave, mango, and many other fruits of a smaller kind, but they always give the preference to the palm-nuts. They drink but little, and as no water is found on the Pico, they must obtain what they require during the day on the lowland. They make no nest, but deposit their eggs (which are from two to four in number) on the bottom of the hole. The eggs are in size, shape, and colour similar to those of the wood-pigeon; when unblown they are of a pinkish hue, which may be owing to the thinness of the shell. Both birds take it by turns to sit, and while one is sitting the other often comes and feeds it out of its crop. The young ones are fed

in the same way. In time of danger the old birds defend their progeny vigorously, and should the enemy prove too strong to be successfully resisted by one, other parrots come up to their assistance, and, joining forces, either kill or put the aggressor to flight. The grey parrot delights to dwell in companies; many nests are found within a few feet of each other, and often in one tree two or more holes may be seen occupied by hatching pairs. The young birds are covered with a long and fluffy down, which afterwards, when moulting, falls off. Their first plumage is darker, and the iris dark grey, instead of pale yellow. They leave the nest when about four weeks old, but may be seen looking outside the hole some time before they are able to fly." In captivity this parrot is the best of talkers; and, did space permit, many interesting anecdotes might be quoted relative to this accomplishment. Contrary to what usually prevails among higher bipeds, the male is commonly the more voluble and fluent speaker of the two, although the female pronounces her words more distinctly. Like most parrots, this species attains a great age, and there seems no doubt that examples have been kept in captivity for periods of between sixty and eighty years. Whether, however, they have lived in this state for upwards of a century, as reported, seems doubtful. The anecdote of the old lady of eighty, who purchased a parrot with the view of testing by experiment the truth of such report, is probably well known to our readers.

Five peculiar parrots inhabiting Madagascar and certain neigh-

Vasa Parrots.

bouring islands, constitute a genus easily recognised by their black or blackish brown plumage, which gives them at a distance somewhat the appearance of crows. The region round the eye is naked, the lore also partially bare, and the whitish bill somewhat thickened and swollen. The greater vasa (*Coracopsis vasa*) attains a length of about 20 inches. Although common in their native islands, very little is known of the habits of these parrots in the wild state. The few that are brought to Europe are readily tamed, and soon learn to talk.

New Guinea

Black Parrot.

This species (*Dasypterus perqueti*) is distinguished from its Malagasy allies by its longer and shallower beak, and the larger amount of bare skin on the sides of the face. The general sable hue is relieved by a red band on either side of the back of the head; while the under wing-coverts are likewise red.

THE PARRAQUET GROUP.

Subfamily PALEORNITHINÆ.

The true parraquets, together with the love-birds and certain other allied forms, constitute a fifth subfamily, confined to the Eastern Hemisphere, but exceedingly difficult to define from external characters. All of them differ, however, from the members of the foregoing groups, except the pigmy parrots, by certain peculiarities connected with the course of the carotid arteries. As a rule, the females are markedly distinct from the males, which, with the exception of the parrotlets, is not the case in the preceding groups; the tail-feathers are frequently pointed; and the sides of the head are either completely feathered, or only naked just round the eyes. The bill is often very strong, and frequently, especially its

upper moiety, red in colour. In the skull the ring round the eye is incomplete. The cere is always narrow, surrounding the whole base of the bill with a band of equal width, and is generally partially feathered; while the nostrils may be either exposed or concealed. The group ranges over the Oriental, Ethiopian, and Australasian regions.

The Moluccas and Papuan Islands are the home of a genus of *Eclectus* Parrots. parrots of this group, of which the typical red-sided eclectus (*Eclectus pectoralis*) exceeds the green parrot in size; its total length being from 16 to 18½



RED-SIDED ECLECTUS ($\frac{1}{4}$ nat. size).

inches. In this genus the bill is thick, notched, and very deep, with its lower mandible marked by a keel along the middle line of the symphysis. The tail is of moderate length and nearly squared, with its central feathers of normal form; and the nostrils are hidden. In the females the general hue of the plumage is red, while in the males it is green.

So different are the two sexes of the red-sided eclectus, that it is at first sight

difficult to believe that they belong to the same species. In the female, the beak is black and the eye yellow; the plumage of the head and upper-parts of the neck and breast is rich crimson-red; a band across the upper part of the back, the lower breast and abdomen, as well as the edge of the wing and under-coverts, are blue; the back, rump, upper tail, and wing-coverts, and the secondaries are blood-red; the primaries and their coverts are blue, edged with green on their outer webs; while the tail is blood-red above, and more dusky beneath. In the more soberly clad male, the general green hue is relieved by red on the axillaries and under wing-coverts; while there is blue on the angle of the wing, and the primaries and their coverts; the under surface of both the wings and tail-feathers being black. In the beak, the upper mandible is vermilion, and the lower one black. No adequate conception of the gorgeous coloration of these birds can, however, be conveyed without the aid of coloured illustrations. This splendid parrot ranges from the Aru Islands through New Guinea to the Solomon Islands; but, as with its allies, scarcely anything is known concerning its habits in the wild state. In captivity it is readily tamed; but its chief attraction lies in its brilliant plumage, as its movements are listless and devoid of interest, and it is at times subject to fits of deafening screaming.

All who have travelled or resided in India are familiar with the
True Parraquets. flights of long-tailed parraquets which swarm in every jungle, and form one of the most characteristic features of an Oriental landscape. These parraquets, of which there are many species, belong to a genus ranging from Africa north of the Equator, through Mauritius and the Seychelles, to India, Burma, the south of China, and Malaysia, and taking its name from the circumstance that one of the species was brought to Europe by Alexander the Great from the Punjab. They are characterised by the long and graduated tail, in which all the feathers, but especially the middle pair, are narrow; and by the presence of a notch in the upper mandible; while very frequently there is a rose-coloured collar round the neck, at least in the males. The general hue of the plumage is green; but while in one large group the head is of this colour, in a second it is only partially green, or not green at all. The best known species is the ring-necked parraquet (*Palaeornis torquatus*), belonging to the former group, and ranging from India to Cochin-China. In length, this bird varies from 16 to 17 inches, of which from 9½ to 10 are taken up by the tail; and while its general colour is green, the neck of the male is ornamented with a rose-red collar, incomplete in front, above which is a black ring incomplete behind. Far handsomer, however, is the Indian blossom-headed parraquet (*P. cyanocephalus*), in which the head of the male is red, tinged with plum-colour on the sides and back, and defined by a narrow black collar, while the middle feathers of the tail are blue. The following account of the habits of the Indian ring-necked species is given by Jerdon, who writes that it frequents "cultivated grounds and gardens, even in the barest and least wooded parts of the country, and it is habitually found about towns and villages, constantly perching on the house-tops. It is very destructive to most kinds of grain, as well as to fruit-gardens. When the grains are cut and housed, it feeds on the ground, on the stubble corn-fields, also on meadows, picking up what grains it can; and now and then takes

long flights, hunting for any tree that may be in fruit; and when it has made a discovery of one in fruit, circling round, and swirling with outspread and down-pointing wings till it alights on the tree. It associates in flocks of various size, sometimes in vast numbers, and generally many hundreds roost together in some garden or grove. It breeds both in holes in trees, and very commonly, in the south of India, in old buildings, pagodas, tombs, etc. It lays four white eggs. Its breed-



ROSY-FACED LOVE-BIRDS ($\frac{2}{3}$ nat. size).

ing-season is from January to March. Its ordinary flight is rapid, with repeated strokes of the wings, somewhat wavy laterally or arrowy. It has a harsh cry, which it always repeats when in flight, as well as at other times." These parraquets are readily tamed, and in India will breed in that state. If well trained, they are fairly quiet, but if their tempers have been unduly tried they are wont to exercise their powers of screaming.

Love-Birds.

The pretty little parrots (of which a group is represented in our illustration), commonly known as love-birds, derive both their

popular and scientific titles on account of the attachment the pairs appear to entertain for one another. Mr. W. T. Greene remarks, however, that a single bird will live in captivity for years without any apparent signs of pining, and will actually become more attached to its owner than if it formed one of a pair. And he adds that the reason why if one of a pair dies the other generally soon follows its companion, is that the constitutions of the two have been undermined by the hardships of the voyage to Europe; thus demolishing the pretty fable that the death of the survivor of a pair is due to inconsolable grief at the loss of its mate.

The love-birds, of which the largest does not exceed $6\frac{1}{2}$ inches in length, differ from all the other members of the subfamily, in that the thick and deep beak has no ridge along the inferior surface of the symphysis of its lower mandible; and they are further distinguished by the shortness of the tail, which is marked with a black band near the extremity. Their skeletons are peculiar, in that the furcula is absent. In the latter respect as well as in their small size, and the occasional difference in the coloration of the two sexes, the love-birds resemble the American parrotlets (p. 119), with which they have frequently been classed. They may, however, be at once distinguished from the latter by their rounded instead of pointed tail-feathers. The love-birds, of which



GREY-HEADED LOVE-BIRDS.

there are seven species, are confined to Africa south of the Sahara and Madagascar, although they have been introduced into the Mascarene Islands. The rosy-faced species (*Agapornis roseicollis*) belongs to a group in which the rump and upper tail-coverts are blue, and the under wing-coverts green. In both sexes the general colour is green, becoming yellowish beneath; the rump and upper tail-coverts being light blue, the forehead bright red, and the sides of the face and throat rose-colour. This species inhabits South-Western Africa from Angola to Namaqualand, and is also reported from the opposite side of the continent, in the neighbourhood of the Limpopo. The two sexes are almost undistinguishable in this species.

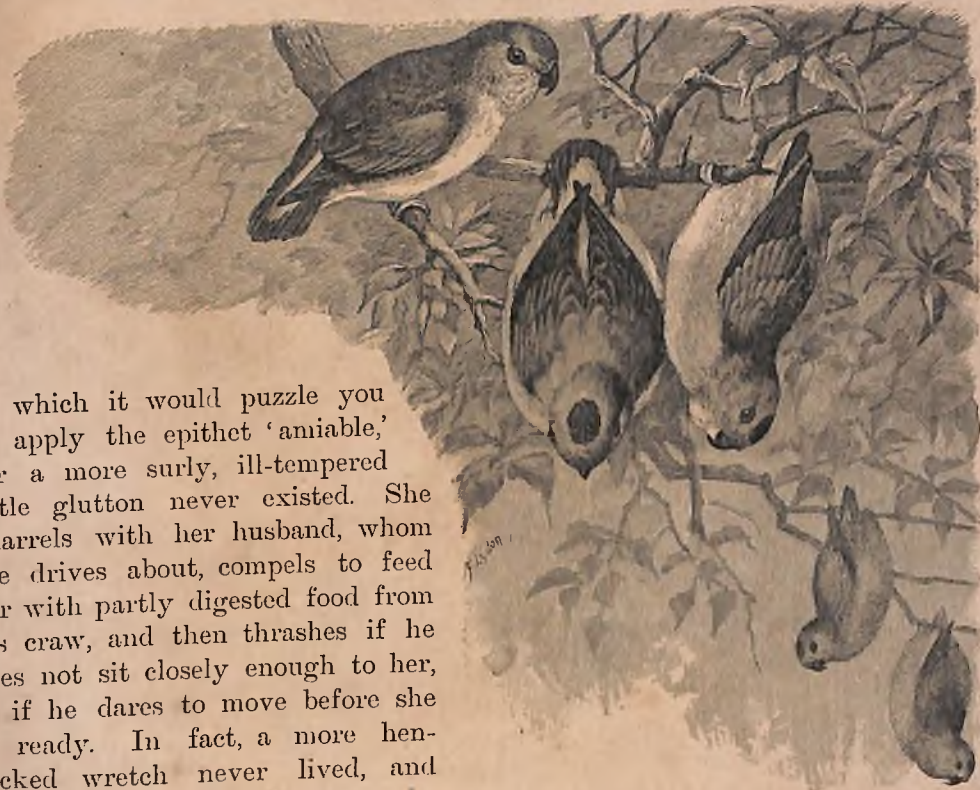
Andersson writes that these love-birds are common in Namaqualand, and are met with in small flocks, never far removed from the vicinity of water. Their flight is rapid; and while on the wing they utter their sharp cry. Their food consists of berries and large berry-like seeds. Instead of making nests for themselves, they take possession of those of other birds; but Andersson was unable to ascertain whether they did so by dispossessing the rightful owners, or

whether they were content with deserted domiciles. The number of eggs is not mentioned.

From their small size and engaging manners the love-birds are great favourites in captivity, although they are all more or less delicate. The rosy-faced species is, however, the most hardy, and will readily breed in confinement, often producing two broods in the year. That love-birds have not always the angelic disposition commonly attributed to them, is indicated by the following extract from a correspondent of Mr. Greene's, who writes, that "I have a red-faced love-bird,

to which it would puzzle you to apply the epithet 'amiable,' for a more surly, ill-tempered little glutton never existed. She quarrels with her husband, whom she drives about, compels to feed her with partly digested food from his craw, and then thrashes if he does not sit closely enough to her, or if he dares to move before she is ready. In fact, a more hen-pecked wretch never lived, and yet he seems to like it, and to be specially proud of his beautiful but utterly unamiable wife."

The last group of this great subfamily is formed by the curious hanging parrots,—so called from their habit of sleeping head downwards, suspended by their feet from a bough. These parrots, which are about the same size as love-birds, comprise twenty species, ranging from India and the Philippine Islands through the Malayan region as far east as Duke of York Island. They differ from all the other members of the subfamily in the thinness of the beak, in which the length exceeds the depth; the upper mandible being long and but little curved, while the profile of the lower one slopes upwards with very little convexity. In all of them the under surface of the remiges and tail-feathers is of a bright verditer blue. They are brilliantly coloured, with green as the predominant tint; and Dr. Guillemard describes a species from the



A GROUP OF HANGING PARROTS.

Sulu Islands (*Loriculus bonapartei*) as looking like a little glowing ball of vivid crimson, yellow, and green. The blue-crowned species (*L. galgulus*), here figured, is an inhabitant of the Malay Peninsula and Islands, and measures just



BLUE-CROWNED HANGING PARROTS ASLEEP ($\frac{2}{3}$ nat. size).

over 5 inches in total length. In the male the general colour is green, with a deep blue spot on the top of the head, another of yellow on the interscapular region, a broad band of yellow across the lower part of the back, the rump and upper tail-coverts scarlet, and a patch of the same colour on the throat. The female is duller.

As might be inferred from the conformation of their beaks, all the hanging parrots are flower-suckers, subsisting largely on honey, although they also eat flower-buds and young shoots. The Indian species (*L. vernalis*) is usually found in open spaces in the forests, where it associates in small flocks. When feeding, it keeps up a continual chirping cry; and it is said, like the fruit-bats, to be at times taken in a stupefied condition, lying beneath the pots suspended to catch palm-juice. They appear to pass a large portion of their time in sleep; but when awake exhibit marvellous activity in climbing. From the nature of their food, these little parrots are not well adapted for captivity, although they can be kept on a diet of rice boiled in milk and well sweetened, with the addition of fruit and

ants' eggs. Mr. Greene says that if several are kept in a cage, they will hang suspended side by side from the roof for hours at a time, in which position they will caress and feed one another.

THE BROADTAIL GROUP.

Subfamily PLATYCERCINÆ.

The last subfamily of the *Psittacidae* is represented by the broadtails, grass-parraquets, and their allies, and is entirely confined to Australia, New Zealand,



ROSE HILL BROADTAIL ($\frac{2}{3}$ nat. size).

New Caledonia, and the Society Islands. They are distinguished from all the preceding groups, with the exception of the parrotlets and love-birds, by the absence of the furcula;¹ while in the skull the ring round the eye is incomplete. The tail is rather long, graduated, and often pointed; and the beak of moderate size, and never red in colour. The cere is small, merely surrounding the nostrils: the beak short and thick, with the lower mandible generally concealed by the feathers of the cheeks; and the plumage much variegated.

¹ The single species of *Naunodes* is an exception in this respect, while it also differs from all other *Psittacidae* in its brush-like tongue.

Broadtails.

The broadtails, of which the best known example is the Rose Hill broadtail, or Rosella parraquet (*Platycercus eximius*), take their name from the breadth of the tail-feathers, which are not acuminate. The bill is distinctly notched; and the feathers of the back are black, with broad, light edgings, and presenting a general scale-like appearance. The genus, of which there are thirteen species, is restricted to Australia, Tasmania, and Norfolk Island.

The Rose Hill broadtail is one of the handsomest of the Australian parrots, and belongs to a group of three species, in which the cheeks are white and the head red. Its coloration may be briefly indicated by saying that the head, neck, and breast are red; the cheeks white, the nape yellow; the feathers of the back black, with greenish yellow borders; the rump, upper tail-coverts, and lower part of the abdomen yellowish green; and the lower breast yellow, with a scarlet band in the middle. A large portion of the wings is blue; and while the two middle tail-feathers are green tipped with blue, the outer ones are darker. The total length is $13\frac{1}{2}$ inches. This species inhabits South-Eastern Australia and Tasmania. It generally assembles in small flocks, and, although strong on the wing, is not migratory. Its favourite haunts are open districts, and it specially frequents cultivated lands, where it inflicts much damage on the crops. In addition to seeds of various kinds, this parraquet is believed to consume insects and their larvæ. It may be distinguished from most other parrots by its cry, which is described as a kind of chattering or warbling, with some approach to a whistle. Frequently the flocks may be observed feeding on the ground, and exhibiting little fear of man, except when they have been much fired at. In the breeding-season these birds collect in large companies, making their nests in hollow trees, where from four to eight or occasionally twelve eggs are laid; the males taking no share in the work of incubation. Although a very noisy bird, the Rose Hill broadtail is well adapted to captivity, being active and lively in its habits, and during the breeding-season dancing and singing in an amusing manner. It has frequently bred in Europe.

Grass-

Parraquets.

The grass-parraquets, of which the turquoisine (*Neophema pulchella*) is the most familiar example, form a small genus restricted to the south of Australia and Tasmania. They belong to a group of genera readily distinguished from the broadtails by the uniform coloration of the feathers of the back; and are specially characterised by the bill being deeper than long, without any notch in its upper mandible, by the absence of a yellow collar on the neck, and the nearly uniform length of the four middle feathers of the tail. The turquoisine is about the size of a lark, its total length being $8\frac{1}{2}$ inches, of which rather more than half is occupied by the tail. It derives its name from the turquoise-blue on the front of the head and wing-coverts. The general colour of the upper-parts is green, with the forehead, a streak over the eye, the cheeks, and wing-coverts turquoise-blue; the breast, abdomen, and the under tail-coverts are rich yellow, the sides green, and the inner wing-coverts marked by a chestnut-red patch. The outer upper wing-coverts, together with the under-coverts, are bright blue; while the primaries and primary-coverts are deep blue. In the tail the four middle feathers are green with black tips, and the remainder bluish green at the

base, with the inner webs black and the tips yellow. The female is somewhat paler.

Turquoisines inhabit the south east of Australia, not ranging far inland, and being generally found in family-parties of from six to eight, although when the grass is in seed they assemble, with others of their kindred, in large flocks, to feast on their favourite food. These parrots are largely terrestrial



TURQUOISINE GRASS-PARRAQUET ($\frac{2}{3}$ nat. size).

in their habits; and although the turquoise nests in hollows of trees, other species select clefts of rocks in which to lay their eggs. The number of the latter is generally eight; and the male is said to render no assistance in incubation.

In New Zealand and some of the neighbouring islands this group of parrots is represented by the genus *Cyanorhamphus*, characterised by the upper mandible of the beak being black at the tip and pearly grey at the base; the red-fronted parraquet (*C. novae-zealandiae*) being a well-known species.

Crested
Parraquets.

Agreeing with the above-mentioned New Zealand parraquets in their parti-coloured beaks, the crested parraquets of New Caledonia and the Loyalty Islands differ from other members of the family in the presence of a small crest of feathers on the head. In the New Caledonian crested parraquet (*Nymphicus cornutus*), of which the general colour is green, and the total length about 14 inches, the crest consists of two black feathers tipped with red, the nape has a yellow collar connecting the ear-coverts, the top of the front of the head is red, and the face black. In the smaller Uvæan species (*N. uvænsis*), confined to Uvæa and perhaps Lifu in the Loyalty Group, the crest consists of six dark green feathers, curving forwards at the tips; there is no yellow collar on the neck, the middle of the forehead is red, and the face dark green.



HEAD OF UVÆAN PARRAQUET.—After Layard.

Budgerigar.

One of the prettiest, and at the same time the best known, of the smaller parraquets is the Australian budgerigar (*Melopsittacus undulatus*), also known as the Australian love-bird, undulated grass-parraquet, or shell-parraquet, which is the sole representative of its genus. It differs from all the members of the subfamily yet noticed by the long tail-feathers being narrow and acuminate; and is distinguished from the allied genus *Nanodes* by the absence of a notch in the beak. It is widely distributed in Australia, and attains a total length of $7\frac{1}{2}$ inches, 4 of which are taken up by the tail. Such a well-known species as the budgerigar (a term meaning "pretty bird") requires but little description; and this is the more fortunate, as the complex coloration renders any exact description somewhat difficult. Its general colour is grass-green, with the front of the head primrose-yellow, the tail blue, and the remainder of the head, neck, back, and wings mottled with undulating and alternating bands of greyish black and yellow. Each cheek has an oblique patch of blue, below which are three round black spots. The male is distinguished by the cere being black, instead of brown or cream-coloured, as it is in the female. The budgerigar is a very common bird in the neighbourhood of Adelaide, where it may be seen in large flocks, either perching on the gum-trees or feeding on the ground. Its food consists mainly of seeds; and the female lays from four to nine eggs at a time, and produces two broods in the year. Its voice is a kind of warble, not devoid of melody, and in constant use. In the domestic state these little parraquets breed very freely; and, according to Mr. Greene, the great majority of those imported into England are bred on the Continent. Although readily tamed, the budgerigar is always apt to bite

severely; while it is an undesirable inhabitant of an aviary, on account of its propensity to attack and disable smaller birds.



BUDGERIGARS.

The long-tailed Ground-Parraquets. ground-parraquet, or swamp-parraquet (*Pezoporus formosus*), and the short-tailed ground-parraquet (*Geopsittacus occidentalis*), are two peculiar Australian species, of terrestrial habits, and easily distinguished from all others by the alternate dark and light bars with which the feathers of the tail are marked; hence the name of "pheasant-cuckoo" which is sometimes applied to the former. The swamp-parraquet may be compared in size to a thrush, its total length being $12\frac{1}{2}$ inches, of which the tail takes up $7\frac{1}{2}$ inches. It is characterised by the length of the tail, which exceeds that of the wings, and also by its long and straight nails; while the legs are also of considerable relative length. Its general colour is green, with a band of dark orange on the forehead, and the feathers of the crown and nape marked with a broad median streak of black. The remainder of the body plumage is mottled with irregular bands of black and yellow; the quills are brown, greenish outwardly, and marked with a yellow spot; and the bars on the tail-feathers are alternately green and yellow.

The "Old Bushman" writes that the swamp-parraquet "lives on the ground (but I have seen them perch on the tea-tree scrub), runs much and quickly, is hard to rise, flies in jerks, goes away very sharp before a wind, and is very pretty shooting, rising from the grass and heather. We used to find them during the whole year, frequenting different localities at different times; and although they could scarcely be said to flock, I generally rose three or four on the same spot. Dogs will set them like quail." They generally frequent sandy tracts covered with sparse grass and other herbage, and are but rarely seen in the neighbourhood of trees. The eggs are laid on the bare ground, and are brooded by both sexes in turn. The short-tailed ground-parraquet of the south and south-west of Australia differs by the tail being shorter than the wings, and the short and curved claws, as well as in coloration. It is essentially a nocturnal bird, spending the day in holes in the ground, and only issuing forth at sunset to wander abroad in search of food.

A specimen in the London Zoological Gardens remained quiet and drowsy during the daytime, and only became lively and inclined to feed towards evening. It never attempted to perch, always remaining on the floor of its cage. Its cry was a sharp monotonous whistle; and its food consisted of corn and young shoots of grass. The flesh of both species of ground-parraquets is said to be delicate and well flavoured.

THE OWL-PARROT.

Family *STRINGOPIDÆ*.

From the practical absence in those islands of indigenous mammalian life, many of the birds of New Zealand have more or less completely lost the power of flight, owing to the disuse of their wings; and among these flightless species is a very remarkable member of the present order—the owl-parrot, or kakapo (*Stringops habroptilus*), which is not only the representative of a distinct genus but likewise of a separate family. This bird is distinguished from the other members of the order by the rudimentary condition of the keel of the breast-bone or sternum; and likewise by the radiating disc of feathers around the eye, which communicates the characteristic owl-like appearance to the head. The beak is thick and swollen on the sides, with no notch; and the nostrils open in a much inflated cere. The wings are short and rounded, with the fourth, fifth, and sometimes the sixth primaries the longest; and the tail is also comparatively short, with its extremity rounded, but the individual feathers pointed. The metatarsus is somewhat elongated, the nails moderately long, and the whole plumage rather soft.

The ground-parrot is a somewhat large bird, attaining a total length of about 24 inches, 9 of which are occupied by the tail. The general colour of the plumage of the upper-parts is sap-green, each feather having a median yellow line margined with black, from which spring irregular black rays. The feathers of the front and sides of the head are, however, pale umber-coloured, with median lines of yellowish white; and those of the wings and tail are mainly brownish buff, variously mottled with black and lemon-yellow. Beneath, the prevailing tint is greenish yellow, tinged with lemon-yellow, and with somewhat similar dark markings.

Although formerly distributed over the whole of New Zealand, the kakapo is now confined to the North Island and the northern half of the South Island; its semi-fossilised remains being found in association with those of the extinct moas. From many parts of the country it has been recently exterminated, and is rare in most regions, and mainly restricted to mountainous regions, and it is probably doomed to extinction at no very distant date. Many accounts of the habits of this interesting bird have been given, from among which we select the following from the pen of Sir George Grey. This observer writes that during the day, the kakapo “remains hid in holes under the roots of trees or rocks, or very rarely perched on the boughs of trees with a very dense thick foliage. At these times it appears stupid from its profound sleep, and if disturbed or taken from its hole, immediately runs and tries to hide itself again, delighting, if practicable, to cover itself in a heap of soft dry grass; about

at sunset it becomes lively, animated, and playful, issues forth from its retreat, and feeds on grass, weeds, vegetables, fruits, seeds, and roots. When eating grass, it grazes rather than feeds, nibbling the grass in the manner of a rabbit or wombat. It sometimes climbs trees, but generally remains upon the ground, and only uses its short wings for the purpose of aiding its progress when running, balancing itself when on a tree, or in making a short descent—half jump, half flight—from



THE OWL-PARROT ($\frac{1}{4}$ nat. size).

an upper to a lower bough. When feeding, if pleased with its food, it makes a continued grunting noise. It eats greedily, and is choice in its food, showing an evident relish for anything of which it is fond. It cries repeatedly during the night, with a noise not very unlike that of the kaka, but not so loud. The kakapo is a very clever and intelligent bird, in fact singularly so; contracts a strong affection for those who are kind to it: shows its attachment by climbing about and rubbing itself against its friend; and is eminently a social and playful bird. It builds in holes under trees and rocks, and lays two or three white eggs about the size of a pullet's in the month of February; and the young birds are found in

March. The natives assert that, when the breeding-season is over, the kakapo lives in societies of five or six in the same hole; and they say that it is a provident bird, and lays up in the fine season a store of fern-root for use in the bad weather."

The extermination or reduction in the numbers of the owl-parrot in certain districts is attributed to the ravages of dogs, cats, or rats, which have run wild in many parts of the island; and it is not improbable that in some parts, at least, pigs have likewise had a share in the work of destruction. According to Haast these birds are generally found in the open mossy glades of the beech-forests; although they also frequent open hillsides, where they hide among blocks of stone. On two occasions the same observer met with a single kakapo during broad daylight, from which he is led to consider that these parrots are not so strictly nocturnal as has been supposed.



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CHAPTER XI.

THE OWLS AND OSPREYS,—Orders STRIGES AND PANDIONES.

THE well-known and peculiar physiognomy characterising most of the owls renders the group as readily distinguishable as that of the parrots. This characteristic "owl-face" is due, firstly, to the forward direction of the eyes; and, secondly, to a circular disc of radiating feathers, more or less distinctly developed round each eye, and which may be bounded by a ruff of closely-set feathers. - In common with many



THE RIGHT CANNON-BONE
OR METATARSUS, OF
THE SNOWY OWL.¹

diurnal birds of prey, the owls have a short, stout beak, of which the upper ridge is strongly curved, and the tip deflected in a perpendicular direction; at its base is a cere, usually covered with stiff bristles concealing the nostrils. The feet are furnished with strong, curved, and sharp claws, and have the middle toe reversible. The metatarsus, or cannon-bone, longer than in the parrots, is comparatively short and the upper part of its front surface deeply excavated, and furnished with a bony bridge over the outer part of the hollow; at its lower end the three pulley-like trochleæ, viewed from below, are arranged in an arch. In the parrot-bone, there is no bony bridge at the lower end, as in the parrots. The short skull has no well-marked hinge at the base of the beak; the palate is of the bridged, or desmognathous type; and the lower mandible has a short and shallow notch, and its angle is not produced behind the surface of articulation with the quadrate bone. The oil-gland is present, but naked.

The foregoing characters, especially those of the toes and leg-bones, serve to distinguish the owls from the parrots on the one hand, and the diurnal birds of prey on the other; but the two are very closely connected in these respects by the ospreys. In addition to the features noticed, owls, as a rule, are characterised by the large size and dense feathering of their heads, the softness and fluffiness of the whole plumage, and their big, round eyes; the feet being usually feathered down to the toes. The ears are usually of large size, and are often protected by an operculum or lid; from which we may infer that the sense of hearing in these birds is highly developed. Many owls are furnished with tufts or crests of feathers above the eyes, popularly known as horns or ears, but more properly termed ear-tufts. The coloration is usually a mottled blending of various sombre tints; bright colours being, as might be expected in

¹ The bridge over the hollow at the upper end is imperfect.

nocturnal birds, invariably absent. The young are born in a helpless condition, and covered with down; and the eggs are invariably white, and of a rounded form. In size these birds are subject to great variation; the eagle-owls reaching to 28 inches in length, while the owlets are not larger than a thrush. Considerable diversity of view has obtained as to the affinities of the owls, some authorities considering that their nearest relationships are with the diurnal birds of prey, while others regard them as more nearly related to the Picarians. From their osteology alone they appear, however, to be related on the one hand to the parrots, while on the other they are intimately connected through the ospreys with the diurnal birds of prey; in their soft internal parts they differ, however, very considerably from the latter.

Distribution and Habits. Unlike the parrots, the owls (of which there are probably about two hundred species), enjoy a cosmopolitan distribution, ranging from the Arctic regions to the most distant islands of Oceania. The great majority of them are crepuscular and nocturnal in their habits, and are more or less completely dazed if disturbed and driven from their haunts during the daytime. Others, however, are but little incommoded by daylight; while the hawk-owls actually seek their prey in the full glare of the sun. As owls subsist entirely on living prey, which at night must be closely approached before it can be detected, an absolutely silent flight is essential, and this is effected by the soft and fluffy nature of their plumage. It is doubtless from this ghost-like, stealthy flight, coupled with their nocturnal habits, their large glaring eyes, and their weird hootings and screechings, that these birds have in all ages and in all countries been regarded as creatures of ill-omen. Indeed, in this respect, owls hold a position among birds precisely similar to that occupied by lemurs among mammals; with the difference that, owing to distribution, while in the one case the superstition is universally diffused, in the other it is confined to certain races inhabiting the warmer regions of the Old World. While the majority of owls are arboreal, some of the species roost in holes or clefts of rocks or in buildings. It is common to see owls in museums mounted with three toes in front of and one behind the perch on which they are seated. An anonymous observer states, however, that this is totally incorrect, and that no living owl ever places three toes in front of his perch, although he could do this for a moment if he felt so minded. The same writer also observes that "no owl seizes his prey or holds it with both feet, though both feet may be used to carry it when the prey is a large one; such quarry, for instance, as a full-grown rat. With one foot the owl grasps his prey, the other foot grasps a tuft or some other inequality of the ground. Then the bird goes to work."

Owls feed chiefly on small mammals, such as rats, mice, voles, and shrews—more especially the two latter—as well as on birds, reptiles, fishes, and insects. The large eagle-owls will readily attack and kill hares, rabbits, and the largest game-birds; and it is undoubtedly the case that such species inflict much harm on game-preserves. The smaller kinds do, however, far more good than harm to the agriculturist; and although they were formerly shot down ruthlessly, both by the gamekeeper and the farmer, there is some reason to believe that the latter, at least, is beginning to see the error of his ways. If proof were needful of the usefulness of these birds in keeping in check the pestilential field-vole, it is afforded by the flocks

of owls that collected from all sides to prey on the hosts of these rodents which recently infested portions of Scotland. In all owls the indigestible remnants of their food, such as bones, feathers, hair, scales, etc., are formed into pellets in the stomach, and disgorged; such castings affording incontestible evidence of the nature of the food of these birds. All owls are furnished with a syrinx, or organ of voice, which most of them know only too well how to use; their cries taking the form of hooting, howling, screeching, or a weird kind of laughter. It is from these cries that the names of these birds are derived in many languages, as witness the English *owl*, the German *eule*, the Latin *ulula*, and the Hindustani *ulu*.

BARN-OWLS.

Family *STRIGIDÆ*.

Although one of the commonest and most familiar of all the group, the barn-owl (*Strix flammea*) is of special interest as constituting, together with a few nearly-allied forms, a family apart from that which includes all the other representatives of the order. This family (*Strigidae*) is characterised by the breast-bone, or sternum, having its lower margin entire, and also by its keel being firmly united with the furcula. Then, again, the third claw has its inner margin serrated, while the second and third toes are of equal length. An additional peculiarity is to be found in the presence of a small patch of stiff feathers between the adjacent portions of the face-discs. In the cannon-bone the bridge over the hollow at the upper end is absent. As a genus, the barn-owls are characterised by the completeness of the discs round the eyes, which are large, and narrow rapidly as they approach the beak. The wings are long, and extend considerably beyond the tail; the beak is straight at the base, and decurved only at the tip; and the aperture of the ear is large, and furnished with a distinct lid. The head is devoid of tufts, and the rather long legs are feathered down to the origin of the toes.

The common barn-owl has a wider distribution than any other member of the order, being in fact almost cosmopolitan, although comparatively rare in the extreme north, and unknown in New Zealand, parts of Oceania, Persia, Japan, and China. With this extensive distribution, it would be only natural to expect great variation in the colour of the plumage; and, as a matter of fact, we find representatives of this owl from widely distant regions so unlike one another that it is at first sight difficult to believe that they belong to the same species, more especially as there are also differences in point of size. In the ordinary British form, of which the length averages 14 inches, the face-discs are white, with their margins defined by the feathers being tipped with brown; the top of the head and neck are pale buff, dotted with specks of black and white; on the back and wings a darker buff, speckled with grey and irregularly mottled with black-and-white, obtains; the tail-feathers are pale buff above, marked with five transverse grey bands; and the whole of the under-parts are white. From this normal coloration there is every intermediate stage to one where the eye-discs are rusty red, the under-parts tawny, and the back darker than usual; while in other cases the discs may be grey, and the whole plumage tending more or less to this tinge. In other instances, however,

grey may exist only on the discs, while both the upper and under-parts are of various shades of tawny and yellowish brown. Mr. Dresser remarks that the American form is slightly larger and darker, and the Indian variety both darker and of a clearer grey above than the ordinary type.

Habits. In Britain the barn-owl is generally distributed, and resident throughout the year, although it becomes less numerous in Scotland, and as far north as Ross and Caithness but seldom nests. Strictly nocturnal in its



BARN-OWLS ($\frac{1}{2}$ nat. size).

habits, this owl spends the day in the recesses of buildings, or in hollow trees, generally standing with closed eyes. Like other owls, it associates in pairs, and such pairs, if undisturbed, will return year after year to the same nesting-place. In hunting, the barn-owl quarters its ground with the regularity of a spaniel, and its food consists chiefly of voles. Its usual cry is a kind of scream, but the young utter a snorting sound. In Europe this owl is a late breeder, usually commencing to lay from the middle to the end of April, but sometimes not till May. The number of eggs in a nest generally ranges from three to six, although seven have

been taken. In California the nesting may be as early as January, and there, as in other parts of America, the nest may be made in some hole in a bank, which is enlarged to suit the requirements of its tenants. Writing of the habits of the American barn-owl (which he regards as a distinct species), Captain Bendire observes that, strictly speaking, this owl "makes no nest. If occupying a natural cavity of a tree, the eggs are placed on the rubbish that may have accumulated at the bottom; if in a bank, they are laid on the bare ground and among the pellets of small bones and fur ejected by the parents. Frequently quite a lot of such material is found in their burrows, the eggs lying on and among the refuse. Incubation usually commences with the first egg laid, and lasts about three weeks. The eggs are almost invariably found in different stages of development, and young may be found in the same nest with fresh eggs. Both sexes assist in incubation, and the pair may be sometimes found sitting side by side, each with a portion of the eggs under them." When the eggs are hatched at distant intervals, it is probable that the warmth of the young birds aids in their incubation during the absence of the parents. It is on record that the eggs of a barn-owl have been removed and replaced by those of a hen, which have been successfully hatched.

The grass-owl (*S. candida*) is an allied species, ranging from India to Japan and Formosa, and found almost exclusively in long grass; while in South Africa the common species is replaced by the Cape barn-owl (*S. capensis*). Both these species differ from *S. flammea* in having the upper surface of a uniform brown colour, with spots of white, and lacking the mottlings of grey and black characterising the former.

Family BUBONIDÆ.

With the comparatively small species, represented on the left side of the figure on the opposite page, known as Tengmalm's owl (*Nyctala tengmalmi*), we come to the first representative of the second family of the order, distinguished from the last by the breast-bone having two or more distinct notches in its lower border, and also by its keel being firmly attached to the furcula; in addition to which the third toe is not serrated, and is always longer than the second. The cannon-bone, or metatarsus, has a bridge over the hollow at the upper end. Tengmalm's owl belongs to a group of three genera, characterised by having the tube of the ear large and furnished with a well-developed lid; and also by the face-disc being distinct and extending as much above as below the eye.

Tengmalm's owl, together with the Acadian owl (*N. acadica*) of North America, are the representatives of a genus distinguished by the absence of tufts on the head, by the extreme shortness of the cere, and the curious circumstance that the bony tube of the ear is quite unsymmetrical on the two sides of the skull. The toes are thickly feathered, the head is relatively large, the under mandible notched, the wings long and rounded, and the tail short. This owl measures only from 8½ to 10 inches in length, and may be easily recognised by its thick and fluffy plumage, which stands out widely on each side of the head, and by its prettily-mottled coloration. The general colour of the upper-parts is pale brown, mottled with white bars, and the forehead spotted with white. The tail-feathers are marked with five interrupted whitish bars, and the under-parts are greyish white, mottled with clove-

brown. This species, which is rarely met with as a straggler in the British Isles, is an inhabitant of the forest-regions of Northern Europe and Siberia, ranging in Russia as far as the Urals; and also occurring as a straggler in Nipal, Southern Europe, and North Africa. Across the Atlantic it reappears in Eastern North America. In habits it is strictly nocturnal, rarely being seen abroad in the daytime, and always dazed and stupid in a strong light. It frequents the densest recesses of the forests, and nests early in hollow trees, laying its eggs, from four to six in number, on the bare wood at the bottom of the hole.

The Acadian owl, in addition to its smaller size, differs by the nearly uniform



TENGMALM'S OWL AND PIGMY OWL ($\frac{1}{3}$ nat. size).

colour of its upper surface, by the replacement of the spots on the forehead by stripes, and the presence of only three white bars on the tail. In length it only measures $6\frac{1}{2}$ inches, so that it is smaller than a robin. Both species feed chiefly upon insects. Writing to Dr. Coues of the Acadian owl, a correspondent observes that, "in the hollow of an oak tree, not far from Germantown, lives an individual of the common chickari squirrel with a specimen of this owl as his sole companion. They occupy the same hole together in perfect harmony and mutual goodwill. It is not an accidental temporary association, for the bird and the squirrel have repeatedly been observed to enter the same hole together, as if they had always shared the apartment. But what benefit can either derive from the other?"

Wood-Owls.

The clear, hooting cry or laughter-like scream of the common English tawny or wood-owl is probably familiar to most residents in

wooded districts. The genus of which this owl is the best known representative includes comparatively large species, distinguished from *Nyctala* by the ears and their tubes being symmetrical, while the toes may be either feathered or bare. All of the species frequent woods and groves, where hollow trees are abundant, and the whole of them are strictly nocturnal in their habits. Their flight is soft and noiseless, and their food, in addition to small birds and mammals, may



THE TAWNY OWL ($\frac{1}{2}$ nat. size).

include frogs and fish. They breed early; and while some of the species select woods as their nesting-places, others prefer old buildings. Nearly thirty members of the genus are recognised, whose range embraces the whole world, with the exception of Madagascar, certain of the Malay Islands, Australia, and Oceania.

The tawny brown, or wood-owl, as it is indifferently called Tawny Owl. (*Syrnium aluco*), belongs to an extensive group of the genus, characterised by the crown of the head being either barred or mottled, and the completely feathered toes. It is by no means one of the largest representatives of

the genus, its total length being about 15 inches. The colour of the face-disc is greyish white, margined with brown; the crown of the head, neck, back, and wings, are a mixture of ashy grey mottled with shades of brown; the primary quills are barred with dull white and brown; and the tail-feathers, with the exception of the middle pair, are also barred with the latter colour. On the under-parts the ground-colour is greyish white, upon which there are longitudinal streaks and mottlings of brown, without any trace of transverse bars. The tawny owl is still common in Britain, although rare in Scotland, most English woods having a pair of these birds. From Britain their range extends over Europe as far as 67° north latitude, and eastwards to the Urals; while it also embraces North Africa, Syria, and Turkestan. This owl is essentially nocturnal, seldom stirring from its sylvan resting-place during the daytime, and if driven forth being more completely dazed than any other British species. It is this species which is generally mobbed by a crowd of small birds, such as tits, finches, and warblers, when seen abroad by day. Oak and beech-woods, where hollow trunks are numerous, are the favourite haunts of the tawny owl; although occasionally the choice falls on ruins or towers. In addition to voles, shrews, rats, and mice, its food includes an occasional young hare or rabbit, and sometimes frogs, fish, and beetles. It is an early breeder, laying its three or four eggs in March, or even earlier. These are usually deposited in a hollow tree, but sometimes in ruins or old chimneys, or even in a deserted rabbit-hole, or on the bare ground; while occasionally an old rook's nest is selected. The clear hooting cry, like the words *tu-whit, to-who*, is uttered at morning and evening; while the laughter-like cry appears to be peculiar to the breeding-season. The young owls are fed by the parents for a considerable time after leaving the nest, and are reported to be more easily reared in captivity than are those of any other species.

Great Grey Owl. The great grey owl (*S. cinereum*) of Arctic America, and the closely allied Lapp owl (*S. lapponicum*) of Northern Europe and Asia, are much larger birds than the tawny owl, and are easily recognised by the grey face-disc being marked by a number of fine concentric brown lines. The great grey owl has the plumage darker, with less distinct streaks on the breast, than its European cousin; but Captain Bendire regards the two as merely varieties of a single species. The great grey owl ranges from the shores of Hudson Bay to the limits of forest in about latitude 68°, but in winter it migrates southwards even beyond the Canadian border into the Northern United States. The Lapp owl, which is one of the rarest of the European species, is confined to the boreal districts, in the upper part of the forest-belt, occasionally straying to North Central Europe. It is distributed over Northern Scandinavia, Finland, and North Russia. The total length of the grey owl may be as much as 30 inches. The Lapp owl nests on the summits or forked branches of broken firs, in the former case making a little or no nest, but in the latter erecting a large structure of twigs. The number of eggs in a clutch is probably from two to four. Writing of the great grey owl, Captain Bendire observes that "from the limited information we possess about the nesting-habits of this species it appears that in Alaska these birds nest sometimes as early as April, and in the interior as late as June. From two to four eggs seem to be laid to a set, and these are small for the size of the

bird. The body of the great grey owl is, however, much smaller than that of the great horned owl, in fact but little larger than that of the barred owl. The long tail and the loose fluffy plumage of the bird make it look much larger than it really is."

The Ural owl (*S. uralense*), of which a pair are represented in our illustration, belongs to a subgroup distinguished from the preceding forms by the feathers of the head and neck having a simple median dark



URAL OWL ($\frac{1}{2}$ nat. size).

streak, without any lateral bars. In this species the facial disc is dusky white, and the ruff pure white with dark median streaks to the feathers; on the upper parts the general colour is dull white streaked with dark brown, each feather being brown in the middle and white on the sides; on the under-parts below the head the hue is whitish, some of the feathers being tinged with yellow, and all of them with a dark median streak. The quills of the wings are brown, with whitish tips, and marked with bands of paler brown, tending to ashy on their outer webs; and the tail-feathers are very similarly coloured. The total length of this fine bird is $27\frac{1}{2}$ inches. The Ural owl is distributed over Northern and Eastern Europe, and North

and Central Siberia, where it is locally not uncommon, especially in Scandinavia, Russia, South-East Germany, and Transylvania. In Mongolia, China, and Japan, it is replaced by the dusky owl (*S. fuscescens*), which is smaller in size and darker and redder in colour. Its habits, according to Mr. Dresser, are still imperfectly known; but in the breeding-season it frequents forests and hills, while in the winter it seeks the open country. It nests early in April; and its pairing-call has been compared to the bleating of a goat. Occasionally it may be seen hunting during the daytime.

Barred Owl Another well-known representative of the genus is the barred owl (*S. nebulosum*) of Eastern North America, distinguished from all the preceding species by the chest having a regular series of dark cross-bands, in addition to the longitudinal streaks. The general colour of the upper surface is light brown, with white cross-bands; the dark tail being marked with six light brown bars; and the beak greenish yellow. Captain Bendire writes that the barred owl "is nocturnal in its habits, but nevertheless sees well enough, and even occasionally hunts, in the daytime, especially during cloudy weather. The flight is easy, and though quite swift at times it is perfectly noiseless. A rapidly passing shadow distinctly cast on the snow-covered ground, is often the sole cause of its presence being betrayed as it glides silently by the hunter's camp-fire in the still hours of a moonlight night. Far oftener, however, it announces itself by the unearthly weird call-notes peculiar to this species, which surpass in startling effect those of all other owls with which I am familiar. It is necessary to listen to such a vocal concert to fully appreciate its many beauties (?), as it is impossible to give an accurate description of the sounds produced when a pair or more of those birds try to outdo one another." The barred owl generally nests in hollow trees among damp forests, the time of laying ranging from February to April, according to the latitude. Occasionally eggs have been taken resting on a solid cake of ice. No matter how frequently the nest be despoiled, a pair of birds will return to the same site year after year; and if one clutch of eggs be taken, they will soon be replaced by a second.

Mottled Wood-Owl. The mottled wood-owl (*S. ocellatum*) of India, which attains a length of 21 inches, may be selected as an example of another section of the group with feathered toes, characterised by the under surface of the body being marked with regular cross-bars without any dark longitudinal streaks. This particular species has a blackish beak, the dark bars on the breast very narrow, and the upper surface uniform brown with spots or bars of white. Mr. Hume says that this owl is most commonly met with in moderately dry country, well furnished with large groves. It usually lays two eggs in a cavity or fork of some large tree, at a height of from eight to twenty-five feet from the ground, without attempt to form a nest. Certain other species of the genus, such as *S. leptogrammicum* of Borneo and several South American forms, while agreeing with all the preceding in having the plumage of the crown of the head either mottled or barred, differ in their more or less completely naked toes. In the second main group of the genus, comprising five species, of which the Indian brown wood-owl (*S. indiani*) will serve as an example, the crown of the head is, on the contrary, always of a uniform brown; the toes being either feathered or bare. The Indian

brown wood-owl, which is uniform chocolate-brown above, becoming darker on the head, attains a length of 28 inches; it is replaced in the Himalaya by the rather smaller Nipal brown wood-owl (*S. newarense*).

Although several groups of owls are furnished with the tufts of feathers, commonly denominated ears, it will be convenient to restrict the title of eared owls to the members of the genus *Asio*, which includes the common



SHORT-EARED OWL ($\frac{1}{3}$ nat size).

long and short-eared owls of Britain. While agreeing with those of the two preceding genera in the structure of their ears and the form of the facial disc, the owls of this genus are readily distinguished by the presence of longer or shorter ear-tufts, and also by the cere being of much greater length. In all of them the lower mandible is notched, the tube of the ear very large, the wings long, usually with the second quill the longest, and the legs and toes are generally more or less feathered to the claws. They are all purely nocturnal birds, seldom or never hunting by day, and not leaving their roosts till evening. They may frequent either woods or open country, and nest either in trees or on the ground. Their flight is very silent, and their cry a loud hoot. The species are few.

Short-Eared Owls.

The short-eared owl (*A. accipitrinus*) is a common and well-known British species, having an almost world-wide distribution, and ranging from the Arctic regions to South America and Africa, although unknown in Australia and Oceania. The distinctive character of the species is the shortness of the ear-tufts, which are less than the length of the third toe and claw. The general colour of the upper-parts is fulvous or tawny, with each feather streaked with brown down the middle; whereas in the allied Cape eared-owl (*A. capensis*) the same surface is uniform brown. In the common species the under-parts are pale buff, with streaks of blackish brown; the wings and tail are barred with brown (five stripes on the latter); the facial disc dusky with a whitish border; the beak horn colour; and the iris golden-yellow. The whole length of the bird varies from 14 to 15 inches, and, when closed, the wings reach beyond the end of the tail.

Widely distributed in Great Britain, the short-eared owl breeds but sparingly, many of the specimens seen being merely winter visitants. In place of frequenting woods and groves, this owl haunts open moors, fields,—either stubble, grass, or turnips,—and generally nests on the ground rather than on trees or bushes. Although mainly nocturnal, if flushed during the day—as not unfrequently happens in partridge-shooting—it flies strongly and well; and it is even said to hunt its prey at times in cloudy weather during daylight. Its cry is said to resemble the words *keaw-keaw*. In most parts of Europe the chief food of the short-eared owl consists of voles, but in Scandinavia it preys almost exclusively on lemmings. It also kills small birds and beetles. At such times as plagues of the short-tailed vole have made their appearance in the British Islands it has been this owl which has made its appearance in the greatest numbers to prey upon the obnoxious rodents; and it also collects in similar flocks during the periodical migrations of the lemming in Norway. It is a curious circumstance that although the number of eggs laid by this bird is generally four, yet when food is unusually abundant, as during a lemming-migration, the number in a clutch will rise to seven or eight; and during the recent vole-plague in Scotland even larger numbers are recorded, reaching to as many as thirteen. The eggs are usually laid in a hollow of the ground, with only a very slight nest. In India Jerdon states that this owl “is almost exclusively found in long grass, and in beating for florikan many are always flushed; one now and then paying the penalty of keeping company with such a game-bird by falling to the gun of some tyro. It is migratory in India, coming in at the beginning of the cold weather, and leaving about March.” In North America the breeding-range of this owl extends from the middle of the United States to the Arctic regions. “Its home,” writes Captain Bendire, “is amidst the rank grasses or weeds usually found along the borders of lakes and sloughs in the open prairie country, where it hides during bright sunshiny days. If the sky is clouded, this owl may be frequently seen hunting in the early morning or evening, and sometimes in the middle of the day, and at such times it flies very low, not more than a few feet from the ground, which it carefully scans for its humble prey. Its flight is remarkably easy, graceful, and perfectly noiseless. From the fact that these owls are generally seen in pairs at all seasons of the year, it is very probable that they remain mated through life.” While in the Arctic regions the nesting of this owl is often deferred till June, in the more southern

portions of its range it takes place in March or April. In defence of their eggs or young, both sexes of the short-eared owl display but little boldness, usually circling round and round the intruder, uttering a shrill cry, accompanied by a snapping of the beak, but not making any attempt at a direct attack.

As its name implies, the long-eared owl (*A. otus*) belongs to a group of which there are three or four representatives, characterised by the great length of the ear-tufts, which are about as long as the third toe and claw. From its beautifully mottled plumage, of which the general colour above is



SCOPS OWL AND LONG-EARED OWL ($\frac{1}{2}$ nat. size).

blackish brown variegated with orange-buff, while beneath it is orange-brown streaked and barred with black, this owl is one of the handsomest of the British species. The facial disc is dusky white, with hair-like lines of brown, while immediately round the eyes the feathers are blackish. The head is finely mottled dusky and tawny; and both the quills and tail feathers are barred with dark brown, the number of such bands on the tail being seven. The bill is dusky horn-brown, and the iris of the eye orange-yellow. In size this owl is rather inferior to the short-eared species, its total length being $13\frac{1}{2}$ inches. The typical form of the long-eared owl is distributed all over Europe as far north as the 64th parallel, while southwards it ranges to North Africa in winter, and eastwards it extends to China, Japan, and North-Western India. In North America, as far south as Mexico, it is replaced by the American long-eared owl, regarded by Dr. Sharpe as a mere

variety, but considered by Captain Bendire and others to represent a distinct species (*A. americanus*). It is distinguished from the European form by the darker tone of the entire plumage, and by the white feathers of the breast being striped down the middle with brown, and barred on the sides with the same tint. The European long-eared owl is a forest-dwelling bird; and while in Britain it is resident through the year, on the Continent and eastwards it is more or less migratory. On the Continent it is much more numerous in winter than summer; and it is not unfrequent in the former season to see parties of from ten to sixteen, or even more, together; such parties assembling in the open fields. In England a pair of these birds always keep to one particular wood. Unlike the majority of its kindred, this owl is a silent bird, making little or no noise, except when young; on which account its presence is often unsuspected in districts where it may be comparatively common. It nearly always nests in woods, frequently selecting a deserted squirrel's drey or crow's nest in which to deposit its four or five eggs; the usual laying-time being March. Although mainly nocturnal, this species is not exclusively so, Mr. Tuke observing that in Yorkshire he has met it "in the woods, sailing quietly along, as if hawking, on a bright sunny day." In their nests the same observer has detected remains of numerous small birds, as well as the foot of a young hare or rabbit. Both in Europe and America their chief food consists, however, of the various kinds of smaller rodents, although, where frogs are numerous, these also contribute to the menu. In America, Captain Bendire states that very few of the nests are built by the birds themselves; but one which had been thus constructed was formed of twigs of willows and aspens, and was remarkable for the depth of the cup, which was lined with hair. In mountainous regions it is stated that nests are occasionally made on cliffs. Writing of the American form, the observer just referred to states that "in the daytime, particularly on a bright sunny day, the long-eared owl will allow itself to be closely approached, and on discovering the intruder will try to make itself look slender and long by pressing the feathers, which are usually somewhat puffed out, close to the body, and sitting very erect and still. It might in such a position very readily be mistaken for a part of the limb on which it may be sitting. Occasionally, while on the ground, for instance, and being suddenly disturbed at a meal, they throw themselves into quite a different attitude—one of defiance, making themselves look much larger than they really are, and presenting a fierce and formidable front. I nearly stepped on one of them once while it was busily engaged in killing a ground-squirrel, which it had evidently just caught. The owl was sitting by the side of a fallen pine-tree, and as I stepped over it my foot was placed within twelve inches of the bird. All at once she seemed to expand to several times her normal size; every feather raised and standing at a right angle to the body; the wings were fully spread, thrown up, and obliquely backward, their outer edges touching each other over and behind the head, which likewise looked abnormally large; and this sudden change in appearance, combined with the hissing noise she uttered, made it appear a very formidable object at first sight."

The Jamaica long-eared owl (*A. grammicus*) differs from all the other representatives of the genus in that the number of light bands on the quills is ten; there being also about the same number on the tail-feathers. It is also dis-

tinguished by the toes being completely bare, although it is approached in this respect by the Stygian owl (*A. stygius*) of Brazil.

Pigmy Owls. The pigmy owls, few of which exceed 8 inches in length, while several are less than six, bring us to the first representatives of the second subfamily of the *Bubonidae*, which includes all the remaining members of the order. The group is characterised by the ear-tube being not larger than the eye, and unprovided with an operculum, and also by the facial disc being unequal, and in some cases very imperfectly developed, the portion below the eye being always much larger than that above the same. The latter difference may be seen by comparing the figure of the Ural owl on p. 148 with that of the little owl on p. 159. The pigmy owls, of which the common species (*Glaucidium passerinum*) is represented on the right side of the illustration on p. 145, in addition to their small size, may be distinguished by the absence of ear-tufts, the inflated and swollen cere, in which are pierced the nostrils, by the first primary of the wing being short, the whole wing short and rounded, the tail also rounded, and more than half the length of the wing, and the metatarsus of moderate length, and densely feathered. There is not unfrequently some confusion between the members of this genus and the little owls of the genus *Carine*; but if it be remembered that while in the former the first primary is short, in the latter it is long, the difficulty will vanish. There are some twenty species of pigmy owls, ranging over the greater part of the Old World, but not found eastwards of the Malay Islands; and also occurring in Southern North America and the whole of South America. For their size these little owls are bold and rapacious, many of them flying at birds of larger bulk than themselves. Usually nocturnal, and hunting in the morning and evenings, they may at times be seen abroad in daylight. Mice, voles, lemmings, small birds, and large insects form their chief food; and their cry is a kind of whistling note, which may be imitated by blowing into a key. They build in hollow trees, without forming a nest.

The common pigmy owl, which is unknown in Britain, is the smallest European representative of the order, and ranges over Europe and Northern Asia from Norway to Eastern Siberia. It belongs to a group of the genus in which the head is usually spotted or streaked, although occasionally nearly uniform; the second great group of the genus being distinguished by the regular barring of the top of the head. In size this species attains a length of $8\frac{1}{2}$ inches; and its general colour above is umber-brown, becoming ashy on the head and back, and variegated with yellowish white spots, tending to bars on the back. The head is thickly dotted with these round spots; the sides of the face are white, barred with dark brown; and the white breast is marked with longitudinal splashes of dark brown. The toes are thickly feathered. This owl is generally distributed in Norway, where it is commonly found during the summer in forests, either evergreen or deciduous; but in winter it approaches human habitations. A certain number of individuals migrate in winter. It may frequently be seen at midday, sitting silently on some bare tree; and when made bold by hunger, it will fly at and seize sparrows and tits while on the wing. It generally nests in hollow aspen trees, and lays four eggs at a time.

Among the second group of the genus, or those in which the head is regularly barred across, we may refer to the jungle owlet (*G. radiatum*), of the plains of

India, and the large barred owlet (*G. cuculoides*), ranging from the Himalaya to Burma, and attaining a length of 11 inches. The former does not exceed 8 inches in length, and has nine bars of white, including the one at the tip, whereas in the larger species there are seven such bands. The large barred owlet has the whole plumage brown, banded with five transverse white bars, giving it a very unmistakable appearance; but in the jungle owlet there is a large white patch at the base of the neck in front. The latter species is dispersed in forest regions all over India, and breeds in April and May, laying three or four eggs in the hollows of trees. These owlets are strong fliers, and will kill small birds on the wing in the daytime. Mr. Hume says that they can easily be tamed, and will then eat cooked meat, frogs, insects, or almost anything that may be offered them. A pair he had in captivity "were excessively noisy birds, both by night, and even at intervals by day, in fact at times a perfect nuisance. Dogs were their abomination, and in the way in which, menaced by a puppy, who evidently thought it famous fun, they would lower their heads, set out their wings and ear-coverts, and 'curse and swear' (a mixture of hissing and chattering, utterly indescribable in words), was really quite edifying!" The same writer observes that in the Eastern Himalaya the large barred owlet may frequently be seen sitting on trees or stumps in the full glare of the midday sun. Its presence may be easily recognised by its chuckling, vibrating call. It generally nests in hollow oaks, at a height of twenty or thirty feet from the ground, laying four eggs in a clutch.

Oriental Hawk-

Owls.

As the name hawk-owl is commonly applied both to the members of the present genus, and also to the true hawk-owl (*Surnia*), it is necessary to distinguish the former by the affix Oriental. These owls agree with those of the preceding genus in the shortness of the first primary quill of the wing; the interval between its tip and that of the third primary being in all the group either equal to a greater than the length of the metatarsus. Whereas, however, in the pigmy owls the wing was short and rounded, in the present genus it is long and pointed, the interval between its points and the end of the tail being not more than equal to the length of the metatarsus. From their nearest allies, the Oriental hawk-owls are distinguished by the short metatarsus, of which only a very small portion is bare. Most of them have relatively small heads, in which the face-disc may be very imperfectly developed, and short bills; while the tail is long and firm, and the plumage of the wings likewise hard. The genus comprises a large number of species, ranging from India through China, Japan, and the Malay region to Australia and New Zealand, and likewise represented in Madagascar. The species vary greatly in size, the great Australian hawk-owl (*Ninox strenua*) attaining a length of 24 inches. Writing of the Indian species, Jerdon remarks, that in the small size of its head, the slight development of the disc, the firm plumage, and the length of the tail, these owls approach the diurnal birds of prey.

The Indian brown hawk-owl (*N. lugubris*), which measures 12 inches in length, and is of a uniform glossy brown above, with a greyish tinge on the head, is common in the wooded parts of India. Although generally nocturnal, it occasionally issues forth before dark; and its food is stated to be mainly insects, although it will also eat small mammals and reptiles.

The curious little burrowing owl (*Speotito cunicularia*) of America has a special interest on account of its habits, and accordingly demands a somewhat fuller notice. This bird is only some 9 inches in length, and may be easily recognised by the length of its legs, of which a considerable portion is bare, and its spotted plumage. It differs from the preceding form by the length of the first primary quill; the interval between its tip and that of the third feather of the same series being less than that of the metatarsus. The whole wing is comparatively short, and has but little power of sustained flight. The general colour of the plumage is sandy brown, the head being marked with oval splashes of buffish



BURROWING OWL ($\frac{2}{3}$ nat. size).

white, while all the back, wings, and tail are mottled and barred with white or buff. The throat and the front of the neck are white, but most of the remainder of the under surface creamy white, with transverse bars of sandy brown, gradually becoming more and more indistinct towards the under tail-coverts, where they disappear. Although it has been considered that there are several distinct species of burrowing owls, Dr. Sharpe is of opinion that only two can be distinguished, one of which ranges throughout the southern and western portions of the United States and the whole of Central and South America; while the second (*S. guadelupensis*) is confined to the West Indies. There are two great peculiarities in the habits of the burrowing owl: firstly, that it is largely diurnal, and secondly, that it always takes up its residence in underground burrows. Regarding its

diurnal habits in South America, Mr. W. H. Hudson writes that, "all day long, in cold and in heat, it stands exposed at the mouth of its kennel, or on the viscacha's mound, staring at the passer-by with an expression of grave surprise and reprehension in its round yellow eyes; male and female invariably together, standing stiff and erect, almost touching—of all birds that pair for life the most Darby-and-Joan-like." In North America, where these owls are mainly confined to the prairie-regions, Captain Bendire writes that they "may be seen sitting in front of their burrows at any hour of the day. When not unduly molested, they are not at all shy, and usually allow one to approach them near enough to note their curious antics. Their long slender legs give them rather a comical look, a sort of top-heavy appearance, and they are proverbially polite, being sure to bow to you as you pass by. Should you circle around them they will keep you constantly in view, and if this is kept up, it sometimes seems as if they were in danger of twisting their heads off in attempting to keep you in sight. If you venture too close, they will rise and fly a short distance, and generally settle down near the mouth of another burrow close by, uttering at the same time a chattering sort of note, and repeat the bowing performance. Occasionally, when disturbed, they alight on a small sage-bush, probably to get a better view of the surroundings."

In many parts of North America, the burrowing owl takes up its quarters in the warrens of the prairie-marmot (*Cynomys*), one pair of birds to a burrow; and it was at one time thought that both owls and marmots, together with the rattlesnakes which likewise frequent the colonies, lived together as a kind of happy family. Modern research has, however, shown that this is one of many zoological fables. Captain Bendire is indeed of opinion that, in spite of its diminutive stature, the owl is a match both for the marmot and the snake, and that it subsists to some extent on the young marmots, if not also on the old ones. In parts where there are no marmots, such as California and Oregon, the owls generally frequent the burrows of the susliks (*Spermophilus*), which they enlarge to suit their own requirements; and Dr. Coues states, they sometimes occupy the earths of wolves, foxes, or badgers. From having been found living alone, the latter writer thinks that the owls may sometimes excavate their own burrows, but this is considered improbable by Captain Bendire. On the pampas of Argentina, the burrowing owls take up their residence with the viscacha (*Lagostomus*). Mr. Hudson says that the "birds generally make their own burrows to breed in, or sometimes take possession of one of the lesser outside burrows of the village; but their favourite residence, when not engaged in tending their eggs or young, is on the viscacheria." During the daytime they are exceedingly bold, flying and screaming round the head of the intruder on their domains (as the writer has often witnessed); while at night their weird cry resounds across the silent pampas. In North America the food of these owls consists of young prairie-marmots, susliks, chipmunks, gophers, and other small mammals, as well as lizards, frogs, fish, large insects, and perhaps small birds. The owls hunt their prey mainly in the early evening and during the night, and but rarely in the daytime; they are exceedingly voracious, each bird being said to eat fully its own weight in the twenty-four hours, if it can obtain a sufficient supply. In North America the breeding-season commences in the latter part of March; the same burrow being generally used year after

year, and cleaned out and repaired when necessary. The burrows, according to Captain Bendire, vary from five to ten feet in depth, and are usually about five inches in diameter; the nesting-chamber being, however, from twelve to fifteen inches across. Frequently the burrow is much curved, so that the nest may lie within a couple of feet off the surface; at times the nest is lined with grass or feathers, but more generally with cow-dung. Seven to nine is the usual number of eggs, but there may be as few as six or as many as eleven. Both sexes assist in incubation; and, unless the eggs be taken, but a single clutch is laid in a season. In defence of their eggs and young, these little owls exhibit determined ferocity; retreating to the ends of their burrows, and striking out at the intruder with beak and claws.

Although the name little owl, or owlet, is of course equivalent to pigmy owl, yet it is convenient to restrict the latter term to the members of the genus *Glaucidium*, and the former to those of the present genus. As already mentioned, the little owls are frequently confounded with the pigmy owls; but the two differ essentially in that the former have a long and the latter a short first primary quill. The little owls differ from the burrowing owl in that both the fourth and fifth primaries have their outer webs deeply scalloped, and also in having the upper part of the metatarsus hidden by feathers, and the base of the toes enveloped in the plumage of the metatarsus, their legs thus appearing very short. In having the nostrils pierced near the front of the cere, they are distinguished from an allied Indian owl known as *Heteroglaux*, in which the nostrils occupy the middle of the cere. The wings are large, with the third and fourth quills of nearly equal length; and the head is large and round. The five species of this genus range from Europe and North Africa across Central Asia to China, and also from the Mediterranean countries across Persia to India and Burma. The common little owl (*Carine noctua*) is about the same size as Tengmalm's owl—from which it may be at once distinguished by its compact plumage,—and is an occasional straggler to the British Isles. The general colour of the upper-parts is brown mottled with oval white spots; the facial disc being greyish white, passing into brown externally, while the greater portion of the under surface is whitish streaked with brown; each feather on this aspect having a dark median line and light edges. This form is found all over continental Europe except the extreme north, but its extreme eastern limits are not yet fully known. A desert-hunting variety or species (*C. glaux*) differs by its paler coloration, the ground-colour of the upper-parts being rufous fawn, while the under surface is pure white streaked with rufous. Moreover, while in one form the toes are but scantily covered with hair-like feathers, in another they are thickly plumed. The pale desert form of the little owl inhabits the countries to the south of the Mediterranean, except near Tangiers (where the ordinary form occurs); and it also ranges into North-Eastern Africa, and extends eastwards into Persia, India, and Afghanistan. The ordinary form is the commonest owl in Italy, and is also common in Sicily, although there it is migratory. It breeds in Italy, Gibraltar, Spain, Greece, and Holland. Professor Newton observes that "the little owl is not strictly nocturnal in its habits, for one observer has seen it, at midday, when the sun was shining brightly, carry off a sparrow from a flock; but, as a rule, towards the evening it

becomes more active and vigilant. It seldom haunts forests, but frequents old buildings, towers, and church walls, where, as well as in hollow trees and even in a rabbit-hole, its nest is found." The number of eggs varies from three to five, and both sexes take their share in incubation. No nest is formed. In Italy the flesh of this owlet is commonly eaten; and this species has a peculiar interest as being the owl associated with the goddess Pallas in classical literature. In Persia, Mr. Blanford states that he has often seen five or six individuals of the pale-coloured desert variety in company; and almost every garden in that country has a pair, whose melancholy cries are regularly heard at night.

In India the genus is represented by the spotted owlet (*C. brama*), in which



LITTLE OWL ($\frac{2}{3}$ nat. size).

the under-parts are barred, instead of streaked, and the general colour above greyish brown, with large and distinct white spots, and five bars on the tail. To the eastward of the Bay of Bengal there is a variety of this species, in which the ground-colour of the upper-parts is slaty brown, and the white spots very small, while the tail has six bars. Jerdon says that the spotted owlet is to be found everywhere in India except in dense forests. "Every clump of trees, and often a large single tree, especially near a village, is sure to be tenanted by a pair, or a small colony of these noisy birds. It often takes up its abode and roosts during the day in the eaves of houses, or under the roof; and if anything disturbs its rest, comes forth with its noisy, chattering, and disagreeable chorus. About sunset it is always on the alert, and soon after it sallies forth to feed. It takes short flights, frequently

seating itself on the ground, or a paling, or low branch, or outhouse; and thence captures beetles and other insects on the wing, or snatches one off the branch of a tree; now and then taking a low, undulating flight over the plain or garden, and dropping on any small mouse, shrew, lizard, or insect it may spy on the ground." The writer has often put his hand into some hole in a tree and had his fingers seized by one of these owlets, and has frequently noticed the calm nonchalance with which the birds have sat and regarded him when they have been dragged forth. The spotted owlet lays from two to four eggs, which are generally deposited in March.

Hawk-Owls. As already mentioned, the term hawk-owl, although commonly applied to the members of the genus *Ninox*, properly belongs to the species here represented. It may be well to add that the reader must be careful to avoid confusing the scientific title of this genus with the name *Syrnium* (p. 146). The hawk-owls bring us to a group of genera differing from those already described by the cere not being inflated, with the oval nostrils always pierced in its front margin. The hawk-owls, which have no distinct ear-tufts, are characterised by the long and graduated tail, which approaches the wing in length. The head is unusually flat, with the facial disc nearly obsolete, a strongly-curved and powerful bill, and a small orifice to the ear. The wings are short, and the whole plumage very hard and compact; while the legs are rather short, and the toes thickly feathered.

The hawk-owl (*Surnia ulula*) is the most hawk-like member of the order, both in appearance and habits. The typical form is distributed over Northern Europe and Asia, ranging through Siberia to Kamschatka and Amurland; a few stragglers ranging into Central Europe in the winter. It is represented in North America, to the northward of latitude 40°, by a darker variety (*funerea*); and, according to Dr. Coues, it is to this variety that some of the specimens taken in Britain belong. In length this owl reaches 15 or 16 inches. The general colour of the upper-parts is brown mottled with white,—the white being most abundant on the head and neck, and least so on the umber wings. The facial disc is dirty grey, bounded on the sides by a crescentic purplish brown patch, extending down from the ears. The chin is dusky; the throat and upper part of the breast are dull white, while the remainder of the under-parts is dull with numerous dusky bars; the under surface of the tail being barred with greyish brown and dull white. In addition to the darker colour of the upper surface, the American variety is distinguished by the broader and redder bars on the breast, and the smaller size of the white gorget. In habits the hawk-owl is strictly diurnal, hawking its prey in the bright sunshine. It is an inhabitant of the subalpine districts of Norway, sometimes reaching as high as the zone of birch-trees, although its true home is the fir-woods. Frequently it may be seen sitting in the full sunlight on some bare tree, surrounded by a mob of small birds; these the owl generally disregards, although at times it makes a sudden swoop on one of its tormentors. At the times when lemmings are migrating, hawk-owls make their appearance in great numbers to prey upon the rodent hosts. The nesting-place is usually upon the broken top of some dead tree; the eggs (five to eight in number) being laid either on the bare rotten wood, or upon a thin layer of dried grass. The female

commences to sit from the laying of the first egg. Never shy, in the breeding-season this owl is bold in the extreme. When the nest is approached, the bird rapidly raises its head and tail in a series of jerks, after the manner of a cuckoo, and then suddenly dashes at the intruder. Writing of the habits of this species in Lapland, Mr. Wolley, in a letter to Prof. Newton, observes that the "hawk-owl flies much in the daytime; and, with its long tail, short, sharp wings, and quick flight, has a very hawk-like appearance in the air, when its large square head is



THE HAWK-OWL ($\frac{1}{3}$ nat. size).

not seen. It carries itself much after the fashion of the more regular owls; but whilst all the feathers at the back give a great breadth to its full face, there is quite a table at the top of its head. It cast its bright yellow eyes downwards with the true air of half-puzzled wisdom, or turns its head round for a leisurely gaze in another direction; to glance backwards is out of the question, and to look at anyone with a single eye is much beneath its dignity."

The chief food of this owl consist of lemmings, voles, mice, and birds. The breeding-season apparently commences in the middle of April and continues

till the end of June; and, as the eggs are laid at intervals, some may frequently be found far on in the latter month. In America the hawk-owl probably breeds only in the fur-country and the wooded districts of Alaska. It is there very destructive to ptarmigan, as it is in the Old World to willow-grouse. In America the number of eggs laid varies from three to seven. Mr. R. MacFarlane states, that on the Anderson River "four nests of this species were discovered, and the eggs taken therefrom. All of them were built in pine-trees at a considerable height from the ground. One was actually placed on the topmost boughs, and, like the others, constructed of small twigs and sticks, and lined with hay and moss."

Snowy Owl.

Conspicuous for its snowy plumes—generally more or less mottled with black—the great snowy owl (*Nyctea scandiaca*) cannot be confounded with any other member of the order, being the only representative of its genus. As a genus the snowy owl is distinguished from the preceding by the shortness of the tail, which is only about the length of the wing, and also by the under tail-coverts being produced nearly to the tip of the tail. Moreover, there are slight rudiments of ear-tufts. The plumage of the adult bird may vary from pure white to white largely spotted with black; when present, the dark markings are placed near the tips of the feathers, and while those on the under-parts are crescentic, those above approach a linear form. Although the nestling is covered with sooty black down, the first feathers are similar to those of the adult; whence we must conclude that the evolution of the white plumage dates from an extremely remote period. While Prof. Newton is disposed to regard the amount of black in the plumage as an individual peculiarity, Dr. Sharpe believes that the pure white plumage occurs only in the oldest birds, and then only in the male sex. In length the snowy owl measures upwards of 26 inches.

The snowy owl has a circumpolar distribution, inhabiting the northern regions of both hemispheres, and straggling southwards in winter. Common in Lewis, and blown over to the east coasts of Scotland in considerable numbers, and likewise visiting Ireland in winter, the snowy owl does not breed in any portion of the British Islands. Found in Iceland during the winter, it is a permanent resident in Scandinavia, Greenland, and Northern Russia; while in winter it ranges all through Siberia to Amurland, and has been taken in Poland and Lithuania, as also at Peshawur. Although rare in Spitzbergen, it is common in Novaia Zemlia and on the northern coast of Asia. At the present day this owl is very rarely seen in the south of England, but during the Pleistocene period it appears to have been not uncommon, the bone represented on p. 140 having been obtained from a cave in Devonshire. And it is noteworthy that during the period in question, lemmings, which now form such a large portion of the prey of this species, were also common in England. In America this owl ranges as far south as Texas. The open and desolate moss-covered tundras of Northern Siberia and Lapland, as well as the corresponding regions of North America, are the favourite haunts of the snowy owl. A shy bird, hunting both by day and night, and endowed with noiseless though powerful flight, it falls suddenly on its prey, which is always immediately devoured on the spot. In the Old World its food consists of lemmings, young sea-birds, ptarmigan, grouse, ducks, and, it is said, the Arctic fox and hare; while in the Trans-Baikal districts

susliks are largely consumed. Wherever lemmings are on the move, numbers of snowy owls are sure to collect. In America these birds will often take the musquash from the trap, and in both hemispheres they have been known to fish. The nest is usually placed on the bare ground, in a spot raised somewhat above the general level of the plain, but it may be situated on a ledge of rock. It is a poor affair in the way of structure, the eggs resting merely on a few feathers.



SNOWY OWL AND LAPP OWL ($\frac{1}{2}$ nat. size).

The usual number of eggs is from four to seven, but in seasons when lemming are numerous as many as ten may be laid at considerable intervals of time. Incubation commences with the first egg, so that eggs and young are frequently found in the nest together. While the female is sitting, the cock-bird remains on the watch near by, and gives the alarm in case of danger. According to Mr. Turner's observations, the old birds, and more especially the female, exhibit great boldness in defence of their nests, flying close to the head of an intruder with outstretched talons and snapping beaks. In such cases the natives are reported to seize hold of

one of the young, whereupon one of the parents charges the despoiler, who holds up his gun-stock, against which the bird dashes headlong.

With the screech-owls, or scops-owls, we come to a genus of mostly small species, distinguished from the preceding representatives of the group with uninflated ceres by the presence of distinct ear-tufts. In this character these owls agree with the large eagle-owls to be next mentioned, from which they are distinguished, in addition to their generally smaller size, by the wings being very long, and reaching nearly or quite to the tip of the tail. As a rule the toes are feathered, but in certain species the metatarsus is completely bare. There are between twenty and thirty species of these small-horned owls, which range over the greater part of both the Old and New Worlds, although only one of them occurs in Europe. In habits they are largely nocturnal, although they may at times be seen abroad in the daytime. Groves, gardens, and wooded districts are their favourite resorts; their nests are made in trees, and the food of some of them is to a great extent composed of the larger insects. Dr. Sharpe remarks that the various species of screech-owls are more difficult to distinguish than are those of any other genus, although the Old World forms are very distinct from those of America.

The common scops-owl (*Scops giu*), which is represented on the left side of the figure on p. 152, is one of the smallest European members of the family, and is occasionally met with in England. It ranges over southern continental Europe in summer, and in winter reaches North Africa; while eastwards it extends to Persia and Turkestan, being replaced by allied varieties or species in Japan, India, Malaysia, and South Africa. In length this little owl does not exceed 8 inches; and it belongs to a group characterised by the dusky hue of the beak, the greyish brown colour of the face-disc, the slender and feathered metatarsus, and the general grey or brown hue of the plumage, of which the upper surface is vermiculated, while on both aspects the middle lines of the feathers are distinctly streaked with black. Although generally nocturnal, the scops-owl has been observed in Spain in the full summer sun. Its flight is very like that of the little owl, and its food consists almost wholly of insects. In May the female lays from five to six eggs in the hollow of some tree, and the bird sits so close that it may often be taken by the hand. "This owl," as Professor Newton observes, "is remarkable for the constancy and regularity with which it utters its plaintive and monotonous cry, sounding like *kew, kew*, and pronounced at intervals of about two seconds throughout the livelong night."

Among the American species we may mention the flammulated screech-owl (*S. flammeolus*), ranging from the southern United States to Guatemala, which is of small size, with the metatarsus feathered for more than half its length, and the toes bare; the common North American screech-owl (*S. asio*), which has a very extensive range and numerous varieties, and is distinguished by its feathered toes; and, lastly, the crested screech-owl (*S. cristatus*) of Amazonia, which attains a length of fully 16 inches. The common screech-owl is an abundant bird, exhibiting a grey and a red phase of plumage, and is not migratory. Although living for the greater part of the year in forests, when the ground is mantled in snow this owl seeks the protection afforded by buildings, and is then more frequently seen.

It is considered a true friend to the farmer, as it lives almost exclusively on mice and other small rodents and the larger insects. Hollow apple and oak trees are its favourite nesting-resorts; the eggs, usually five or six in number, being laid on the bare wood.

The great horned owls, or eagle-owls, include the largest and most powerful representatives of the entire order, but few of the species falling short of 20 inches in length. Allied to the screech-owls, they



EAGLE-OWL ($\frac{1}{2}$ nat. size).

may be distinguished by their relatively shorter wings, which never reach within a considerable distance of the end of the tail; while the great size of the ear-tufts and the beautifully barred plumage aids in recognising these magnificent birds. Although the toes may be sometimes bare or but sparsely feathered, the metatarsus is always plumed throughout. The beak is short and strong, with a compressed tip, and the large nostrils are either oval or rounded. Of eagle-owls there are nearly a score of species, ranging over the greater part of the Old and New Worlds, although unrepresented in Australasia. As being the only

species found in Western Europe, the best known of all is the great eagle-owl (*Bubo ignavus*), of which specimens are occasionally taken in Britain. This splendid bird, of which the total length may reach 28 inches, belongs to a group of two or three species characterised by the toes being so thickly feathered that even



EAGLE OWL SEIZING ITS PREY

their last joints are concealed. It has a black beak and bright orange iris; while the plumage is a beautiful blending of various shades of brown. The ear-tufts include a few dark feathers, with light bars on the inner webs; the hind-neck and back are mottled dark and reddish brown, with the dark tint occupying the middle

of the feathers; and the same colours, but arranged in transverse bars, occupy the primary quills and tail-feathers. On the face-disc the feathers are light brown with greyish black speckles; while the breast is pale brown, with longitudinal streaks of darker brown, and the remainder of the under-parts are shades of brown banded with darker bars.

The great eagle-owl inhabits the greater part of Europe and Northern Asia, the Central Asian form (*B. turcomanus*) being paler than ordinary. In Asia it extends as far south as the Pangong Lake and the Himalaya; and it has also been obtained from North-Eastern Africa. Common in Scandinavia and South Germany, this owl is rare in Denmark; and although not unfrequent in Italy, is unknown in Sardinia. Many of the specimens taken in England have been birds escaped from captivity. The eagle-owl is one of the boldest and most rapacious of the European birds of prey, attacking and devouring young fawns, hares, rabbits, other small rodents, capercaillie, grouse, pheasants, and many smaller birds, as well as reptiles and frogs. Mainly nocturnal, it appears early in the evening, and can fly well and strongly in the daylight. Its cry has been compared to the syllables *boo, boo*. When reposing during the day, the eagle-owl usually sits with its feathers ruffled up, and thus appears much larger than it really is. When irritated it spreads and drops its wings in the manner represented in our illustration, at the same time snapping its beak and hissing, and thus rushes with flaming eyes at its aggressor in the most menacing manner. Although it is said that when attacked by the golden eagle it will come off victorious, this owl appears to be quarrelsome rather than really courageous, and in the daytime will take wing immediately on the approach of an intruder. When detected on its perch, it is immediately mobbed by a host of smaller birds, generally led by a crow. The breeding-season commences in the latter half of March or the beginning of April; and the two or three eggs are usually laid on a ledge or shelf of rock with but little if any attempt at a nest. Occasionally, however, a large nest of twigs is formed, which, in the absence of suitable rocks may be placed in a tree; while sometimes the eggs are deposited in a hole in the ground. The young are hatched in about three weeks, and are able to fly in eight weeks after birth, although they frequently remain in the nest for some time longer. This owl breeds freely in captivity.

Other Species. The Virginian eagle-owl is a somewhat smaller bird, distinguished by the head and neck being of the same hue as the blackish back instead of yellowish and lighter. It ranges over the whole of North, and extends into Central America, and is liable to great local variation in colour. In cultivated districts this owl inflicts much damage on poultry yards, killing all kinds of birds, from turkeys down to young chickens, and frequently merely devouring the hearts of its numerous victims. Where the primitive forests have been destroyed, the owls breed in the deserted nests of eagles, hawks, or crows, but elsewhere nest in hollow trees. Usually there are but two or three eggs, although occasionally four or five; and so early in the year are these laid that in Nova Scotia and Newfoundland they are not unfrequently found frozen in the nest. The Indian eagle-owl or rock horned owl (*B. bengalensis*), may be taken as an example of the second group of the genus, in which the covering of the feathers on the toes is more or less

scanty, the last joint and sometimes the whole toe being bare. This species attains a length of 20 inches, and is confined to India. Its habits appear to be very similar to those of the other species, the nesting-season being from February to April, and the eggs usually laid on a shelf of rock near water, although occasionally in a hole in the ground. That the eagle-owls are an old group is proved by the occurrence of remains of extinct species in the Lower Miocene Tertiary of France; those of



INDIAN FISH-OWL ($\frac{1}{2}$ nat. size).

the existing European species occurring in the Pleistocene deposits of Norfolk. The metatarsus may be distinguished from that of the snowy owl by its longer and more slender form.

Fish-Owls. The fish-owls of the Oriental region and Africa form a group distinguished from all other members of the order by the under surface of the toes being covered with a number of small spicules, thus presenting an admirable holding surface. In most cases the metatarsus is naked. These owls are divided into two genera, one of which (*Cetupa*) is confined to Palestine,

India, Malayana, and China, and is characterised by the possession of large ear-tufts; while the second (*Scotopelia*) is African, and lacks those appendages. Of the Oriental genus one of the best known species is the Indian fish-owl (*C. ceylonensis*), which inhabits Palestine, India, Ceylon, the countries on the east of the Bay of Bengal, and part of China. It is a large bird, measuring 25 inches in length; and is of a general tawny colour above, with the individual feathers broadly streaked with black down the middle. The quills are brown with pale bands; the tail is also brown with pale fulvous bars; while the greater part of the under surface is golden tawny, with black streaks down the middle of the breast-feathers. The feet are dark; and, as in all the other members of the genus, the eyes bright yellow.

This fish-owl inhabits wooded districts near water, and is mainly nocturnal, although Prof. V. Ball writes that he has seen one flying in the daytime. Jerdon says that "it roosts during the day in the densest part of the jungle, coming forth to feed shortly after sunset, and generally making its way to the nearest water, be it a tank, brook, or river. Here it may be seen sitting on some overhanging rock or bare tree, occasionally uttering its loud dismal cry, which Tickell well likens to *haw, haw, haw, ho*, calling it a repulsive laugh. It feeds much on fish, and more particularly on crabs." Mr. Hume states, however, that he invariably found the remains of birds or small mammals round their breeding-places. And he subsequently observes that these owls breed from December to March, but appear as a rule to lay in February. "They always nest in the vicinity of water, sometimes choosing a cleft in rocks overhanging a mountain stream, sometimes a broad shelf in the clay cliffs of some river, sometimes a huge cavity in some old banyan tree, and at times appropriating an old nest of *Haliaetus*. Where they make their own nest, on a ledge or recess of a cliff, it consists of little but a few sticks, mingled with a few feathers, or, when in holes of trees, of a few feathers and dead leaves; but when they annex an old nest of the fishing-eagle's, they seem to line it more carefully with finer twigs, grass, and feathers." The usual number of eggs is two. Mr. G. Marshall writes that in the Saharunpur district he found a nest situated in the fork of a banyan tree, about 25 feet from the ground, the hollow being so deep that the parent bird when sitting could not be seen from the ground. To this nest the birds returned for three consecutive years.

African
Fish-Owls. Of the three species of African fish-owls, two are restricted to the west side of the Continent, from the Gabun to Senegambia, while the third (*S. peli*) is common to those districts and the neighbourhood of the Zambesi mouth. Pel's fish-owl is the largest, measuring 23 inches in length. In habits these owls appear to be very similar to their Oriental cousins, frequenting the borders of lakes and rivers, but they are all comparatively rare. A captive specimena fed eagerly on fish, which is probably the food of these birds in the wild state. The general hue of the plumage in Pel's fish-owl is deep rufous-bay above, marked with transverse black bars; while beneath it is pale bay, with heart-shaped black markings. The iris of the eye is dark brown, instead of the yellow tint characterising the Oriental fish-owls. We have not met with any account of the nesting-habits of this species, while nothing is known of the two others in the living state.

THE OSPREYS.

Order PANDIONES.

The osprey (*Pandion haliaëtus*), together with two species of the Oriental genus *Polioaëtus*, constitute not only a family (*Pandionidæ*), but, according to Dr Sharpe, a separate order, which appears to connect the owls with the diurnal birds of prey. While resembling the latter in the lateral position of the eyes, which are not furnished with a distinct disc, and their firm, hard plumage, they agree with the owls in the fourth toe being reversible, as well as in the form of the cannon-bone or metatarsus, which has the bony bridge over the hollow at the upper end, and likewise in the general form of the lower end of the tibia,¹ although the latter retains the bony bridge which has been lost in the owls. Moreover, the osprey agrees with the owls, and thereby differs from the typical diurnal birds of prey, by the absence of a distinct aftershaft to the feathers. In the present group the nostrils are not concealed by bristles; and the toes are naked, and furnished beneath with spicules like those of the fish-owls. The osprey, or fishing-hawk, is the sole representative of its genus, and is characterised by the length of its wings, and naked and rather short metatarsus, which is entirely covered with reticulate scales. In length the osprey varies from 22 to 24 inches. In colour the beak is black, the cere blue, and the iris yellow. The elongated feathers at the tip of the head and nape of the neck are whitish, streaked with brown; the upper surface of the body and wings is dark brown, with the ends of the primaries black, and that of the tail two shades of brown. Beneath, the chin and throat are white, the upper part of the latter being marked with a pale brown band; while the abdomen, thighs, and under tail-coverts are also white. The wing is partly white and partly brown beneath, and the lower surface of the tail is white, barred with greyish brown. The legs and toes are blue.

Following the views of most English writers, that there is but a single representative of the genus, the osprey has an almost cosmopolitan distribution, although it is unknown in the extreme south of South America, as well as in parts of Oceania. In England it is a rare summer visitor, but it used formerly to breed in many parts of Scotland, where it is now well-nigh exterminated. For nearly a century a pair have, however, bred at Loch-an-Eilan Castle. In 1890 three birds appeared at the nesting-place, one of which, after a fierce encounter, was killed, whereupon the others disappeared. In 1891 a pair again visited the district, but, instead of taking up their old quarters, selected Loch Merlich—some miles distant—as their abiding-place. Here they were unfortunately disturbed, but in 1892 they once more reappeared at Loch-an-Eilan, where effective measures have been taken to secure them from molestation. The osprey feeds almost exclusively on fish, which it captures both at sea and in fresh waters; and it is doubtless for the purpose of holding its slippery prey that the fourth toe is reversible, and the soles of the feet covered with spicules. Sir J. Richardson writes that “when looking out for its prey, it sails with great ease and elegance, in undulating and curved lines, at a considerable altitude above the water, from

¹ I have not had the opportunity of examining the leg-bones of *Polioaëtus*.



OSPREY AND YOUNG.

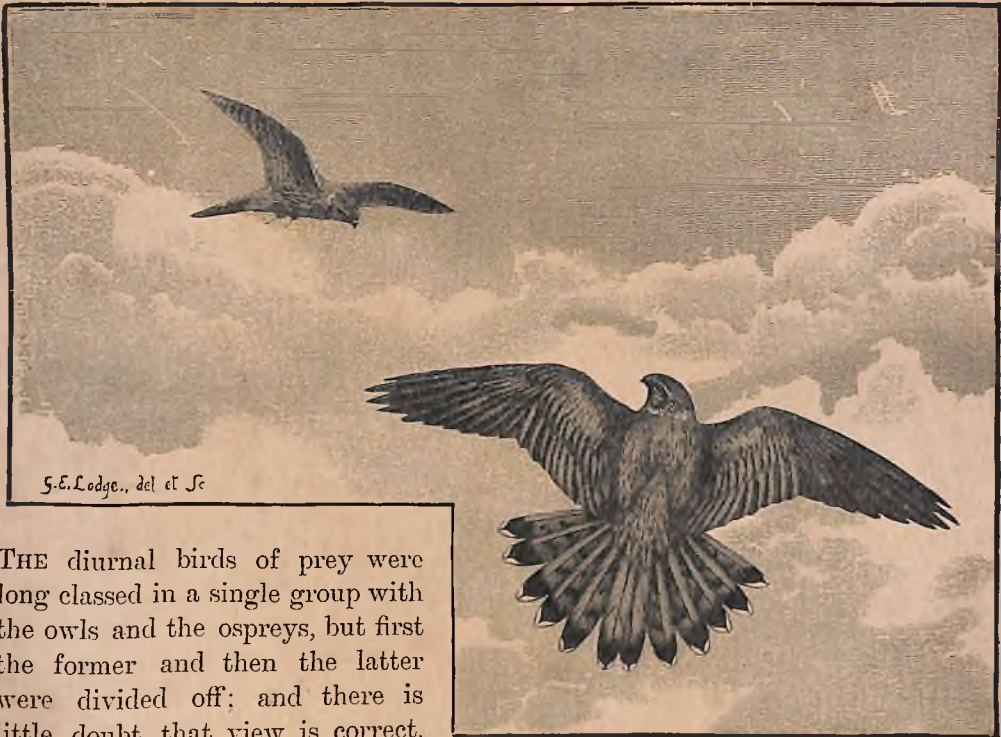
whence it precipitates itself upon its quarry, and bears it off in its claws; or it not unfrequently, on the fish moving to too great a depth, stops suddenly in its descent, and hovers for a few seconds in the air, like a kite or kestrel, suspending itself in the same spot by a quick flapping of its wings; it then makes a second, and, in general, unerring dart upon its prey, or regains the former altitude by an elegant spiral flight. It seizes the fish with its claws, sometimes scarcely appearing to dip its feet in the water, and at other times plunging entirely under the surface, with force sufficient to throw up a considerable spray. It emerges again, however, so speedily as to render it evident that it does not attack fish swimming at any great depth."

On the Continent the osprey generally builds in the later part of April, laying three, or rarely four eggs, which resemble those of the Accipitrine birds in being blotched with shades of reddish brown. The nest is large, and composed of sticks, and may be placed either on a tree, a ledge of rock, or in a ruined building. In North America, where ospreys are numerous, Captain Bendire states that the nest is usually built in a tall tree—frequently on the top of the broken stem of a pine. In places where trees are scarce, as in some parts of California, the nest may be situated either on the ground or on a cliff. Mr. W. W. Worthington writes that on Plum Island many pairs of ospreys "nest on the ground, on the tops of sand-dunes, in such cases depositing the eggs on the sand; the nest consisting of a few sticks, bunches of seaweed, and pieces of various kind of rubbish arranged in a circle. In other cases the nests are built up several feet, the height in all probability being regulated by the number of years the nest has been occupied, and the amount added to it from year to year." But a single brood is produced during the year, and, while the period of incubation is commonly considered to be twenty-one days, Captain Bendire believes it to be a week longer.

Oriental Fish-Eagles. The Oriental fish-eagles, which must not be confounded with the sea-eagles, constitute a genus (*Polioaëtus*) differing from the preceding by the shorter wings, longer tail, and differently-formed feet, and confined to India and the Malayan region. The large Oriental fish-eagle (*P. ichthyaëtus*) somewhat exceeds the osprey in size, whereas the smaller (*P. humilis*) is inferior in this respect. The larger species has the upper plumage brown, becoming paler on the middle of the back, and darker on the wings; while the head and neck are ashy grey and the tail white, with a broad bar of brown at the tip. Its range extends from India to Celebes, and its food consists mostly of fish.

CHAPTER XII.

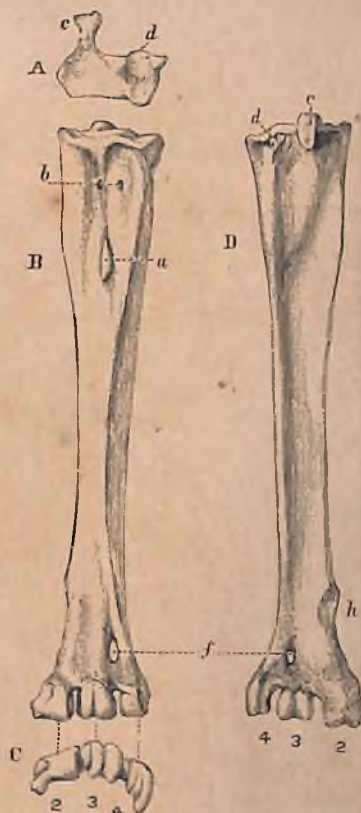
THE DIURNAL BIRDS OF PREY, OR ACCIPITRINES,—Order ACCIPITRES.



MERLINS.

THE diurnal birds of prey were long classed in a single group with the owls and the ospreys, but first the former and then the latter were divided off; and there is little doubt that view is correct, although, to our thinking, the ospreys appear to connect the two groups very intimately. Exclusive of the ospreys, the diurnal birds of prey, as they may be conveniently designated, include falcons, hawks, kites, eagles, buzzards, harriers, and vultures, together with the so-called secretary-bird of Africa and the American vultures; the two latter forming very aberrant groups, one or both of which are by some ornithologists regarded as constituting distinct orders. By the older naturalists the Accipitrines were placed at the head of the birds, but by common consent they have now to yield this position to the Passerines, which are, on the whole, the most highly organised members of the entire class. It must, however, be remembered that, for their own particular mode of life, the organisation of these birds is as perfect as it is possible to conceive; and, from the mechanical point of view, the spectacle of a falcon swooping on its quarry presents us with one of the very highest developments of bird-life.

While agreeing with the owls and the ospreys in their desmognathous palate, their hooked beak and curved talons, and the presence of a cere, the Accipitrines differ from both in that the fourth toe is not reversible; while they resemble the latter and differ from the former in their laterally-directed eyes, which are never surrounded by complete discs, and their firm plumage. In the bones of the leg the tibia differs from that of the owls in possessing a complete bony bridge at the lower end, while in the typical forms this lower end is remarkably flattened from back to front. The cannon-bone, or metatarsus, as shown in the accompanying figure, is also longer than in the owls and ospreys, and lacks the bridge at the upper end found almost universally in these groups; while at its lower end the three trochleæ, instead of forming a very high arch when seen from below (compare the figure on p. 140), are situated nearly in the same transverse plane. Hence the metatarsus at once serves to distinguish an owl or an osprey from an Accipitrine. In addition to its bridged palate, the skull of an Accipitrine agrees with that of an owl in the absence of any production of the lower mandible beyond its point of articulation with the quadrate bone, but it differs by its more elongated form. Like those of the owls, the young have a downy coat, but the eggs, although occasionally white, are very generally more or less coloured, usually with reddish blotches on a pale ground. The whole group is carnivorous, like the owls and ospreys; but, while some of its members kill their own prey, others live on carrion. The Accipitrines may be divided into four distinct families, namely, the falcon group (*Falconidæ*), the vultures (*Vulturidæ*), secretary-vultures (*Serpentariidæ*), and American vultures (*Cathartidæ*). The two first of these families are closely allied; the other two differ greatly both from the first two and from one another.



THE LEFT CANNON-BONE OR METATARSUS OF THE BUZZARD.

From the upper (A), front (B), lower (C), and hinder (D) aspects. *c.d.*, hinder processes of upper end; *a.b.*, points of muscular attachment; *f*, foramen; *h*, facet for first toe.

THE HAWK TRIBE.

Family *FALCONIDÆ*.

The present family, which includes the falcons, hawks, kites, buzzards, eagles, etc., constitutes together with that of the vultures the typical Accipitrines, which are collectively characterised by the following features. In the head the nostrils are separated by a median partition, while on the base of the skull there are no basipterygoid processes. The feathers have well-developed aftershafts, and the

oil-gland is crowned with a circle of feathers. Inferiorly the windpipe is provided with an organ of voice. Although very closely connected by the lammergeier, the falcons and their allies differ from the vultures (except the lammergeier) by the head being clothed with true feathers, and by the size of the females exceeding that of the males. The group includes the smallest members of the order, while its largest representatives are second only in size to the vultures. As a rule, these birds subsist mainly or exclusively on prey killed by themselves, although some will eat carrion, and a few feed on honeycomb. Like other Accipitrines, the two sexes associate in pairs, which mate for life; while the number of young produced in a brood seldom exceeds four, and is frequently less. They have a cosmopolitan distribution, and may be divided into five subfamilies.

True Falcons. The true falcons, as represented by the peregrine and the kestrel, are the typical members of a subfamily, characterised by the length of the tibia being considerably greater than that of the metatarsus, by the scutes on the hinder aspect of the metatarsus being arranged in a reticulate manner, and by the sides of the bill being notched. In all of them the cere is large, and often brightly coloured. With regard to the extent of the genus *Falco*, there is a certain amount of difference of opinion among ornithologists, some, including in it the whole of the European falcons, while others separate the gerfalcons (as *Hierofalco*), and the kestrels (as *Tinnunculus*, or *Cerchneis*). Used in the wider sense, the genus will include (with the exception of one peculiar species from the Argentine and another from New Zealand) all the falcons in which the nostrils are circular and furnished with a distinct tubercle in the middle. The beak in all is short and curved, with one notch in the upper mandible; the wings are long and pointed, with the first and third quills of equal length, and the second the longest; and the toes are elongated. Many of the larger species have a distinct dark stripe on the cheek, which in the peregrine expands into a large patch. All are subject to great variation of plumage, according to age, which renders the discrimination of many of the species a matter of exceeding difficulty.

Gerfalcons. Under the common title of gerfalcons are included several closely allied falcons of large size, from the northern regions of the Northern Hemisphere, distinguished by the comparative shortness of the toes, more especially the fourth, which (exclusive of the claw) is about equal in length to the second. The wings, moreover, are rather short, and the length of the interval between the tips of the primary and secondary quills does not exceed half the length of the tail. The beak is somewhat elongated; and the colour of the plumage tends to slaty grey, or white; these being the only falcons in which there is such a type of coloration. One of the best known of these species is the Greenland falcon (*Falco candicans*), of Greenland and North America, young birds occasionally straggling to the British Islands. This is the lightest-coloured member of the group, and is hence sometimes termed the white gerfalcon. Its distinctive characters are to be found in the yellow tint of the cere, beak, and claws; and by the ground-colour of the plumage being white at all ages. In old birds, the head, under-parts, and tail become almost, or completely, white; while the upper-parts retain small black spots. In the young the breast and flanks are longitudinally streaked with brown. The length of the female reaches 23 inches. In



THE GREENLAND FALCON.

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THE GREENLAND FALCON.

the Iceland falcon (*F. islandicus*) the beak and claws are of a dusky horn colour, and the plumage darker than the last; its ground-colour being brown in the young and grey in the adult. Moreover, in the adult the flanks have transverse arrow-head dark bars, and the tail is likewise barred; the crown of the head being lighter coloured than the back. In young birds the dark markings on the under-parts are longitudinal; this change from longitudinal to transverse bars being common in the group. The home of this bird is Iceland, from which a certain number of individuals migrate to the south-east, a few from time to time reaching Britain. The Norway, or true gerfalcon (*F. gyrfalco*), is a somewhat larger bird than the last, with the crown of the head as dark as or even darker than the back, and the whole tone of the plumage tending more to brown. It has also frequently a distinct cheek-stripe; while the wings are relatively longer, and the tail shorter. This falcon inhabits all Northern Europe and Asia, as well as North America, and migrates southwards in winter, although not reaching Britain. It is replaced on the Labrador coast by the still darker Labrador falcon. The habits of all the gerfalcons are probably very similar; although, from the general absence of trees in its native country, the Greenland species is compelled to breed exclusively on cliffs, while the others often resort to trees. The eggs are usually three or four in number, and are of a creamy white ground-colour, blotched with cinnamon or reddish brown. All of them are extremely shy, but display great boldness in defence of their nest, circling round the head of the aggressor with loud screams. When sitting on its nest in the snow, with its white breast towards the hunter, the Greenland falcon will often escape detection. Their prey consists chiefly of water-fowl and ptarmigan. Gerfalcons, and especially the white kind, were formerly much esteemed in falconry, and commanded high prices; the white Greenland falcons imported to the Continent being captured in Iceland. Although larger and more powerful birds, all the gerfalcons lack the supreme dash and "go" of the peregrine; and their former estimation was probably mainly owing to their size and beauty.

Saker Falcon.

The large and handsome falcon, known as the saker (*Falco sacer*), a term apparently derived from the Arabic, is a southern form, agreeing with the gerfalcons in the proportionate length of its toes and wings, but differing markedly in its plumage. In length the male saker measures upwards of 18½ inches, while the female falls but little short of 25 inches. By this large size and the relative length of the claws, the saker may be readily distinguished from all the other falcons of Europe and Asia. In its ordinary dress, as shown in the accompanying figure, it is further characterised by the upper surface of the tail-feathers, instead of being completely barred, having whitish bars on the inner webs, and spots on the outer ones; these spots being especially marked in the middle pair. Then again the cheek-stripe, if present at all, is very narrow. The head is pale rufous, sometimes turning nearly white, with narrow black stripes along the middle of the feathers. The general colour of the upper-parts is pale brown, with the feathers margined with rufous; while the quills are darker brown, with white or rufous markings, and the pale tail ornamented in the manner noticed. The sides of the face and throat are white; while the rest of the under-parts are whitish, with longitudinal streaks of brown, which are largest on the flanks and abdomen. The cere and feet are yellow, while the beak

is greenish horn-colour. In the young bird the feet are bluish green. When in its full adult dress, which is not assumed till late, and but seldom seen, the saker becomes completely barred on the whole of the upper surface with rufous, and is then compared by Dr. Sharpe to a gigantic kestrel; the under-parts being creamy white, with a few blackish spots on the abdomen passing into bars on the flanks.

The range of the saker extends from South-Eastern Europe and North-Eastern Africa through Central Asia to the north of China. Although not



SAKER FALCON ($\frac{1}{2}$ nat. size).

definitely known to breed in the plains of India it extends from Afghanistan and Gilgit to Peshawur, and thence straggles as far south as Dehli and Amballa. *F. milvipes*, of Central Asia, is now regarded as a distinct species. This noble falcon is common in the Danubian principalities, and generally frequents open country, although nesting in trees—usually in the neighbourhood of water. The nest is not large, and the eggs, which are generally four in number, are more pointed than those of most Accipitrines. In the Harriana Desert of India these falcons feed largely on a spiny lizard of the genus *Uromastix*. In Palestine

the saker is trained for the chase of gazelles; while in India, where it is termed the cherug, it is flown not only at cranes, bustards, hares, etc., but likewise at kites. The chase of the latter is described as being exciting in the extreme, the two birds doing all they know to obtain the higher position, and often flying far from the hawking party. On one such occasion, Mr. R. Thompson, writing to Mr. Hume, says that "after going a considerable distance from his quarry, and thereby acquiring what he wanted—superior height—the saker resumed the chase, returning downwards like a thunderbolt on the kite. Blow after blow was struck, and the helpless kite, with his merciless enemy, descended, clutched fast together, their wings expanded, in wheeling circles to the earth, where the kite, already half dead, was soon despatched." Curiously enough, kites seem to recognise the saker as their enemy, as, immediately one was unhooded, all the kites in the vicinity flew off, although they took not the least notice of other falcons.

Lanner and Laggar Falcons. The falcon known as the lanner (*F. feldeggii*), although a much smaller bird, has been frequently confounded with the preceding species; but, together with the laggar, it belongs to a group agreeing with the under-mentioned peregrine in the relative length of the toes and wings, although resembling the saker in the absence of the distinct dark barring on the thighs in the ordinary dress. The lanner is chiefly characteristic of the countries bordering the Mediterranean, and attains a length of 17 inches in the male. It has the back barred, the forehead blackish, and the hinder part of the head and nape rufous, with a narrow line of black on the forehead, and a thin black cheek-stripe; the general colour of the upper-parts being ashy brown, and the tail-feathers distinctly barred with pale rufous. The laggar (*F. jugger*), which is confined to Peninsular India, is a still smaller species, measuring only 15½ inches in the male, and having the thighs with scarcely any or no dark markings, and the middle tail-feathers not barred; the crown of the head being dull rufous, with lines of ashy black on the back. Other well-known species of this group are the Barbary falcon (*F. barbarus*), ranging from West and North-East Africa to North-Western India and the Himalaya; and the red-capped falcon (*F. babylonicus*), with a nearly similar range, but extending into Turkestan, and unknown in West Africa. The former is next in size to the saker, the female reaching a length of 22½ inches; and may be distinguished from the lanner by the rufous forehead and nape, and the bluish grey of the hinder part of the crown. The latter is much smaller, and has the under-parts uniform sandy rufous, instead of with wavy dark bars.

Peregrine Falcons. In common with the group just noticed, the peregrine falcon (*F. peregrinus*)—so named from the migratory habits of the young birds—differs from the gerfalcons and saker by its longer toes, especially the fourth, which (exclusive of the claw) exceeds the second in length; and also by the elongation of the wings, in which the interval between the primary and secondary quills is greater than half the length of the tail. The peregrine, which attains a length of 15 inches in the male and 17 in the female, is easily recognised by the distinct narrow black transverse bars on the thighs, the blackish colour of the crown of the head, and the expansion of the cheek-stripe into a large black patch. In the adult the whole of the crown of the head,

the nape, and the space below the eyes are nearly black; the back, wing-coverts, and tail some shade of bluish grey, with darker bars; the primary quills brownish black, with the inner webs barred and spotted with reddish white; the throat is nearly white, and the breast reddish white, with short dark brown transverse bars; the remainder of the under-parts, as well as the lower surface of the tail, being marked with more continuous bars of brown and grey. The beak is blue, tending

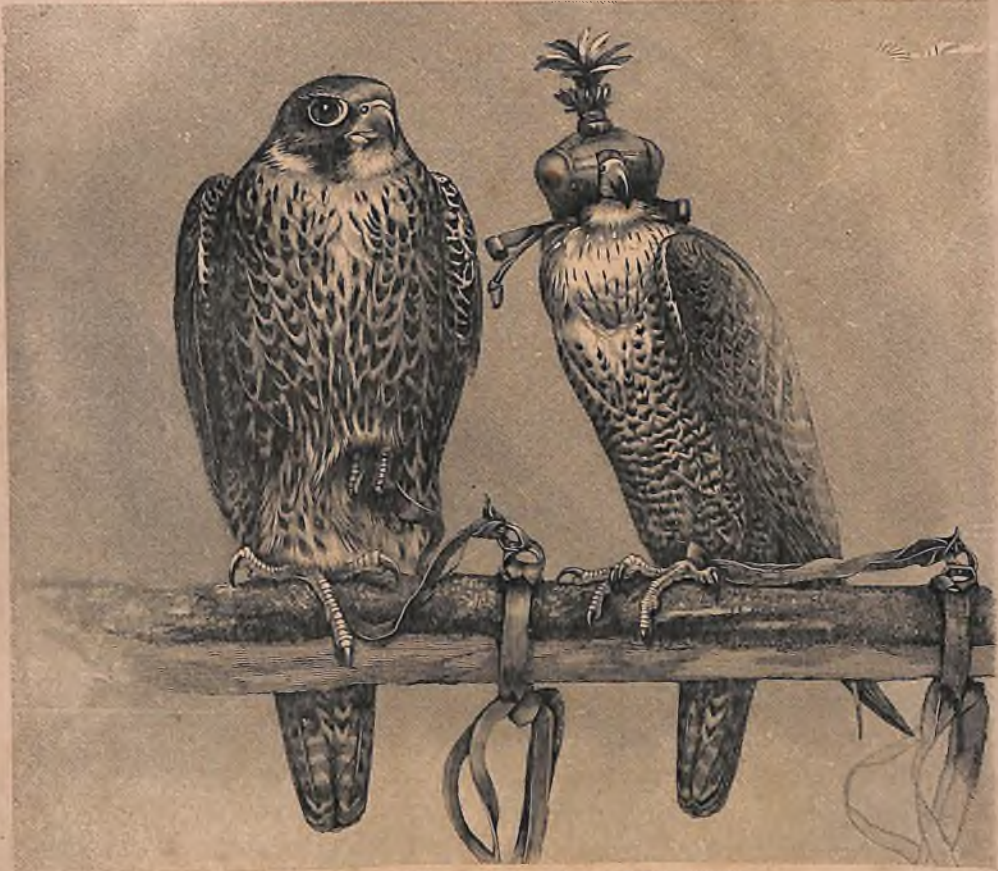


PEREGRINE FALCON ($\frac{1}{2}$ nat. size).

to black at the tip; and the cere, legs, and toes are yellow. Such is the general coloration of the typical northern peregrine, which ranges over all Europe, except Iceland and Spitzbergen; while eastwards it extends across Siberia to China and Japan, and thence to the Malay Islands. It also occurs in North-Eastern Africa, as far as Kordofan, and occasionally straggles as far as the Cape, where, however, its place is normally occupied by the very distinct lesser peregrine (*F. minor*). Entering India on the extreme north-west, it is replaced in the peninsula by the shahin falcon (*F. peregrinator*). In Java we meet another

southern form, known as the black-cheeked falcon (*F. melanogenys*), which ranges to Australia, and is distinguished by its redder and more finely-barred plumage. Ornithologists are now pretty well agreed that the peregrine of North America—where it is commonly known as the duck-hawk—is merely a variety of the European species; but in Chili and the adjacent parts of South America we meet with another form, apparently allied to the black-cheeked falcon, and known as *F. nigriceps*, or *F. cassine*.

Breeding on the cliffs of the sea-coast in the south, and in the more mountainous



CAST OF PEREGRINES—RED FALCON AND BLUE TIERCEL.

districts in the interior of the country, the peregrine is best known in England as a migrant. These migratory individuals are chiefly birds of the first year, and are most commonly met with in autumn; but there are also a certain number of old birds which make their appearance in spring on their northward journey. Although nearly always nesting on some lofty cliff, there are instances of its having bred in an open marsh, and also in a tree. The nest is usually of large size, and generally contains four eggs, which are remarkable for the depth of the colour of their red blotchings. Feeding chiefly on birds of different kinds, the peregrine undoubtedly kills a considerable quantity of game. Professor Newton is of opinion, however, that the harm it inflicts is not so great as might at first appear to be the case,

since all falcons invariably seize the weakest birds, and the elimination of such weaklings is probably to the general advantage of the breed. In North America, although by no means common, the peregrine is the most numerously represented of all the larger falcons. Captain Bendire writes that in the northern portion of its range it is only a summer resident, following the immense flocks of water-fowl during their migrations. "Hares, ptarmigan, grouse, bob-whites, pigeons, as well as smaller birds, enter largely into its bill of fare, and the poultry-yard as well occasionally suffers. Next to the goshawk, the peregrine falcon is our most audacious bird of prey. Its flight, when once fairly started in pursuit of its quarry, is amazingly swift; it is seemingly an easy matter for it to overtake the fleetest of birds, and when once in its grasp resistance is useless. I have seen this falcon strike a teal almost within gunshot of me, kill it apparently instantaneously from the force of the shock, and fly away with it without visible struggle, and as easily as if it had been a sparrow instead of a bird of its own weight."

Use in Hawking. From its docile disposition, its powerful flight, and the ease with which it can be procured, the peregrine has always been a favourite bird in falconry, and is the one most commonly employed in the modern revival of that sport. In falconry it is the female only that is termed the "falcon"; the male bird being designated the "tiercel," corrupted into "tarsel." While the tiercel was commonly flown at partridges and occasionally at magpies, herons, and next to them rooks, were the favourite quarry for the falcon. In heron-hawking, the birds were intercepted on their way home, and, if possible, when flying against the wind. When a heron was viewed, a cast or pair of falcons was loosed; and thereupon pursuers and pursued immediately began to try and soar above the other, the heron lightening himself by disgorging his food. The falcons fly in a spiral, and as soon as one has gained a position of advantage and made its swoop, it should be succeeded by its fellow; the manœuvre being repeated until the heron is brought to the ground. In striking, the falcon attacks only with its claws, and not, as often represented, with its beak. In India the peregrine, locally known as the bhyri, used to be employed by the native chiefs in hawking egrets, stalks, herons, cranes, etc.; only a single bird being flown at each quarry. The smaller shahin, or royal falcon was, however, held in still higher estimation for this sport. It may be added that the shahin differs from the peregrine by the more rufous tinge of its under-parts, and its dark head and nape.

Turumti Falcon. With the Indian turumti falcon (*F. chicquera*), which scarcely exceeds the common kestrel in size, we come to much smaller representatives of the present section of the genus. This species resembles the peregrines in having the feathers of the thighs distinctly barred, but is at once distinguished from that group by the chestnut-coloured head, nape, and cheek-stripe. The rest of the upper-parts are pale grey, with dark markings, the quills being dark slaty, and the tail light grey, with a broad black terminal band tipped with white. The lower surface is white to the breast, behind which there are narrow cross-bars of dusky grey. The beak is greenish yellow at the base, while the cere and legs are bright yellow. This species is confined to India, but is replaced in Africa by the rather paler tawny-headed falcon (*F. ruficollis*), which is perhaps

only a local race. The female attains a length of 13, and the male of $11\frac{1}{2}$ inches. The turumti is spread all over India, generally haunting open country in the neighbourhood of cultivation. Jerdon writes that "it frequents gardens, groves of trees, and even single trees in the open country, whence it sallies forth, sometimes circling aloft, but more generally, especially in the heat of the day, gliding with inconceivable rapidity along some hedgerow, dam of a tank, or across fields, and



TURUMTI FALCON ($\frac{3}{4}$ nat. size).

pouncing suddenly on some lark, sparrow, or wagtail. It very often hunts in pairs, and I have now and then seen it hover like a kestrel for a few seconds." In addition to the smaller birds, the turumti will attack starlings, quails, and doves, while it will sometimes prey on bats. It nests from February to May,—apparently always in trees,—laying usually four eggs, of which the colour varies from yellowish brown, with a few reddish specks, to nearly uniform brownish red. Mr. R. Thompson, in a letter to Mr. Hume, observes that "I have trained this species to be thrown from the hand at quails and partridges. The bird readily learns the

lesson, and makes a good bag. The quail or partridge is allowed a good start, the turumti being held up so as to eye the receding bird, and then thrown in the direction of the latter, with some force, shooting off at once, more like a dart than anything else, at the quarry."

Hobby. The hobby (*F. subbuteo*) is one of the most elegant of the British falcons. It belongs to a group in which the thighs are perfectly uniform; their colour in this species being rufous, while the throat and breast are white, and the latter marked with black stripes. Above, the general colour is dark slaty grey, tending to black on the head. The length is $11\frac{1}{2}$ inches in the male and $13\frac{1}{2}$ in the female. The hobby is a migratory species, ranging over Europe and Northern Asia, and extending into India and North China, while in winter it journeys to South Africa. By no means numerous in Britain, it is still not uncommon in the inland wooded and cultivated districts of the south of England. In addition to preying on small birds, it also feeds on dragon-flies and beetles, and is thus a benefactor to the farmer.

Merlin. Our last representative of the typical falcons is the well-known merlin (*F. aesalon*), which, together with the smaller pigeon-hawk (*F. columbarius*) of North America, may be distinguished from other members of the genus by the longitudinally streaked thighs and the nearly uniformly coloured back, in which the feathers have only a median dark streak. Above, the colour of the merlin is a uniform clear bluish grey, with the tail marked by one broad band near the end. The head is dark slaty, with broad median stripes to the feathers; the forehead and sides of the face whitish, with narrow median lines; the ear-coverts greyish; the throat white; and the remainder of the under-parts white tinged with rufous, with broad median black streaks, becoming narrower on the thighs. In the young bird (shown on the lower figure of our illustration) the general colour of the upper-parts is brown with a faint tinge of grey, and the feathers margined with sandy rufous; while on the under-parts, save the throat, the whitish feathers have very broad reddish brown streaks and black median stripes, the thighs having smaller brown spots, and the lower part of the abdomen and under tail-coverts being only sparsely marked. It is probable that very old female merlins assume a blue plumage like the males. The adult male measures 10 inches, and the female about 2 inches more. The merlin is an inhabitant of Europe and Northern Asia, but extends southwards into India and China. An anonymous correspondent of the *Times* observes that "on the bleak hills of Wales, round the Peak, and in the wildest Midland heights, further north on the barren moors and bold bluffs of Yorkshire, over the rugged and romantic ranges of Scotland, on the short turf of the downs, in the mountain heather, by the slaty and granitic boulders of upheaved rocks, the merlin has its home. Even in the desolate regions it affects, no member of the pariah family is free from attack: yet, like the other small falcons, it holds its own against the destroying band, and manages to live on and do its appointed work against all odds." In Britain the merlin usually nests on the ground, generally on the open moors; but in Lapland and other parts of the continent it commonly takes possession of the deserted nest of some other member of the family, while in other cases it lays on a shelf of rock. When on the ground, scarcely any nest is made. The eggs, which vary from four to six in number, are frequently of a

uniform brick-red colour, but they may be mottled with a darker shade. The merlin commonly preys upon small birds, and has been trained to fly at snipe, larks, thrushes, etc. According to Messrs Salvin and Brodrick, "the strongest female merlins may be trained to fly pigeons admirably, and from their small size, and the way in which they follow every turn and shift of the quarry, are better adapted for this chase than the peregrine; unlike it, they do not stop when the pigeon takes refuge in a hedge or tree, but dash in and generally secure it."



MERLINS ($\frac{2}{3}$ nat. size).

In addition to its smaller size and much darker general colour, the American pigeon-hawk is distinguished by having four black bars on the tail, of which the last is much the widest. This falcon is a migratory species, with a swift and powerful flight, breeding in open nests or hollows of trees, as well as on cliffs, and in cavities in the banks of rivers. The following interesting anecdote is given by Mr. R. Macfarlane regarding this species. On the 25th of May, 1864, an Indian in his employ "found a nest placed in the midst of a thick branch of a

pine-tree at a height of about six feet from the ground. It was rather loosely constructed of a few dry sticks and a small quantity of coarse hay: it then contained two eggs; both parents were seen, fired at, and missed. On the 31st he revisited the nest, which still held but two eggs, and again missed the birds. Several days later he made another visit thereto, and, to his surprise, the eggs and parents had disappeared. His first impression was that some other person had taken them; after looking carefully around he perceived both birds at a short distance, and this led him to institute a search which soon resulted in finding that the eggs must have been removed by the parent birds to the face of a muddy bank at least forty yards distant from the original nest. A few decayed leaves had been placed under them, but nothing else in the way of lining. A third egg had been added in the interim."

Kestrels.

The small falcons, of which the common kestrel or windhover is the most familiar representative, constitute an extensive and easily recognised group of the genus, distributed all over the globe with the exception of Oceania. They are all short-toed birds, agreeing with the gerfalcons in the proportionate lengths of the second and fourth digits; but resembling the peregrines in the length of their wings, as shown by the interval between the tips of the primary and secondary quills exceeding half the length of the tail. They have a peculiar and characteristic type of coloration, easy of recognition but difficult of description; and in the majority of the species (as shown in the figure of the lesser kestrel on p. 190) the plumage is very differently coloured in the two sexes, the hen-birds being barred, while the cocks are more uniform. Although the common kestrel feeds chiefly on mice, many of the other species subsist to a great extent on insects.

The common or true kestrel (*F. tinnunculus*) derives its name of windhover from its habit of hanging suspended in mid-air, with its wings in rapid motion, its fan-like tail spread out, and its head directed to windward. When in this position it spies a mouse or small bird below, it drops upon it suddenly and noiselessly with unerring aim. The male kestrel, which attains a length of 12½ inches, has a yellow cere and limbs, bluish beak, and black claws. The crown of the head, nape, and cheeks are ashy grey with dark streaks; the upper-parts reddish fawn, with a small black spot on each feather; the quills blackish grey with lighter margins; and the tail-feathers ashy grey, with a single broad black band near the end, and the extreme tips white. Beneath, the general colour is pale rufous fawn, with dark spots or streaks, both of which disappear on the thighs and under tail-coverts; while the tail is greyish white with indistinct bars. The female, which scarcely exceeds her consort in size, differs by the top of the head being reddish fawn with dark streaks, the upper-parts being banded with bluish black, and the tail rufous with several incomplete black bars. The young males are nearly like the females, the tail changing blue first and the head last. Our illustration represents a female in which the bars are not so well defined as in some specimens. A further specialisation in the kestrel would involve a similar change of colour in the female; and to this there is an approximation in a dark southern race, where the rump and part of the tail of the hen-bird tend to blue. The kestrel ranges over the whole of Europe and Northern Asia, migrating in

winter into the north of China, India, and North-Eastern Africa, and occasionally straying into the western and southern parts of the latter continent. It is replaced in the New World by the so-called American sparrow-hawk (*F. sparvorius*), in which the centre of the crown of the head of the male is rufous, and the wing-coverts blue with black spots. Although its chief food consists of mice and voles, the kestrel occasionally kills small birds, and will also eat frogs, beetles, worms, and grubs, while in India it frequently devours lizards. That it will



THE KESTREL ($\frac{1}{2}$ nat. size).

occasionally kill a young partridge or chicken is doubtless true, but such small robberies are far more than counterbalanced by the benefits it confers on the agriculturist by the destruction of hosts of pernicious rodents, and it ought therefore to be carefully preserved, instead of being ruthlessly shot down. Although occasionally placed in a hollow tree, the nest is more generally situated among rocks or old buildings, while still more frequently the deserted nest of some other bird, such as a crow, magpie, or raven is taken advantage of. The eggs, usually four or five, but sometimes six in number, may be either mottled all over with brownish red or orange, or blotched with these colours upon a light ground. They are generally hatched late in April, or early in the following month.

The lesser kestrel (*F. cenchris*) is an inhabitant of Southern and South-Eastern Europe, migrating in winter to South Africa; and while scarcely smaller than the common species, has shorter wings. In the adult male the head, hinder neck, rump, upper tail-coverts, and tail are bluish grey; the latter having a broad subterminal dark band and a white tip; while the whole of the back is cinnamon-rufous, without any black spots. The throat is yellowish white, and



LESSER KESTREL ($\frac{2}{3}$ nat. size)

most of the other under-parts are cinnamon-coloured with small black spots, becoming larger on the sides of the body, but disappearing on the thighs, which are uniform pale rufous. Although the cere and limbs resemble those of the common species in colour, the claws are generally white. The female is very similar to the hen of the common species, although lighter in colour, and with white claws. Spain, Malta, Southern Italy, and especially Greece, are some of the countries where the lesser kestrel is most common; but it also ranges into Syria, Turkey, Asia Minor, and Persia, and has been obtained from the steppes of Western Siberia. It may be seen on the Acropolis of Athens, the churches of Madrid, and the

Moorish temples of Granada. In Greece and Spain it nests late in April or early in May, selecting either buildings, rocks, or hollow trees for its breeding-place, and being often found in company with the ordinary kestrel. In Malta it may be seen in flocks, where, according to Leith-Adams, its prey is chiefly small birds. Leith-Adams says that both kinds of kestrel were held in high veneration by the ancient Egyptians; their function being supposed to be to investigate, in conjunction with Anubis, the actions of the soul. Their destruction involved the penalty of death; and "no trouble was spared in preserving them, so that, besides the sacred birds in captivity, it was customary to place food in the way of wild individuals. The kestrel, therefore, must have enjoyed unbounded freedom and protection; and it is a remarkable circumstance nowadays, that, being one of the most common rapacious birds of Egypt, it is far more familiar than any of the others, allowing man to approach it within a few yards."

As there are pigmy parrots and pigmy owls, so there exist diminutive representatives of the falcons, which, although not larger than larks, are as bold and dauntless as their larger relatives. These pigmy falcons range from the Eastern Himalaya, through Tenasserim and Burma to the Malayan Islands, and thence to the Philippines, and are also represented by an outlying species in the Nicobar Islands; and since they differ from the true falcons by their oval nostrils, which have neither a central tubercle, nor an overhanging flap of skin, they are referred to a distinct genus. The beak is short, with a sharp tooth, and a notch on each side, often described as a double tooth. The wings are short, and the tail is of no great length; while the third toe is not much longer than the others.

The black-legged falconet (*Hierax fringillarius*) represented in our illustration inhabits Tenasserim, the Malay Peninsula, Java, Sumatra, and Borneo; and measures 6.1 inches in length. The upper-parts, together with the quills and tail-feathers, are deep bluish black, with the inner webs of the two latter barred with white. The forehead, together with a stripe running from the eye down the side of the neck, and likewise the front of the cheek, the throat, and breast are white, while the abdomen is tinged with rufous. The lores and the space behind the eye, as well as the sides of the body and the outer aspects of the thighs, are glossy black. The bill and feet are dark; although in young birds the former is yellow at the base. The white-legged falconet (*H. melanoleucas*) of Cachar and Assam, differs by its white abdomen and thighs; while the Philippine falconet (*H. erythro-genys*) is distinguished from the latter by its black thighs. The smallest of all is the red-legged falconet (*H. caryolescens*), which measures only 5½ inches, and ranges from Nipal and Sikkim, through Tenasserim and Burma, to Cambodia. It is distinguished from all the others by its white legs, and derives its name from its rufous thighs. All the falconets are quick and active in their movements, making their way with a rapid and direct flight, during which the wings are constantly flapped. They are generally to be seen hawking insects with swallow-like speed, and when tired are said invariably to select a dead branch upon which to rest. Their chief food appears to consist of dragon-flies, beetles, and butterflies; although they undoubtedly at times attack and kill birds, which may exceed themselves in size. Davison writes that he has seen a black-legged falconet swoop at a rock-

thrush, and he once shot a male with a living and partially plucked swallow in its talons. All the species nest in hollow trees, making at the bottom of the cavity a pad of the wings of dragon-flies and butterflies, upon which to lay their eggs. The latter are white; but the number in a clutch does not appear to be ascertained.



BLACK-LEGGED FALCONET AND ITS PREY ($\frac{1}{2}$ nat. size).

It is said that the Malays train the falconets for hawking, throwing them from the hand at the quarry.

The three remaining genera of falcons are distinguished from the foregoing by their oval nostrils being provided with an overhanging flap of skin. In this group the oval nostrils have the long axis parallel or oblique to the bill, whereas in the pigmy falcons it is at right angles to it. Of these genera, the one to which the Mississippi falcon belongs is characterised by the bill having but one notch, and by the wings reaching to the tip of the tail; whereas in the other two (*Baza* and *Harpagus*) the beak has two notches, and the wing does not reach the end of the tail. The Mississippi falcon (*Ictinia mississippiensis*) is one of the two American species which are the sole representatives of the genus, and are characterised by the leaden-black plumage of the upper-parts, and the grey head, neck, and under-parts. In the figured species the secondary feathers of the wing are silvery grey, like the head; whereas in the other (*I. plumbea*) they are of the same black hue as the primaries; this species being also distinguished by the presence of three white bars on the tail. The Mississippi falcon, which ranges from the Southern United States to Guatemala, is $13\frac{1}{2}$ inches in length; while the other species, which is a fraction larger, extends from Mexico to Brazil.



NIGHT-HERON AND BOATBILL.

In its native land, where it is generally known as the Mississippi kite, the figured species is a common bird in many districts, more especially in parts of Texas. Its favourite feeding-grounds are said to be the cotton-fields; where it may be seen at one moment soaring high in the air, and soon after just skimming above the tops of the plants, or flying between the rows. It seldom alights; but may now and then be observed perched on some dead tree, when it suffers itself to be approached within fifteen or twenty yards before taking wing. The food of this species is believed to consist mainly of large insects, probably



MISSISSIPPI FALCON AND SWALLOW-TAILED KITE ($\frac{1}{2}$ nat. size).

supplemented with small rodents and reptiles. The nest is built in a tree, usually in a fork, and may be used for two or more seasons in succession. Usually but two or three eggs are laid, which differ from those of most members of the family in being of a uniform bluish white colour, without spots. In defence of their nest and young these birds are said to display great courage.

Crested Falcons. The crested falcons, of which there are several species ranging from India through Malayana to North Australia, and to Africa, and Madagascar, differ, as we have seen, from the last genus by having two notches on the edge of the beak and by their shorter wings; while they are distinguished from all other members of the subfamily by the crest of elongated feathers at the

back of the head. These birds vary from 14 to 17 inches in length, and many of them are remarkable for their handsome coloration. The Indian representative of the genus is the black crested falcon, or, as it is commonly called, kite (*Bazalophotes*), which has the plumage of the upper-parts of a glossy greenish black, and a uniformly black tail. It is a rare bird, frequenting forests, and feeding almost exclusively on insects. The other species have the tail brown or grey, with darker bars; some, like the Philippine crested falcon (*B. magnirostris*), having the breast marked with broad transverse bars of white and chestnut; while in the West African cuckoo-falcon (*B. cuculoides*) the brown bands are narrower, less continuous, and confined to the sides of the body beneath the wings. Three Central and South American falcons, constituting the genus *Harpagus*, differ from the crested falcons by the absence of the plume of feathers, and also by the presence of a tubercle in the centre of the nostrils.

THE EAGLE-LIKE SUBFAMILY.

The preceding genera are included, as we have seen, in the subfamily *Falconine*; and we now come to a second subfamily, known as the *Aquiline*, which includes the honey-buzzards, kites, eagles, etc. The members of this group differ from the last by the sides of the beak being simply festooned, instead of notched; although they resemble them in having the hinder aspect of the metatarsus reticulated, that is to say, with the scales small and polygonal. As regards their insectivorous habits, the Mississippi and crested falcons serve to connect the more typical members of the preceding subfamily with the kites. In the whole group the nostrils are not concealed by plumes.

Honey-Buzzards. A rare visitor to the British Islands, the honey-buzzard (*Pernis mellivora*) is a well-known although locally distributed bird on the Continent, and is the only European representative of the small genus to which it belongs. The honey-buzzards agree with a considerable number of other genera in having the lower portion of the metatarsus bare, the length of the naked part being, however, less than that of the third toe, exclusive of the claw; and also in the oblique form of the nostrils, which are generally closed in by a membrane, so as to render their aperture little more than a slit. They are more specially characterised by the tail being rounded, with the outer feathers inferior in length to the middle pair. From their immediate allies they are distinguished by the shortness of that portion of the beak in advance of the cere, as compared with the third toe; while the bill itself is stout and the feathers on the lores short and not produced beyond the hinder edge of the nostril. The wings are long and large, and the tail also elongated; the toes are of moderate length, and the claws but slightly curved. The shortness of the feathers on the lores, together with its peculiar gait, which has been compared to the running of a hen, render the honey-buzzard the most unhawk-like of all the British representatives of the family. It is subject to a great amount of variation in the colour and markings of the plumage, more especially in birds of the first and second year. Generally speaking, it may be said, however, that the adult male (as shown in our upper figure) has an ashy grey head, brown upper-parts, with the feathers

margined with a lighter tint, and having a dark median streak; and the tail pale brown, with the extreme tip whitish, and marked by three dark transverse bars. Beneath, the plumage is white, narrowly streaked with brown, such streaks expanding on the sides of the body into spade-shaped markings. As in our figure, there may be some white on the tips of the wing-feathers. The iris is straw-coloured, the beak black, and the feet yellow with black claws. Young birds, as shown in the lower figure of our illustration, are generally brown or yellowish brown, with the shafts of the feathers distinctly streaked with black, and the under-parts more rufous than the upper surface. The ashy brown tail is broadly tipped with buffish white, and is crossed by two distinct chocolate bars, one near



HONEY-BUZZARDS ($\frac{1}{2}$ nat. size).

the end and the other near the middle, between which are a number of imperfect dark bars. The iris is hazel. The length of the adult bird is about $25\frac{1}{2}$ inches, so that it may be compared in size to a kite. The honey-buzzard ranges over the greater part of Europe, and probably occurs in several parts of Northern Asia, as it has been recorded from Japan and near Peking. In Sweden it breeds within the Arctic Circle, and it has frequently nested in England. During the winter it migrates to Arabia, Africa, and Madagascar. In India it is replaced by the crested honey-buzzard (*P. ptilorhynchus*); a species ranging through the Malayan region, distinguished by the crest of the adults, and remarkable for its great individual variation, some individuals being light fulvous, while others are nearly black. A third species (*P. celebensis*) inhabits Celebes.

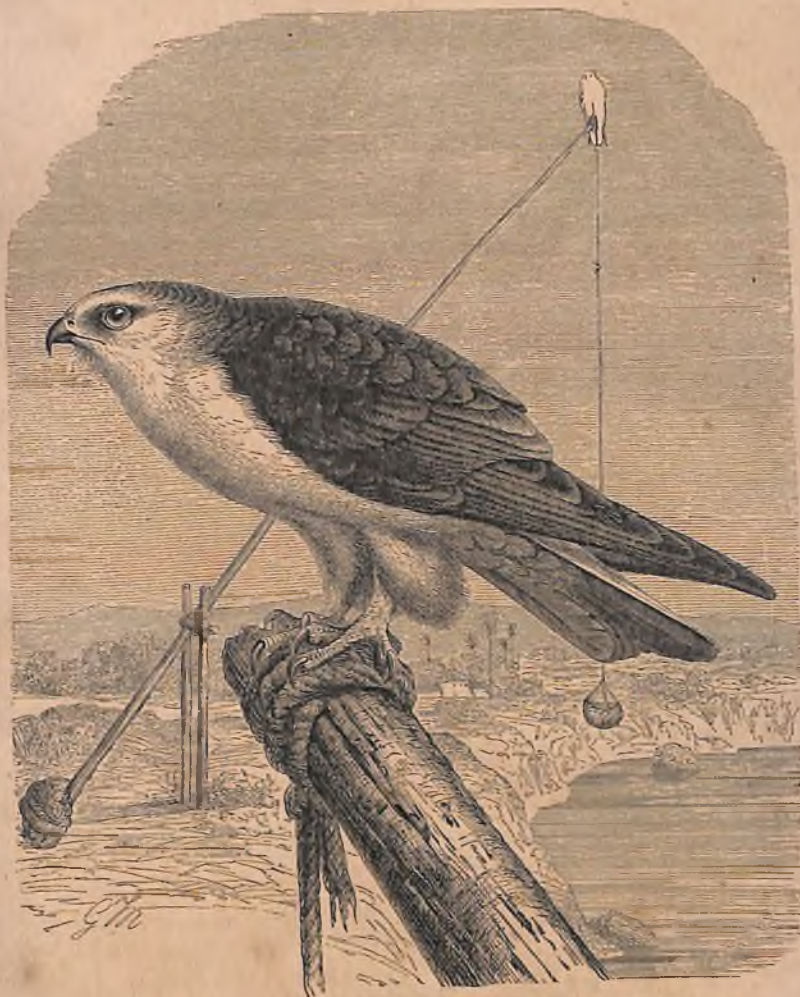
The honey-buzzard derives its name from its habit of feeding on the larvæ of bees and wasps, digging out the combs with its claws, and tearing them to pieces. It will, however, also eat adult insects of various kinds, together with worms, slugs, the eggs of birds, moles, and even grain. It may be taken in traps baited with wasp or bee-comb; and in captivity has been known to kill and eat rats, as well as comparatively large birds. The nest is said to be generally placed at a considerable height from the ground in some tall oak; and is composed of lichen-clad sticks, lined with wool and the leaves of the oak and beech. . . . Prof. Newton was informed by Mr. Newcome that in France the honey-buzzard surrounds the nest, after the young are hatched, with a barrier of leafy boughs, which are renewed from time to time as the foliage withers; but whether this was to prevent the young from falling out, or to act as a screen, was not ascertained. The eggs are not more than three in number; and usually have a buffish white ground-colour upon which are dark blotches.

**Black-Winged
Kite.**

A much smaller bird than the last is the black-winged kite (*Elanus cœruleus*), which is one of the best known representatives of a small genus widely distributed over both hemispheres. Agreeing with the honey-buzzards in their nearly even or slightly emarginate tails, the hawks of this genus differ by their more elongated bill, of which the length, in advance of the cere, is greater (instead of less) than half the length of the third toe, exclusive of the claw. They are further characterised by the extreme shortness of the bare portion on the front of the metatarsus, and also by the feathered lores, and the wings reaching to the end of the tail; these characters distinguishing them from certain allied genera which we have not space to notice. The black-winged kite is an inhabitant of South-Eastern Europe, Africa, and India; and attains a length of just over 13 inches. Above it is of a beautiful ash-grey colour, with the forehead and under-parts white, and the shoulders and lesser wing-coverts deep glossy black; the lores and a narrow streak above the eye being also sable. The iris is of a full carmine-red, and the beak black, while the cere, like the feet, is yellow. In young birds the upper surface is brownish grey, with the under-parts yellowish streaked with brown, and most of the feathers with light borders; the iris being yellow. In America this species is replaced by the white-tailed kite (*E. leucurus*), easily distinguished by the feathers of the tail (except the middle pair, which are grey) being pure white; while two other species inhabit Australia, and a fifth the Philippines, Java, Borneo, and Celebes.

Mr. Hume writes that the black-winged kites hover over grass in the fashion of a kestrel, "but in a clumsier and heavier manner. The wings point upwards, so that they are within 3 or 4 inches of each other, instead of being retained nearly horizontally as in the kestrel, and the legs and tail hang down unlike those of any other bird that I have noticed. Thus hovering, they after a time slowly descend, and when within a few feet of the ground generally drop suddenly. They are very tame, bold birds, passing unconcernedly within a few feet of a sportsman when busy hunting, over fields or grass, and sitting composedly on the bare end of a bough, whilst gun in hand one walks up to within a few paces of their perch." They are frequently to be seen sitting on the telegraph-wires alongside the Indian railways; while in Egypt they may be observed (as shown in our illustration)

perched on the summits of the long poles used for raising water from the Nile. The nests are usually placed in low trees; and the eggs have a creamy or bluish white ground, sparingly streaked and blotched with pale yellowish brown, and are usually two or three in number. One of the Australian species usually nests in large companies; the nests being placed as near together as possible, and composed of twigs, lined with the cast pellets of the fur of the rodents on which the birds



BLACK-WINGED KITE ($\frac{1}{2}$ nat. size).

have fed. The black-winged species subsists chiefly on insects, but also devours rats and mice. The American white-tailed kite does not apparently breed northwards of South California, but extends south to the Argentine. Its habits seem to be very similar to those of the other species; but whereas in North America it usually lays four or five eggs, in Argentina the number reaches eight. Messrs. Selater and Hudson write that "it is a handsome bird, with large ruby-red irides, and when seen at a distance its snow-white plumage and buoyant flight give it a striking resemblance to a gull. Its wing-power is indeed marvellous. It delights

to soar, like the martins, during a high wind, and will spend hours in this sport, rising and falling alternately; and at times, seeming to abandon itself to the fury of the gale, is blown away like thistle-down, until, suddenly recovering itself, it shoots back to its original position. Where there are tall poplar-trees, these birds amuse themselves by perching on the topmost slender twigs, balancing themselves with outspread wings, each bird on a separate tree, until the tree-tops are swept by the wind from under them, when they often remain poised almost motionless in the air until the twigs return to their feet."

True Kites.

Although the term kite is now commonly applied to many members of the present family, it should properly be restricted to the species of the genus *Milvus*, and belongs, strictly speaking, only to the common or red kite (*M. ictinus*), also known in England as the glead. In Britain the kite is one of those species which has suffered most severely from incessant persecution, having gradually diminished in numbers from the time of Shakespeare, when these birds were to be seen in numbers on the Thames in London, till the present day, when it is practically extinct in the southern and midland counties, although still lingering in the west and north. The kites belong to a group of five genera, easily distinguished from the foregoing members of the subfamily by their more or less deeply-forked tails, in which the outermost feathers are the longest. In the kites the forking of the tail is of moderate depth, and approximately equal in length to the interval between the tips of the primary and secondary quills, while the head is devoid of a crest. The wings are long, reaching nearly to the end of the tail, with the fourth or the third and fourth quills the longest, the beak slightly festooned, and the metatarsus and toes short, with claws of moderate length. There are some half-dozen species, exclusively confined to the Old World, where they range over all the continents and Australia. Kites are the scavengers of the hawk family, feeding chiefly on refuse and garbage, although also consuming insects, reptiles, and such young or feeble birds or mammals as they can capture. Spending most of their time on the wing, they soar gracefully in large, sweeping circles, and form a striking feature in the bird-life of all eastern cities. Their nests may be built either in trees, buildings, or on rocks.

The common or red kite of Europe, represented in the lower figure of our illustration, attains a length of about 24 inches, and differs from all its congeners by its rufous tail and the general rufous tinge of the entire plumage. In old males the head and throat are whitish with brown streaks, the upper-parts having the feathers dark brown in the middle with rufous edgings, tending to buff on the extreme margins, more especially in the wing-coverts. The primary quills and primary coverts are black, with some white at the base of their inner webs; the upper tail-coverts rufous, the tail-feathers reddish brown, with their inner webs barred with dark brown; and the under-parts rufous-brown with a dark median streak to each feather. The beak is horn-colour, and the cere and iris, together with the legs and feet, yellow, the claws being black. The kite is distributed over the greater part of Europe, breeding as far north as the south of Scandinavia, and becoming gradually more rare in the eastern districts. In winter it ranges to Lower Egypt, Algeria, and Palestine. The nest is built either in the fork of a tree or, more rarely, in a cleft of rock; and the three or four eggs

are laid in April or May. Nothing comes amiss to a kite when building, and, while the main framework of the nest is formed of sticks, these are supplemented by all kinds of rubbish, such as bones, fragments of leather, and rags, the latter forming the lining. When their nest is attacked, the parent birds make a vigorous resistance. As we have already had occasion to notice, the kite was a favourite quarry in hawking, showing excellent sport by the manner in which it endeavoured



BLACK KITE AND RED KITE ($\frac{1}{2}$ nat. size).

to baffle the falcon in its efforts to gain the advantage of position. More rarely the kite itself was trained to fly at the smaller kinds of birds.

The black or migratory kite (*M. migrans*), represented in the upper figure of our illustration, is a rather smaller bird than the last, from which it may be distinguished by its dark brown tail, faintly barred with a still deeper tint, the general dark brown hue of the plumage of the upper-parts, save on the head and throat, where the feathers are whitish with dark stripes. It is further characterised by the black beak, and the absence of any distinct patch

of white at the base of the primary quills. This kite is distributed over the whole of Africa and Madagascar, from whence it migrates into Southern and Western Europe, while it occasionally reaches Scandinavia, and has been taken in England. Mr. H. Saunders observes that this kite appears on the Swiss lakes and rivers about the middle of April, and leaves early in the autumn. Frequently it may be seen fishing in the Lake of Geneva, and often, while one of a pair is engaged in this occupation, its fellow will be soaring high in the air. Leith-Adams writes



EGYPTIAN OR YELLOW-BILLED KITE ($\frac{1}{4}$ nat. size).

that as the red kites were formerly wont to play the part of scavengers in London, so do the black kites at the present day in the filthy lanes of Cairo. "Assisted by its ally, the Egyptian kite (*M. aegyptius*), which may be distinguished from the other on wing by the pale colour of its bill, they hover over the refuse-heaps, slaughter-houses, and wherever carrion and offal are collected, now pouncing on their food and bearing it off in their talons, or, with that remorseless activity characteristic of the genus, pursuing pigeons, until the terrified birds, worn out by exertion, sink exhausted, and are despatched by the enemy. Nor is this all: the fisherman has to keep a good lookout when he lands his net, as one or other is

sure to be on the lookout for the small fry. They dispute the ownership of a bone with the lean pariah dog, or pick up refuse floating down the river; they hover over the farmer as he ploughs his field, and are the dread of a village from the number of chickens they pilfer. The nest is built in the top of a palm-tree, where the Nubians catch them in traps baited with pigeons."

In India and the Himalaya the black kite is replaced by the smaller pariah or govind kite (*M. govinda*), the chil of the natives, distinguished by the well-marked patch of white at the base of the primaries. There is, however, in India another and larger species (*M. melanotis*), measuring upwards of $25\frac{1}{2}$ inches in length, against 20 in the smaller species, and also distinguished by some differences in coloration, this larger species ranging eastwards to China, Japan, and Formosa. The pariah kite ranges to elevations of about eight thousand feet in the Himalaya, and abounds in every Indian city and village, where it performs the same useful offices as does the black species in Egypt. These kites frequently display the most astonishing familiarity and impudence; and the writer, when in camp, has seen a portion of his dinner snatched from a plate carried by a servant by one of these marauders. So numerous are they, that in Calcutta from two hundred to three hundred may be seen together at a time; and when the white ants are swarming, the air is sometimes almost darkened by the hosts of kites, buzzards, and crows, which collect to prey upon the flying insects. Their Indian name chil is given to them after their cry, which is a kind of long, tremulous squeal. Jerdon describes the flight of the Indian kite as bold, easy, and graceful, when the bird is once mounted aloft, although some heaviness is displayed in taking wing. In the air the bird "soars slowly about, in greater or less numbers, in large circles. When in pursuit of another kite, it is capable of considerable speed, and shows great dexterity in suddenly avoiding any obstacle and changing its course; in this its long tail is a great help. Occasionally one may be seen dropping down almost perpendicularly from the top of a house on a piece of offal in a narrow street, but in general it reaches the ground from a height by a series of oblique plunges." In the plains the breeding-time lasts from January to April, although most individuals lay in February. The nest, which is very similar to that of the European species, is nearly always placed in a tree, and mostly in a fork. The usual number of eggs is two, although there may be three, and rarely four.

Swallow-Tailed Kite. Distinguished from all its relatives, with the exception of an allied species, by its deeply-forked tail and extremely long wings, the swallow-tailed kite of America (*Elanoides furcatus*), with its striking piebald plumage, cannot be mistaken for any other member of the family. This bird, which is depicted on the right side of the illustration on p. 193, may be compared in size to the pariah kite, its total length being 21 inches. As regards coloration, the entire head and neck, together with the hinder part of the back and rump and the whole of the under surface are pure white; while nearly all the rest of the upper plumage is black with greyish or purplish reflections in different regions. The beak is dark steely blue, the iris dark reddish brown, and the foot bluish white. The range of this handsome and dashing bird extends from the southern states of North America to Colombia and Brazil, a few individuals being occasionally

blown across the Atlantic to the western shores of Europe. Of its habits, Dr. W. L. Ralph writes to Captain Bendire as follows: "Excepting perhaps the turkey-vulture, I think this bird is the most graceful of any while on the wing. It has the same easy, floating motion, but at times it flies very rapidly and turns very quickly, which is something I have never seen the former bird do. Their motions are very swallow-like, and that, with their forked tails, makes them look like gigantic swallows; and, like the chimney-swifts, they have a habit of travelling together in small companies, usually consisting of three individuals, especially when they first return from the south. During the breeding-season flocks consisting of from two or three to ten or twelve birds, but oftener of three, may be seen following one another around, frequently uttering their calls, and circling in and out among the tree-tops so fast as to make one dizzy to look at them. Except during this season, one seldom sees one of these birds unless it is flying, and I have often wondered if they did not at times sleep while on the wing. At least I know that they usually, if not always, eat while flying; for I have many times seen one sailing leisurely along, occasionally bending its head to tear a piece from a small snake that it held in its talons, and I have never seen one alight to eat its food, as other birds of prey do. When hunting, they fly quite close to the ground, like marsh-harriers, but at other times they sail above the tree-tops, and sometimes so far above that it takes a good eye to see them. Their food consists almost entirely of reptiles; small snakes seem to be a favourite article of food with them. I have never seen one catch a bird, and believe they do not. This habit of eating snakes has given them the name of snake-hawk among the natives of Florida." These birds begin to arrive from the south in the latter state about the middle of March, but do not become common till two or three weeks later. There they nest in April, usually building in tall pines, frequently at a height of ninety, and sometimes as much as a hundred and thirty feet from the ground. The nest is a very irregular structure of mossy twigs, and usually contains two eggs, spotted and blotched with rich brown and ferruginous. The African swallow-tailed kite (*Nauclerus riocouri*) is about two-thirds the size of the above, with relatively shorter wings. It is greyish above and white beneath, and is confined to the western and north-eastern parts of the continent.

Vulturine Sea-Eagle. The vulturine sea-eagle (*Gypohierax angolensis*) brings us to a group of four genera which, while agreeing with the preceding in the shortness of the bare portion of the metatarsus, differ in the absence of a flap of membrane to the nostrils, which have a clean, bony margin. In three of them the aperture of the nostril is oval, with its longer axis placed more or less nearly at right angles to that of the beak, but in *Haliastur* the aperture is circular. In all, the tails are rounded or slightly emarginate. It may be well to mention that *Haliastur* is represented by the common brahmny or maroon-backed kite (*H. indus*), easily recognised by its white head, neck, throat, and breast, and the maroon-chestnut of the rest of the plumage.

The vulturine sea-eagle, which is the sole representative of its genus, differs from the other forms with oval nostrils by the naked space above the eye, and is conspicuous for its parti-coloured plumage. It has a peculiarly vulture-like appearance, and may be compared in size to a kite, the total length of the male

being 23 inches, while the female is $1\frac{1}{2}$ inches longer. The beak and head are elongated and the wings very long and pointed, while the short tail is very markedly rounded. In the adult bird the colour of the plumage, with the exception of the ends of the primary quills, the secondaries, most of the scapulars, and the tail-feathers (save their tips), which are black, is pure white. The cere is grey, the bare skin of the face flesh-coloured, the iris light yellow, and the foot rosy flesh-coloured. The feathers of the hinder part of the head are somewhat



VULTURINE SEA-EAGLE ($\frac{1}{2}$ nat. size).

elongated, so as to form a slight crest. In the young the whole plumage is dark brown, and the iris also brown; the complete change to the adult dress not taking place till the third or fourth year. This bird is exclusively African, and is met with on the west coast from Senegambia to Angola, and on the opposite side of the continent on Pemba Island, near Zanzibar. Although so like a vulture in general appearance, in its habits it much more resembles the sea-eagles. According to Reichenow, the vulturine sea-eagle is one of the commonest birds on the west coast. Essentially a fish-eater, it frequents the sea-coast and rivers, and is but rarely seen

in the dry highlands of the interior. Its favourite haunts are the wide mangrove-swamps bordering the larger rivers, where it may always be met with in numbers, sometimes associating in pairs, and at other times singly. When seated, it may be easily mistaken for a vulture, but its flight, although slower, is more like that of a sea-eagle. When fishing, it generally flies close to the surface of the water, returning as soon as it has captured a fish to the shore to devour its prey. In the breeding-season these birds proceed higher up the rivers, where the trees are taller, and thus afford better nesting-places than the low mangroves. The number of eggs in a nest is usually only two.

The noble birds known as sea-eagles, which include the largest member of the whole family, differ from the preceding genus by the absence of a naked space above the eye, and are further characterised by the lanceolate feathers of the crown of the head, and by the wings reaching nearly or quite to the end of the tail. The beak is long and powerful, straight for some distance from the base, and then curving regularly downwards in a deep hook. In the leg the metatarsus is feathered for nearly half its length, and the naked portion reticulated down to the toes, while the latter are scutellated above. The strong, curved claws are grooved beneath, that of the first toe being the largest of all. There are some eight species of sea-eagles distributed over the whole world, with the exception of South America; and, as the habits of all are generally similar, it will be convenient to notice the species together, and then to consider their mode of life. It may be mentioned that they are often confounded with the true eagles, from which they may be distinguished at a glance by the naked lower half of the metatarsus and the scutellation of its front surface. The sea-eagles may be divided into three groups, according to whether the tail in the adult is entirely white, black with a white band at the end, or white with terminal band of black. In the former group the white-tailed or grey sea-eagle (*Haliaeetus albicilla*) is noteworthy as being the only species met with in the British Isles. In addition to the character from which it takes its name, it is distinguished by the brown abdomen, the brownish wing-coverts, and the ashy brown hue of the head and neck, which are lighter than the back. The female attains a length of 38 inches, the male being about $4\frac{1}{2}$ inches less. This species ranges across Europe and Northern Asia from Ireland to Japan, and also occurs in Southern Greenland, while it extends southward to North-Western India. Its distribution includes the whole of Europe, but it has now become extremely rare in the British Islands, although still breeding in the Hebrides. The largest of all eagles are the giant or Steller's sea-eagle (*H. pelagicus*), and the allied Corean sea-eagle (*H. branicki*), the former attaining a length of 41 inches. Steller's sea-eagle, which is confined to the north-eastern regions of the Old World, inhabiting North-Eastern Siberia, North China, Japan, and Kamschatka, is distinguished by its pure white wing-coverts, thighs, and upper and lower tail-coverts, and is further characterised by its highly wedge-shaped tail, which has fourteen feathers in place of the usual twelve. In young birds the wing-coverts and thighs are, however, brownish, although in this state the species can be distinguished from the white-tailed sea-eagle by the head and neck being of the same dark hue as the back. The Corean species is a uniform slaty black colour, without the white shoulder-patches, thighs,



WHITE-TAILED SEA-EAGLES.

and tail-coverts. In correspondence with their giant size, the cry of both these species is much louder and more penetrating than that of all the other eagles. It is remarkable that a leg-bone, apparently referable to Steller's sea-eagle, has been obtained from the superficial deposits of Walthamstow in Essex. The white-headed sea-eagle, or bald eagle (*H. leucocephalus*), the national emblem of the United States, differs from the white-tailed species, by having the whole of the head and



WHITE-HEADED SEA-EAGLE ($\frac{1}{8}$ nat. size).

neck pure white; the rest of the plumage of the upper-parts being dark brown, approaching black, while beneath the colour is a lighter brown. The length of the female is 38 inches. This bird ranges over the whole of North America, extending southwards to Florida, California, and Mexico. The species known as Pallas's sea-eagle (*H. leucophaus*) differs from all the preceding by having the tail of the adult white with a broad band of black at the end; the remainder of the plumage, except the sides of the face, which are buffish white, being various shades of brown. This species is smaller than the foregoing, measuring only 30

inches in length. Typically an inhabitant of the Caspian region, it ranges eastwards to India and Burma. The white-bellied sea-eagle (*H. leucogaster*) is still smaller than the last, its length not exceeding 28 inches. It differs from all the others by the tail being black with a broad terminal band of white; and is further characterised by the white head, neck, and under-parts; the general tint of the upper surface being grey slightly shaded with brown. This eagle extends from India and Ceylon through the Malayan region to Australia. The handsomest of the whole group is the African sea-eagle (*H. vocifer*), which is smaller than all the northern species, attaining a length of only 25 inches in the female. Resembling the white-headed sea-eagle, in its white head, neck, and tail, this species, which is figured on p. 210, is distinguished by the white area extending on to the interscapular region above and including the breast below, and by the whole of the abdomen, together with the axillaries, being of a deep chestnut hue, while the upper-parts are blackish brown, passing into black on the primary quills. The species is confined to Africa, where it ranges over the whole continent. It is replaced in Madagascar by the Madagascar sea-eagle (*H. vociferoides*), distinguished by the white being confined to the head and neck, the brown under-parts, and the chestnut under wing-coverts; the latter character distinguishing it from the larger white-headed sea-eagle, in which these coverts are brown. An extinct sea-eagle occurs in the Miocene deposits of France.

Although several of the species are more commonly found in the neighbourhood of the coasts, sea-eagles are also met with in the interior of the various continents and islands in the neighbourhood of the larger rivers and lakes. Writing of the white-tailed sea-eagle, Mr. Seebohm observes that "the haunts of this noble-looking bird are the barren hills of the Hebrides and the adjacent isles, and the wild mountain country of the mainland in the west. On the bold and rocky headlands of this wild, rugged coast, whose hoary peaks are washed by the treacherous waters of the Minch, the sea-eagle finds a congenial home. In Pomerania, especially between Stettin and the Baltic, the sea-eagle is a common resident, building in forests. It builds an enormous nest, sometimes six or eight feet in diameter, near the top of a pine, or on the horizontal branch of an oak or beech, preferring forests near inland seas and large lakes. Instances have been known of its breeding in the same 'horst' for twenty years in succession. Every year some addition is made to the nest, until it becomes some five or six feet high. Occasionally a pair of sea-eagles have two 'horsts,' which are used alternately. They are shy birds and leave the nest at the least alarm, but do not easily forsake their old home. If the eggs are taken early in the season, the birds will frequently lay again in the same nest. They make a very flat nest, and generally line it on the top with moss. The male and female are said to sit alternately, and the female is said to be shyer than the male at the nest. Two is the usual number of eggs, but frequently only one is found; in rare cases as many as three are laid. Eggs may be taken from the first week in March to the middle of April." The nest may be situated either on rocks, in trees, or on the ground. In some countries the cliffs on which it is built are of comparatively easy access; but at the present day, in the Hebrides and formerly on the west coast of Ireland, these birds build on ledges of the most stupendous cliffs, where their eyries can only be approached

by the aid of a rope lowered from above. Many anecdotes record the boldness of the Irish peasants in thus attacking the strongholds of both golden and sea-eagles. The food of the white-tailed sea-eagle, like that of its allies, consists chiefly of fish and water-fowl; although these birds will at times not disdain a meal of carrion, while they probably carry off an occasional lamb or kid. It is related that an instance has occurred of a sea-eagle, when attempting to carry off a large salmon, into which it had firmly fixed its talons, being partially dragged under water by its prey; both bird and fish being ultimately secured by a peasant who had witnessed the scene. In India, Pallas's sea-eagle, according to Mr. Hume, always builds in trees, its nest being very similar to that of the last species, and the eggs laid from November to January. The nest may be occupied for several years, but the construction of a new one demands immense labour on the part of the birds. "I once," writes Mr. Hume, "watched a young pair constantly occupied for a full month, building a new nest, which they were still at work finishing off when I left. Nothing can seem rougher or more rugged than their nest when finished, and yet out of every four sticks and branches that they brought, they rejected and threw down at least three. Both birds brought materials, and side by side the pair would work away, throwing down almost as many sticks as they brought; then apparently they would quarrel over the matter; there would be a great squealing, and one would fly away and sit sulky on some cliff-point near at hand; after a time the one left on the nest would go off in quest of materials. Immediately the other would drop softly on to the nest and be very busy till the absent bird returned, not unfrequently with a fish instead of a stick. It is a curious fact, that if the female, which is much the larger, brought the fish to the nest, the male set to work on it at once, without so much as 'by your leave'; while if the male brought it, the female used to eye it, sidle gradually up, and only take slow and modest mouthfuls. When, however, the female begins to sit, the male will bring her fish or fowl, and go off for other food for himself, not attempting to share it with her; and, when not on the nest, neither seems to presume with the other's capture without permission." The eggs, like those of the other species, are uniformly coloured, being in this case of a pale greyish white; their usual number is three. Like the white-tailed sea-eagle, this species will often lay again when its nest is robbed; but, according to Captain Bendire, this is never the case with the American white-headed species. All are agreed that so long as there are merely eggs in the nest Pallas's sea-eagle never makes any attempt at defending its home; and, according to the extensive experience of Mr. Hume, the same is the case after the young are hatched. Hutton relates, however, that a native whom he had sent up a tree to deposit a nest, was once fiercely attacked, at first by the female, and then by both birds in concert; and that it was necessary to disable the eagles by shooting, in order to prevent the man being hurled from the tree.

Continuing his account of its habits, Mr. Hume states that Pallas's sea-eagle is never found far away from rivers, lakes, or swamps. "Early in the morning, even in the cold weather, it goes down to the water-side, and has a good bathe. It is amusing to watch this large bird standing up to its belly in water, sitting down, first on one side, then on the other, so as to wash the wings and back, ducking the head in and out, and splashing, spluttering, and fluttering the wings for all the

world like a pigeon or sparrow. After its bath, it resorts to the top of some tree, or, along the banks of large rivers, to some craggy point, where it sits for a while sunning itself, generally with its wings half outspread. Thence it flies off heavily to seek a meal. A large fish near the surface attracts its attention, as it flies pretty low over the river, down it swoops with more activity and rapidity than its habitual demeanour and method of flight would lead one to expect, and strikes for a break-



AFRICAN SEA-EAGLE ($\frac{1}{2}$ nat. size).

fast, dashing its huge feet and long legs into the water right up to the body." This action shows how adapted is the conformation of the bird to its mode of life, as heavily feathered legs like those of the true eagles would become heavy and bedraggled with water. The food of those birds is, however, by no means confined to fish; and they may frequently be seen on the larger Indian rivers hawking for ducks, teal, and paddy-birds, while Mr. Hume states that they will pursue and carry off such a large animal as a wounded wild goose, of which the weight may be as much as seven pounds. Hutton, too, writes that he has often

watched one of these birds sitting on some dead tree on the river bank itself, suddenly utter its shrill, clamorous, half croak-like, half scream-like cry, spread out its wings, and sweep across the water in search of winged game on the plains. Rising at first in wide circles, until nearly lost to view, it would gradually descend in similar gyrations, until with a sudden swoop it would dart upon some unfortunate partridge or hare, and bear it off in its talons.

The American white-headed sea-eagle ranges from the frozen regions of Alaska and the Aleutian Islands to the torrid plains of Mexico, although it is only a summer visitant to the more northern portions of its habitat. The nests appear to be similar to those of the European species, and but rarely contain more than a single pair of eggs. Usually situated in tall pines, at a height varying from twenty to one hundred feet above the ground, they may occasionally be found on the ground itself. Captain Bendire states that this bird subsists more on winged game captured by its own exertions than on fish; and that the accusation of its gaining its subsistence mainly by robbing the osprey is unfounded. Still however, like others of its genus, there is no doubt that it does at times obtain a meal in this comparatively easy manner; and in some cases it has to depend entirely on fish for its food-supply. A correspondent writes to the author just referred to, that on one occasion he noticed one of these sea-eagles hovering over the sea in a manner very similar to that of the osprey when about to strike a fish. "Suddenly he plunged down and grappled with what I supposed to be a large fish, but was unable to rise with it from the water, and after struggling a while he lay with wings extended and apparently exhausted. After resting a minute or two, he again raised himself out of the water, and I saw he had some large black object in the grasp of one of his talons, which he succeeded in towing along the top of the water toward the shore, a short distance, and then letting go his hold. He was then joined by two other eagles, and by taking turns they soon succeeded in getting it to the shore." The booty was a large cormorant, upon which the eagles were about to feast. It is a remarkable fact, that of the two eggs usually laid by this species, one is always superior in size to the other; the difference between the two in this respect being sometimes very great. Steller's sea-eagle subsists on young seals, Arctic hares, and foxes, and ptarmigan, but it will also eat dead fish and the carcasses of mammals.

An inhabitant of the whole of Africa lying to the south of the Sahara Desert, the handsomely coloured bird known as the bateleur eagle (*Helotarsus ecaudatus*) differs from the sea-eagles, and indeed from all other members of the family, by the extreme shortness of its tail, that appendage being far inferior in length to the wings. A further point of distinction is to be found in the feathers of the head, which are elongated so as to form a voluminous crest. As regards coloration, this bird is perhaps the most striking of all the eagles, presenting bold contrasts of maroon, black, and grey, which give to the entire plumage a most pleasing effect. The head, neck, and under-parts are of a deep glossy black, the same hue also obtaining on the scapulars; contrasted with which is the chestnut-maroon of the hinder part of the neck and the greater part of the back. The wing-coverts are brown with a bronzy sheen; the primary quills blackish, externally shaded with grey; while the secondaries are mostly grey with white tips, although the innermost have the sooty hue of the scapulars. The tail,

with its inferior coverts, is chestnut-maroon, like the back; the under surface of the wings being mainly grey and white. The cere and naked skin in front of the eyes, together with the feet, are of a deep coral-red, while the iris is brown, and the beak black. Such are the striking colours of the ordinary form of the bateleur eagle, although individuals have been obtained in which the chestnut-maroon of the back is replaced by creamy fulvous. Such birds have been regarded as representing a distinct species, but it is suggested by Dr. Sharpe that they may



BATELEUR EAGLE ($\frac{1}{2}$ nat. size).

prove to be the fully adult condition of the ordinary form. The females attain a length of 25, and the males of about 21 inches. Visitors to the eagle-house in the Zoological Society's Gardens in Regent's Park may perhaps think that we have exaggerated the colour of the cere and face in the bateleur eagle, as they will find these in the captive birds of a pale orange-yellow tint. This fading is, however, solely due to the effects of captivity; the same change showing itself in captive specimens of the Accipitrines known as caracaras. The bateleur eagle is a common bird in many parts of Africa, preferring mountains to plains, and generally

frequenting open districts rather than forests. In Abyssinia, where it is by no means abundant, it has been obtained from considerable elevations in the mountains. Mr. Blanford describes them "as soaring at a great height, their pointed wings and extremely short tail rendering them no less conspicuous than the contrast between the white under side of the wings and the black body. The flight is superb, more like that of a vulture than of an eagle, as the bird sweeps along with motionless wings, occasionally high up in the air, but more frequently at about one hundred and fifty to two hundred feet above the ground." Awakening with the first streaks of dawn, it leaves the trees on which it has roosted during the night in search of food, and after hunting for some hours seeks a resting-place in which to pass the hottest portion of the day, issuing forth again to hunt in the evening. Levaillant states that these eagles prey upon young antelopes, lambs, and sick sheep, and that they will also eat carrion; while Heuglin mentions them as feeding largely upon the smaller mammals. Their chief food consists, however, of various snakes and lizards, of which they are said to consume a larger amount than the secretary vulture. Snakes of all size, whether venomous or harmless, are attacked by the bateleur, and speedily disabled by rapid blows from its powerful beak. At such times as the grass-jungles are on fire, the bateleur, like the other serpent-eating birds of Central Africa, beats along the line of flame in order to seize the snakes and other reptiles, as they creep out, sometimes dashing into the very thick of the smoke to secure its prey. The nest of these birds is usually built in a tall tree, and frequently in those whose boughs are thickly beset with thorns. It contains from two to four white eggs. The breeding-season takes place at the commencement of the hot weather, when the snakes are more easily captured than when the grass is long and rank.

Harrier-Eagles. The remaining members of the Aquiline subfamily in which the metatarsus is partially bare have the naked portion longer than in the preceding group, and either equal in length to, or longer than the third toe, exclusive of the claw. Of the several genera thus characterised, the buzzard-eagles (*Batastur*), which range from India, China, and Japan through the Malayan region to New Guinea, and also occur in North-Eastern Africa, differ from the rest in having the oval nostrils provided with a membrane above; the others having a clean bony margin to these organs. Omitting mention of three unimportant genera, severally represented by a single species, we find the harrier-eagles characterised by the nostrils taking the form of transverse ovals, by the feathers of the small crest being of a lance-like shape, and by the elongation of the wing. The long tail is nearly even, the metatarsus long and reticulate, and the short beak somewhat compressed and deeply hooked at the extremity, while the toes are very short. Most of the few species of this genus are confined to Africa, but the common harrier-eagle (*Circæetus gallicus*) has a much wider distribution, ranging from the countries bordering the Mediterranean to India, and the small islands of Timor and Flores, and being sometimes found in Central Europe. They are usually met with in open plains, living much on the wing, and feeding chiefly on snakes and other reptiles; and in appearance and habits resembling the buzzards, with which they are connected by the above-mentioned buzzard-eagles. The common harrier-eagle, represented in the illustration on next page, is one of the smaller members of the group, the females

measuring 26 inches, against 32 in the largest African species. It is thus rather larger than a kite. The general colour of the adult bird is dark brown, with a purplish gloss above, and the head tending to ashy brown, the quills being dusky black. The tail is pale ashy brown, with a white tip, and three dusky transverse bars. Beneath, the colour is white, the throat narrowly streaked with brown, and with a black shaft-stripe to each feather; while the flanks are banded with



COMMON HARRIER-EAGLE ($\frac{1}{4}$ nat. size).

widely separated dark bars. The iris is orange-yellow, the cere whitish, the bill horn-coloured at the tip and grey at the base, and the feet pale greyish brown. Jerdon writes that in India this harrier-eagle is spread over all the more open parts of the country, generally avoiding thick jungle and forest. "It may often be seen sitting on a low tree, whence it occasionally darts on its quarry; but it generally circles in the air, taking a long and lofty flight, now and then flying heavily along the ground like a harrier. I have frequently seen it hover in the air like a kestrel, and drop down on its prey, like a stone, afterwards. It is a rather

noisy bird, frequently uttering a wild plaintive scream. I have seen several together occasionally, but it is usually solitary. Its chief food is snakes and lizards, but it will eat anything,—rats, weakly birds, crabs, frogs, centipedes, and large insects. I have seen one strike at a wounded hare, and it will occasionally carry off a wounded teal or duck." According to Mr. Hume, by whom this species is termed the short-toed eagle, it nests in Upper India from January to March, nearly always building in trees, and laying one or two eggs of a pale bluish white colour. The nest, which is formed of sticks, and from two to three feet in diameter by from six inches to a foot in depth, may be almost entirely devoid of lining, or so thickly coated with grass or straw that the eggs look as though packed in a basket for travelling. This eagle is comparatively rarely met with in the South of France, where it is known as *Jean-le-Blanc*; but is more common in Palestine, where its nesting-habits have been described by Canon Tristram. Nests have been taken in France in the middle of May.

Although the term serpent-eagle is not unfrequently applied to the members of the preceding genus, as a matter of convenience it is far preferable to restrict it to the nearly allied species coming under the generic title of *Spilornis*. These birds are distinguished from the harrier-eagles by the feathers of the crest being of greater length, and rounded, instead of lanceolate, at the tip; and also by the shorter wing. The genus is mainly characteristic of India and the Malayan region, although also represented in the Philippines, the south of China, and Formosa. In habits these birds are more arboreal, and far less constantly on the wing than the harrier-eagles, darting on the snakes and other reptiles, which form their food, from the boughs of trees. The serpent-eagles derive their scientific name from the white or pale spots which ornament the dark-coloured plumage of all the species save one, and the name of spotted eagles would have been exceeding appropriate had it not been already employed in another sense. The Indian serpent-eagle (*S. chila*) is by far the largest member of the genus, the female measuring 30 inches in length; and is a decidedly handsome bird. The head is black, with conspicuous white bases to the long feathers of the crest; above and below the general colour is brown, with small spots on the scapulars and wing-coverts, and larger ones on the hinder part of the lower surface, the chest being uniform. The quills have some dusky markings; and the tail is mottled with white, and crossed with three bars of darker brown. Two other species share in this general type of coloration; but in another pair the chest is rufous, one of them (*S. sulaensis*) having the abdomen banded instead of spotted with white; while in the sixth (*S. holospilus*), from the Philippines, the entire body is spotted. The Indian serpent-eagle ranges from India to China and Formosa; and in the former country is most common in jungly districts, although also found in wooded places. In addition to reptiles, it eats large insects and frogs, catching the latter in tanks. It nests in trees, laying two white eggs marked with a few dark specks.

**African Crested
Eagle.**

The handsome bird represented in the illustration on the following page, and known as the African crested eagle (*Lophoaëtus occipitalis*), is the sole representative of a genus which brings us to the last group of the *Aquilinæ*; the members of that group differing from all the preceding forms by the metatarsi being completely feathered throughout their length. The African

crested eagle belongs to a group of several genera characterised by the tail being nearly square, or slightly rounded; while it is distinguished from all the others, with the exception of the true crested eagles, by the length of the interval between the tips of the primaries and secondaries of the wings being inferior to that of the metatarsus. The great size and pendent character of the crest of the present



AFRICAN CRESTED EAGLE ($\frac{1}{3}$ nat. size).

bird at once serves to mark its distinctness from the members of the next genus. The nostrils are circular, the beak short, and the metatarsi of considerable length, with short feathers. In point of size the African crested eagle is somewhat inferior to the red kite, the total length of the female being 21 inches. The general colour of the plumage is chocolate-brown, with some of the feathers on the back and wing-coverts paler and the head darker, with a black crest. The forehead and legs are whitish, and there are a few white spots on the upper tail-coverts, while

the under wing-coverts are also mostly white. The tail has dark bars. The bill is bluish, with a black tip; the cere and feet are yellow, and the claws black. This eagle is one of the most widely distributed of African Accipitrines, ranging all over that continent, from the Cape to the Red Sea, wherever there are wooded districts. It frequents mountains and plains alike; and is even represented in such of the open regions as have patches of mimosa-jungle, more especially on the river-banks. In the wooded parts of the upper Nile it is especially common; where it may be seen sitting placidly among the branches of a mimosa, not far removed from the main stem. From this coign of vantage it watches for its prey, swooping down like lightning upon any mouse, rat, ground-squirrel, or dove, or other small bird that may come within its range. In its general habits it is very similar to the crested eagles, and, for its size, is one of the most powerful and active of the Accipitrines. In addition to small mammals and birds, it consumes numbers of lizards and snakes, and also eats fish and frogs; while, when hard pressed, it will resort to carrion. It has been seen perched on a branch in the neighbourhood of a slaughter-house, watching its opportunity to feast on the offal or to seize a bone. Little is known of its breeding-habits, although it is said to nest in trees, and lay two nearly round eggs, of a pale ground-colour blotched with reddish brown.

Crested Eagles. There is a difference of opinion among ornithologists as to the best English name to be applied to the members of the present genus, some terming them hawk-eagles, while by others they are designated crested eagles. In the British Museum the latter designation is adopted, and the term hawk-eagles applied to the members of the genus *Nisaetus*; and it is this ruling which is followed here. These eagles are readily distinguished by the crest (occasionally absent) being very much smaller than in the African crested eagle, and by their shorter wings. The beak is short, sharply curved at the tip, and with a prominent festoon; the toes are large, and very unequal; and the claws strong and much curved. The genus is represented by a considerable number of species, and has a very wide geographical distribution. It is spread all over Africa, the Indian and Malayan regions, Celebes, Japan, and Formosa; and it is found in Central and South America, exclusive of the extreme south.

The species shown on next page (*Spizaetus bellicosus*) is from South Africa, and is one of the largest members of the genus, the total length of the female being 31 inches. It belongs to a group in which the chest is uniformly coloured, and is distinguished from some of its allies by the barred tail. In the immature bird, of which our figure is an example, the general colour of the upper-parts is pale brown, with white margins to the feathers of the back; the feathers of the head and neck are white, with a terminal spot of brown; the greater and primary wing-coverts and quills are ashy brown, tipped with white, and barred with darker brown; and the tail-feathers are likewise ashy brown, with buffish white tips, and crossed with eleven dark brown bars. With the exception of a few dark brown spots on the chest and under wing-coverts, the whole of the under-parts are uniform buffish white. In the adult the general colour becomes dark brown above, the head being dark brown, with narrow pale margins to the feathers; the tail has but six bars; and the front of the neck and chest are dark brown, the remainder of the under

surface being white, with some dark spots. All the Oriental species are smaller, some having the inferior portion of the under surface marked with dark barrings.

The following account of the habits of the marsh crested eagle (*S. limnaetus*), which ranges from India to Java, is given by Capt. Feilden, who writes from Pegu. He observes that this eagle "seems to be a very common bird about Thyetmyo; every ravine in the spurs of the Arracan Mountains seems to contain one or more



WARLIKE CRESTED EAGLE ($\frac{1}{3}$ nat. size).

pairs, as well as every wooded stream in the lower ground. Their wild screaming (whistle) is almost always to be heard long before the bird is seen, as it sits in some large tree rising above the rest of the jungle, or wheels in circles far overhead; it is one of the wildest and wariest of birds. One that I took from the nest nearly two years ago is still as wild as ever, and constantly ruffles up the feathers of its head till they look almost like the crest of a bloodsucker, leaving the top of the head almost bare. It has also a habit of throwing back the head, apparently looking for a hole in the top of its cage, and bending backwards till it frequently

falls over. These birds, as far as I know, feed on mynas, rats, and frogs. I have taken a young bird from the nest in the middle of May, and seen several young birds about the end of that month. They build the usual hawk-eagle's nest in the fork of the largest and most inaccessible tree that they can find, invariably overhanging the bed of a stream. Either numbers of these birds build and do not lay, or else they desert their nests on the slightest suspicion of having been discovered. Several pairs of birds belonging to nests in more remote parts of the jungle seemed all to have succeeded in rearing one young each. The Burmese state that the birds lay only one egg, which is pure white. While the trees are in full leaf, these eagles shelter themselves in the middle of some thick tree during the heat of the day." A later observer in the same district, Mr. W. Davison, in commenting on this account, states that he found the crested eagles perfectly silent, and accordingly believes that the peculiar cry is uttered only during the breeding-season.

Another Indian species, the changeable crested eagle (*S. caligatus*), is known in Garhwal as the peacock-killer, and is said to destroy a large number of game-birds. Mr. R. Thompson writes that he once saw one of these eagles "stoop at a peacock which was on the ground, and strike at his head. The peacock dodged, rose, and flew into a patch of tall grass, where he lay concealed. The eagle took himself to a tree close by, whence he quietly watched the movements of the other. After a while, the peacock began to move from his place of concealment; the moment he was well out of the grass, the eagle darted down and caught him by the neck. When I got up to the place, having been a witness to the whole proceeding, the eagle left his quarry, and flew up into a tree; the peacock was quite dead. I have often put up black partridge for these birds, and have had much sport watching them flying after the game. These birds are first-rate at jungle fowl in the wild state. I have caught several and tried to tame them; but all my falconers either refused to keep them, or destroyed them shortly after they were put in their possession. A small chicken, or in its place a grown-up hen or cock, is a capital bait for catching this bird. The net used is a vertical one, about eight feet square, with large and stout meshes. The eagle dashes into this like fury, and is always caught."

Omitting mention of a few comparatively unimportant genera, we
Hawk-Eagles. come to the consideration of those species to which, as we have seen above, it is convenient to restrict the name of hawk-eagles. Together with the true eagles, the hawk-eagles may be distinguished from the foregoing genera with feathered metatarsi by the interval between the tips of the primary and secondary quills being less than the length of the metatarsus; and they are further characterised by the absence of a crest. The hawk-eagles have the metatarsus of considerable length, but of no great thickness; and their wings are as a rule proportionately shorter than in the true eagles; while there are generally more large scales on the upper surface of the toes than in the latter. The most sure way of distinguishing between the two genera, according to Dr. Sharpe, is by comparing the length of the fourth toe, measured from the commencement of the metatarsal feathers, and exclusive of the claw, with the circumference of the beak in front of the cere; when it will be found that whereas in the hawk-eagles the two diameters are equal, in the true eagles the former is less than the latter. The range of the

hawk-eagles includes Africa, the north coast of the Mediterranean, India, Ceylon, and Australia. Among the small number of species constituting this genus, the best known is Bonelli's hawk-eagle (*Nisaetus fasciatus*), which is at the same time one of the largest, the female measuring 26 inches in length, and thus being somewhat more than two-thirds the size of the golden eagle. In general colour the adult bird (shown in the lower figure of our illustration) is dark brown



BONELLI'S HAWK-EAGLE ($\frac{1}{2}$ nat. size).

above, with some white about the head and in the region of the neck; the quills are deep brown, with white mottlings on their inner webs; and the tail is ashy brown, with a broad terminal band of dark brown, and several incomplete bars of the same tint higher up. The axillaries are white, streaked with black; and the under-parts are white, with dark shaft-stripes of variable breadth to the feathers, passing on the flanks into arrow-head-like markings. The beak is black, with a lighter base; the iris yellow, the cere dull yellow, and the foot whitish yellow. In the young bird, as shown in the upper figure of our engraving, the general

colour of the upper-parts is brown, and that of the head, neck, and under-parts fawn, with distinct black shaft-stripes to all the feathers. The range of this fine eagle includes the regions lying on both sides of the Mediterranean, from whence it extends eastwards through Palestine and Syria to Arabia. In India, where it is termed "mohrangi" (*i.e.* peacock-killer), it is generally only seen in hilly or jungly districts, although it occasionally resorts to neighbouring cultivated ground. It is common in the Nilgiri Hills of Madras, where its nests are often placed on such precipitous cliffs as to be accessible only with the aid of a rope. Passing much of its time on the wing, and invariably visiting certain spots within its beat at almost the same hour day by day, this eagle may be seen when in repose perched either on the summit of some tall tree, or on some rocky prominence. Its prey consists of various game-birds, ducks, herons, and other water-fowl, as well as hares and other small mammals; and it is said at times to carry off trained falcons that are employed in hawking. It also occasionally kills peafowl, and is a great marauder in poultry-yards and dove-cots. Jerdon says, in reference to its pigeon-killing habits: "On the pigeons taking flight, one of the eagles pounced down from a vast height on the flock, but directing its swoop rather under the pigeons than directly at them. Its mate, watching the moment when, alarmed by the first swoop, the pigeons rose in confusion, pounced unerringly on one of them, and carried it off; and the other eagle, having risen again, also made another, and, this time, a fatal swoop." Nesting in the Nilgiris and Himalaya on rocky cliffs, in the plains of India Bonelli's eagle more generally selects the tall clay banks of the larger rivers on which to build, although instances are known of the nest being placed in trees. In the plains of India the breeding-season is in December and January, but is delayed in the Himalaya till April and May. The nest is four to six feet in diameter, and varies in height from a few inches to a couple of feet; its summit being always finished off level, with scarcely any central hollow. The eggs, two in number, are oval in shape, and frequently unspotted, while they are at most but faintly blotched with pale yellowish or reddish brown upon a greyish ground. Bonelli's eagle is a common bird in Spain; and a pair breed regularly upon the rock of Gibraltar. It is likewise fairly abundant in Palestine.

**Booted Hawk-
Eagle.**

The booted, or dwarf hawk-eagle (*N. pennatus*) is a far smaller bird than the last, and may be compared in size to a kite, the total length of the female being only 24 inches. It may be easily recognised by the conspicuous white patch on the shoulder. In the greater relative length of the wing, and the generally brown colour of the iris, it differs from the two more typical members of the genus, and approaches the true eagles, although it has the characteristic long legs of the present group. This bird is subject to great variation with regard to the colour of the plumage of the under-parts; a difference which was long considered to be due to age, and has given rise to much discussion. Dr. Sharpe, for instance, considered that the dark-coloured variety represented on the left of our illustration on p. 222 was the immature dress, while the light individual on the right was an individual in the adult plumage. Dr. Scully, writing from observations made in Gilgit, states, however, that in that district "the dark and light forms are about equally common, the difference in colour not being dependent upon sex." And he adds that he captured a nestling with white under-parts, thus

effectually disposing of the theory that the dark form was the young. In the light variety the general colour of the upper-parts is brown, with a tinge of purple on the scapulars, and the above-mentioned distinct white patch on the uppermost feathers of that series. The lowest scapulars and wing-coverts have buffish white borders; while the quills are blackish, the secondaries having light borders. The head and neck are fawn-colour, with streaks of dark brown, the sides of the face being



HOODED HAWK-EAGLE ($\frac{1}{2}$ nat. size).

streaked with blackish, and the frontal feathers nearly white. A slight lengthening of the feathers at the back of the head gives rise to an incipient crest. The brown tail is tipped with dull white, and marked with several indistinct darker bars. On the under-parts the ground-colour is buffish white, with a tinge of fawn on the throat and chest, upon which are a number of dark streaks, which disappear on the abdomen and thighs. The beak is bluish black, with a pale blue base, and the cere and feet are yellow. In the dark variety, the plumage differs from that of the adult by the brown colour of the under-parts, where the feathers have black

shaft-lines. The booted eagle inhabits all the countries bordering the Mediterranean, extending into Southern Africa and South-Eastern Europe, and also occurring in Gilgit, India, and Ceylon. It is represented in Australia by the nearly allied *S. morphnoides*. In India the species under consideration frequents groves, gardens, and cultivated lands; and in the neighbourhood of towns and villages inflicts serious loss on the owners of pigeons and poultry. Jerdon says that this eagle generally swoops down on its prey—which includes small mammals—while circling in the air, but that it will occasionally pounce down from a bough. It breeds in Spain and other parts of Southern Europe, as well as in India and Africa; the nest being apparently always situated in a tree. Writing of the nests observed by him in Spain, Lord Lilford states that they always contained two eggs; this seeming to be invariably the number laid by this eagle. In Spain the booted eagle is one of the most common Accipitrines, arriving late in April, and remaining till October. "The nests," continues Lord Lilford, "of which we found several, were generally placed on the lowest branches of a tall pine, at the junction of the main trunk, and were built of sticks, but inside invariably contained fresh twigs with the green leaves adhering to them." The breeding-season in Spain lasts from April till June; and the oval eggs have greyish or dead white grounds, which may or may not be blotched with pale yellowish or reddish brown. The booted eagle is remarkable for its shrill piercing scream, which is stated both by Lord Lilford and Mr. Hume to be unlike the cry of any other Accipitrine. In Gilgit, this eagle is found from March till October; and it breeds there at an elevation of five thousand feet.

The characters by which the true eagles may be distinguished from the hawk-eagles having been already indicated under the heading of the latter, it will suffice here to refer to some of the leading features of the present group. The true eagles are all birds of large size, and, with the exception of Steller's sea-eagle, include the largest representatives of the whole family. In all of them the beak is strong and of moderate length, curving gradually from the cere, with a sharp point, and nearly straight cutting edges; while the nostrils may be either oval and oblique or circular. The wings are large and long, and have the fourth quill rather the longest. The feathered metatarsus is of moderate length; and its reticulated scales extend far on to the toes, which have only a few large scutes near the claws; these features at once serving to distinguish the limb of one of these birds from that of a sea-eagle. The claws are of moderate size and curvature. They are mostly birds of plain and dark-coloured plumage, with the iris of the eye



THE FEATHERED METATARSUS OF THE GOLDEN EAGLE.

some tinge of brown. Inferior in courage to the falcons, the eagles are much superior in this respect to the kites and buzzards; and, while the majority kill their own prey, few will refuse to eat the carcasses of such animals as they may find dead, and some feed greedily on carrion. The range of the genus includes the whole of Europe and Africa, and the greater part of Asia, but stops short of the Malayan region and does not extend to Australia. In America eagles are found as far south as Mexico.

From its large size and magnificent appearance, the golden eagle
Golden Eagle. (*Aquila chrysaetus*) has by almost universal assent been regarded as the "king of birds," although the tendency of modern writers has been rather to detract from the boldness and fierceness of its character, and one at least has



GOLDEN EAGLE'S EYRIE.

even gone so far as to suggest the accusation of downright cowardice. All, however, who have enjoyed (as the writer has) the opportunity of seeing the flight of this splendid bird, are in full accord as to its power and majestic character.

The female of the golden eagle usually attains a length of $35\frac{1}{2}$ inches, while the male is some 3 inches less. In the fully adult bird, the pointed feathers covering the head and neck are rufous brown, tending to tawny on the back of the neck; while the general colour of the plumage of the upper-parts is blackish brown, with light margins to the feathers of the middle of the back and the wing-coverts. The primary quills are nearly black; the feathers of the abdomen, thighs, and legs, pale brown; and the remainder of the under-parts blackish brown. The tail is blackish at the tip and browner towards the root, where it is mottled with ashy grey, while it is crossed near the middle with one or two greyish bands. The beak is bluish horn-colour, darkening at the tip; the cere yellow; the iris hazel;

while the feet are yellow, with black claws. In young birds, as shown in the woodcut on next page, the whole of the root of the tail is whitish or pure white, becoming gradually mottled with grey and brown towards the middle, and only the terminal third of the feathers is nearly black. The feathers on the back of the neck are thus generally less rufous, the general colour of the plumage of the body and wings is darker and more uniform, and the primary quills, save the first three, have much white at their roots. In this state the bird is termed a "ring-tail." There is, however, a great amount of individual variation in the colouring of golden eagles. For instance, some old birds are almost uniformly dark brown, and others golden-brown, while in some the upper-parts are blackish, and the lower surface golden-brown. In others, again, the white at the base of the primary quills is retained, and in some cases the quills are banded. Very rarely white individuals have been observed. In the Old World the range of the golden eagle embraces the whole of Europe and Northern Asia, extending southwards into Northern China and the Himalaya, while a few individuals straggle into Peninsular India. The bird is common in Palestine during the winter, and is more rarely met with in Arabia, Egypt, and Abyssinia, while it breeds in Algeria. It is now definitely settled that the so-called Canadian eagle of North America is identical with the Old World species; its range extending from Alaska to California and Mexico. The young of the American race are peculiarly light-coloured in the region of the head and neck; and many American specimens attain a very large size, even up to 41 inches. Dr. Sharpe states, however, that nearly equally large examples have been obtained from Northern India. In the United Kingdom the golden eagle still holds its own to a limited extent in the Scottish Islands; and probably also breeds in some of the wilder mountainous districts of Ireland.

Habits. Generally a rock-haunting and cleft-nesting bird, in many parts of Lapland, Siberia, and the North American prairies, the golden eagle frequents more open districts, where it is compelled to nest either in trees or on the steep clay banks of rivers and streams. Its powerful build and strong rapid flight render it more than a match for any animal of its size; and its food consequently comprises many of the larger kinds of game, as well as lambs. In Europe these eagles prey largely upon fawns, hares, rabbits, and the various kinds of feathered game; and are consequently formidable enemies to the game-preserver. One has been known to carry off a wounded grouse from in front of the guns of the sportsmen; while another is recorded to have picked up a hare running before hounds. In pursuing hares and rabbits, two eagles will at times combine their efforts in the chase. An Irish peasant reported to the author of *Wild Sports of the West*, that, in coursing hares, "one bird was the active follower, while another remained in reserve at a distance of forty or fifty yards. If the hare, by a sudden turn, freed herself from her most pressing enemy, the second bird instantly took up the chase, and thus prevented the victim from having a moment's respite." That such a sporting bird can deign to feed on carrion, seems surprising; nevertheless the golden eagle will not only eat such garbage when pressed by hunger, but actually seems to prefer it; and it is owing to this unsavoury taste that these birds are so easily approached and killed. In America the golden eagle preys on marmots, prairie-marmots, wood-rats, squirrels, and smaller rodents, as well as grouse, geese,

ducks, and wading birds; while more rarely it seizes the fawns of the prongbuck and various deer, as well as lambs. A correspondent of Captain Bendire relates, on native authority, that a golden eagle once struck down and killed a full-grown black-tailed deer which had been badly wounded. In devouring their prey,



IMMATURE GOLDEN EAGLE.

these birds usually swallow the smaller mammals, hair and all, although birds are generally previously plucked.

In Northern Europe the golden eagle begins to breed in March or the early part of April, frequently while the ground is still covered with snow, and generally occupies the same eyrie for many successive years. The nest is of large size and composed of sticks, in the shape of a flattened platform, and lined with roots, dry grass, heather, moss, or fern, but never in the Old World with feathers. In Shetland, where sticks are scarce, the material may be long rope-like seaweed. It appears

that although in rocky districts the nests are situated on ledges of cliffs or precipices, yet they are by no means always in inaccessible places. As the nest is repaired year after year, it eventually attains an enormous size if its owners are undisturbed. A correspondent writing to Captain Bendire from Colorado states that he has seen a nest over seven feet in height, and with a diameter of fully six feet, which he estimated to contain two cart-loads of material. In that state the old nests are repaired as early as February; a bough of evergreen being invariably laid on each, as if to mark its being occupied. In California the nests are always in trees; and, although generally lined with vegetable substances, an instance has been observed where the lining was of feathers, evidently from the breast of one of the parents. One case is on record where a golden eagle built in Scotland in a tree. During the breeding-season each pair of golden eagles usually has a definite region over which they hunt, and into which no others intrude. In Oregon the nests are stated to be at distances of as much as twenty miles apart, although in California from two to six miles is given as the width of the range of a pair of these birds. The eggs are usually two in number, but may be three, while four have been occasionally taken. Although fairly constant in size, they are subject to extreme variation in colour; some being pure white, while others are more or less blotched with shades of red or purplish brown. In Scotland the eggs are commonly hatched in the latter part of April; the newly-born nestlings being clothed in pure white down, which, however, is soon replaced by the dark first plumage.

With regard to its courage, Captain Bendire writes that "notwithstanding the many sensational stories of the fierceness and prowess of the golden eagle, especially in the defence of its eyrie, from my own observations I must confess that, if not an arrant coward, it certainly is the most indifferent bird in respect to the care of its eggs and young I have ever seen. This may possibly be due more to utter parental indifference than to actual cowardice, as three of these birds, an adult male caught in a trap, and a pair of young—male and female—taken from the nest when three years old and raised by me, did not seem to be deficient in spirit by any means, and were always ready to attack anything and everything on the slightest provocation." In captivity the golden eagle is far more tractable than the sea-eagles; and in Central Asia, where it is known as the birkut, or karakush, it is trained to kill mammals and large birds. Dr. Scully writes that the trained bird "is always kept hooded when it is indoors, except when about to be fed, and the method of carrying it in the chase is the following. The man who is to carry the eagle is mounted on a pony and has his right hand and wrist protected by a thick gauntlet. A crutch, consisting of a straight piece of stick carrying a curved cross-piece of horn or wood—the concavity being directed upwards—is attached to the front of the saddle; the man grasps the cross-piece of the crutch with his gloved hand, and the eagle then perches on his wrist."

Imperial Eagle. Although frequently mistaken in the later stages of its immature plumage for the preceding species, the imperial eagle (*Aquila heliaca*) is really very distinct, and may be easily recognised in the adult state by the more or less conspicuous white patch on the scapulars. In size it is smaller than the golden eagle, with less difference between the two sexes; the length of the female

of this species being the same as that of the male of the golden eagle (32 inches), while that of the male is but an inch less. The body is stoutly built, the tail short, and the wings so long as to reach slightly beyond the extremity of the former. In the adult bird the general colour of the plumage is blackish brown, becoming lighter on the back and tail-coverts; the head and neck are light fulvous; the scapulars have the above-mentioned white patch, which is exclusively confined to that series of feathers; and the tail is ashy grey, marked with indistinct dark bars for the greater part of its extent, but its terminal portion blackish, with a narrow fulvous border. The young bird is rather light brown above, with the feathers tipped with buffish fawn, so as to give a spotted appearance to the plumage, and some of the wing-coverts have whitish ends; the plumage of the under surface being tawny fulvous, with the breast feathers margined with brown, so as to look as though streaked. The tail is uniform brown, tipped with buffish white. In an intermediate stage the brown edgings of the breast-feathers appear to extend to their centres, so that the whole plumage becomes brown; and it is when in this state that the bird is so often mistaken for the golden eagle. At all ages the cere and feet are pale yellow, while the beak is bluish, and the iris brownish yellow. The imperial eagle is mainly a southern form, occurring in South-Eastern and rarely Central Europe, whence it ranges through Palestine and the adjacent countries to India and China. In Northern Africa it is replaced by Adalbert's eagle (*Aquila adalberti*), which also occurs in Spain, and differs by the white patch on the wing extending on to the carpal plumes. In the neighbourhood of India the imperial eagle regularly breeds in the Himalaya, but the majority of the specimens seen in the plains of India are winter visitors, although a few remain to nest in the Upper Punjab. In Southern India the species is rare, although it is not uncommon in the high table-lands of the Peninsula.

In India, according to Jerdon, this eagle "prefers the neighbourhood of hills, and the bare open country, or thin and low jungle. It may frequently be seen seated on the ground, or on a stone on the top of a low hill, till an hour after sunrise, when it rises, apparently unwillingly, and takes a cast after game at no great elevation, hunting slowly over the bushy valleys and ravines, and occasionally over cultivated ground. If unsuccessful in its search, it reseats itself, and after an interval again takes wing, and this time soars to a great height, circling slowly in the air, and traversing a large extent of country. It pounces on hares, florikins, rats, lizards, and various other mammals and birds, and in default of these will eat carrion. I have several times seen one captured in a net by a portion of a carcase of a sheep being put down as a bait. When it does condescend to partake of carrion, it allows no other bird to approach till it has satisfied its hunger."

In Palestine Canon Tristram writes that this truly imperial bird is more abundant than in any other country which he had visited, and may be said, in summer at least, to replace the golden eagle of Europe. "There is a beauty and majesty in its movements," the Canon continues, "and in its great fearlessness of man, when in search of food, which at once attracts one; while the very distinct white scapulars, and the light head, show conspicuously when on the wing. Un-

like the golden eagle, it was as common at one time of the year as another, though we never took a nest." This account gives an idea that the imperial eagle is a noble and courageous bird endowed with considerable fierceness. The experience of Mr. Hume in India does not, however, countenance the attribute of these qualities; although it is suggested, perhaps humorously, that its deficiencies in these respects may be due to the enervating nature of the climate. Mr. Hume



IMPERIAL EAGLE ($\frac{1}{3}$ nat. size).

says that "I have driven the female off hard-set eggs, and plundered the nest before the eyes of the pair, without either flapping a pinion, even to defend what even a little shrike will swoop at once to save. I have seen a couple of crows thrash one of them soundly; and, whether it be that familiarity breeds contempt, I am bound to record, that after having seen many hundreds, and shot, I daresay, a good hundred myself, I look upon the *Königs-adler* as no better than a great hulking kite." Contrary to the opinion of Jerdon, the writer adds that in his experience this eagle is generally a foul feeder.

The nest appears to be always situated in a tree, and is of large size; one taken in a pollard tree on the Danube having a circumference of about fifteen feet, and being lined with wool. The eggs are very variable in size; and have a greyish white ground, which is usually unspotted, but may be marked with pale brown, or more rarely with purplish brown. In the Punjab the usual laying-time is February and March, but it may be prolonged for another month; the nest referred to above from the Danubian provinces was taken at the end of April.

The spotted eagle (*Aquila maculata*) of Central Europe, **Spotted Eagle.** which is selected as an example of species much smaller than the golden eagle, of which it is only about one-third the size, is a bird which has received more than the usual liberal allowance of scientific names. The total length of the adult female is 25 inches, and that of the male only half an inch less. The general colour of the adult bird is liver-brown on the upper-parts, with the head somewhat lighter, and its upper feathers lanceolate. The wing-coverts are somewhat paler, with simple whity-brown margins; and the quills are blackish, shaded with ashy on the primaries, and browner on the secondaries. The tail-feathers are lighter than the quills, with their inner webs bronzy, and the tips inclining to tawny; the under tail-coverts being earthy brown with lighter tips, and the lower surface of the tail uniform brown. The beak is bluish horn-colour, the cere yellow, the iris hazel, and the toes yellow with black claws. In the young bird, as shown in the central figure of our illustration, the general colour is a darker chocolate-brown, the tips of the wing-coverts, inner secondaries, upper tail-coverts, and tail-feathers being marked with somewhat crescentic spots of a pale wood-brown; the cheeks and under surface pale brown, becoming lighter, with a tinge of tawny on the under tail-coverts; some of the chest-feathers are a rather darker brown, with tawny-brown centres; and certain of the under wing-coverts have light tips. It is of course only in the immature and intermediate stages of plumage that the name "spotted eagle" is strictly applicable to the bird.

The ordinary form of the spotted eagle inhabits Central Europe, ranging into Northern Germany, Pomerania, and Poland, and migrating during the winter into Egypt and other parts of Northern Africa. In Southern and Western Europe it is rare. Eastwards it doubtless extends into Palestine, and it is represented in India by a variety distinguished by the general presence of small white spots on the lesser wing-coverts. There is also a larger variety, or species, known as the larger spotted-eagle (*Aquila clanga*), attaining a length of $26\frac{1}{2}$ inches in the female. This variety is characteristic of South-Eastern Europe, being but seldom found in Poland, Pomerania, and Germany, and ranging eastwards into Siberia. During their migrations specimens of the spotted eagle are occasionally blown on to the English coasts, and an immature example in an exhausted condition was captured at Colchester in November 1891. In general appearance the adult of this species is very similar to the golden eagle in miniature. It is especially abundant in Pomerania, and in Europe frequents wooded districts, sometimes building in low blackthorn bushes, or even on the ground itself. In India, according to Mr. Hume, this eagle is always found either in the neighbourhood of swamps or where

the country has been irrigated; and he refers to the sudden immigration of a number of these birds into a district where irrigation works had been recently opened. The same observer notes that this eagle generally sits in a slouching kite-like fashion across a branch, halfway up a tree; whereas, on the other hand, the imperial and tawny eagles generally sit bolt upright at the very top of a tree,



SPOTTED EAGLE ($\frac{1}{2}$ nat. size).

and consequently cannot be seen by an observer immediately beneath. The spotted eagle commonly nests in trees.

Other Species. Other species of the genus are the tawny eagle (*A. rapax*), of Africa, distinguished by the tawny hue of the immature plumage; the slightly smaller but closely allied Indian tawny eagle (*A. vindhiana*); the small brown Wahlberg's eagle (*A. wahlbergi*), of Africa, distinguished by a slight occipital crest; and the remarkable South African vulturine eagle (*A. verreauxi*), which differs from all the rest in having the lower part of the beak and rump white, the rest of the plumage being black. Remains of extinct eagles, some of which probably belong to *Nisaetus*, while others may pertain to *Aquila*, occur

in the Miocene strata of France. The gigantic *Harpagornis*, from the superficial deposits of New Zealand, was by far the largest representative of the whole family.

Wedge-Tailed Eagle. The wedge-tailed eagle (*Uroaëtus audax*) of Australia is a large species generically separated from the true eagles by its regularly graduated wedge-shaped tail, in which, when closed, the middle pair of feathers are far longer than the outer ones; whereas in the true eagles the difference in the length of the corresponding feathers is inappreciable. This fine eagle attains a total of 38 inches in the male, and has the general colour of the plumage black, with a yellow cere and feet. In young birds the general colour is rufous tawny. These birds are found both in the forests and on the open plains of Australia and Tasmania, frequently soaring at a great height in circles, with no apparent movement of the wings. The large nest is invariably placed in the fork of a gum-tree, sometimes at no great height from the ground. Carrion appears to be the chief food of these eagles.

Harpy-Eagles. The Accipitrines we have now to consider include the harpy-eagles, buzzards, and their kin, forming the subfamily *Buteoninae*. While agreeing with all the foregoing types in having the tibia considerably longer than the metatarsus, they differ from them in that the posterior aspect of the metatarsal segment of the leg is covered with large transverse plates instead of with small reticulate scales. The largest members of this subfamily are the magnificent harpy-eagles, which, while rivalling the true eagles in size and strength, have the plated metatarsus of the buzzards, and may be easily recognised by their long crests of feathers. They are exclusively American, and are mainly confined to South and Central America, although one of the species ranges into Mexico. Represented by three well-defined species, the harpies are referred to as many genera. The Guianan harpy-eagle (*Morphnus guianensis*), which is the species represented in our illustration, is readily characterised by the length of its tail, which is fully four times as long as the metatarsus. The range of this species includes Amazonia and Guiana as well as Panama. The crowned harpy (*Harpyhaliaëtus coronatus*), which has a more extensive distribution, extending from Northern Patagonia and Chili to Central America, differs by the much shorter tail, of which the length is less than thrice that of the metatarsus. Both these species agree in that the interval between the summit of the nostril and the upper line of the beak is less than the length of the nostril; whereas in the true harpy (*Thrysaëtus harpyia*), ranging from Bolivia and Paraguay to Mexico, the corresponding interval is greater than the length of the nostril.

The largest of the three is the last-named species, of which the total length is 38 inches. The figured species occupies a middle position in point of size, measuring 36 inches in length. Like the others, it has the greater portion of the metatarsus naked, and a powerful and strongly-curved beak. In this species the crest is very long and pointed, but varies considerably according to the age of the bird. The Prince of Wied describes the head, neck, breast, abdomen, rump, and thighs as being white, faintly spotted here and there with yellow; the feathers of the back, shoulders, and wing-coverts mottled with reddish grey; the quills blackish brown, with small, reddish grey oblique bars; and the tail similarly coloured, but with the

bars horizontal. This stage, which is the one represented in our illustration, is, however, according to Von Penzeln, the plumage of the immature bird. The adult is much darker, having the head and throat greyish brown, most of the upper-parts dark blackish brown shaded and mottled with ashy, the upper tail-coverts with white tips and irregular white barrings, the chest dark coloured, and the remainder of the under-parts white. The dark tail, according to Dr. Sharpe, is tipped with



GUIANAN HARPY-EAGLE ($\frac{1}{2}$ nat. size).

whitish brown and crossed with only three pale bars, above which it has some whitish markings. But little is known of the mode of life of this handsome bird, which occurs both in the forest near the coasts, and the wooded districts of the plains, but more commonly on the banks of the rivers. During its periods of repose this eagle will sit for hours on the summit of some dead tree, uttering at intervals its peculiarly loud and harsh cry. Its prey comprises mammals and birds, and its nest is said to be generally built in a hollow tree. More is known concerning the true harpy-eagle, which is the most powerful bird of prey in North

America. It breeds in Southern Mexico, and thence to Brazil and Bolivia. Known to the Spaniards as the king eagle, and to the Aztecs as the winged wolf, the harpy attacks and kills animals of more than thrice its own size and weight. Turkeys, fawns, foxes, badgers, peccaries, sloths, and monkeys alike fall victims to this fell destroyer. In regions which it frequents the harpy may be seen sailing in the early morning high up in the clear sky, or wheeling in circles over the forests; while from March to June the tree-tops resound with the loud cries of its young. The nest, it is stated, may be situated either in a lofty tree or on the ledge of a cliff.

The whole of the three genera above mentioned are characterised by the shortness of the interval between the tips of the primary and secondary quills, which is less than the length of the metatarsus. Three other genera from South and Central America, viz. *Urobitinga*, *Buteogallus*, and *Busarellus*, comprise much smaller buzzard-like birds, agreeing with the harpies in the above-mentioned character, but differing by the absence of crests. The last two genera have but a single species each; but there are several kinds of urobitingas, two of which range northwards into the south of Mexico.

Buzzards. "The buzzard," writes Gilbert White, "is a dastardly bird, and beaten not only by the raven, but even by the carrion-crow"; and no better description could be given of the pusillanimous disposition of the birds of the genus *Buteo*. The buzzards are the typical representatives of the subfamily under consideration, and belong to that section in which the interval between the tips of the primary and secondary quills equals or exceeds the length of the metatarsus. They are specially characterised by the squared tail being of considerable length, and extending markedly below the closed wings; and also by the long oval nostrils, devoid of any central tubercle, and the bare metatarsus. The beak is rather small and weak; the wings have the fourth quill the longest, and the first four deeply notched on their inner margins; the naked metatarsus is of moderate length and covered with scales and scutes; and the toes are short, with strong claws. Buzzards are represented by nearly twenty species, and have an almost world-wide distribution, although they are unknown in the Indian and Malayan regions, as well as in Oceania and Australasia. The common buzzard (*B. vulgaris*) is one of the species of British hawks which has suffered the least from the persecution of gamekeepers, and may still not unfrequently be seen in the wooded parts of the country. It belongs to a large group of the genus in which the tail is marked by more or less complete dark transverse bars, the number of such bars in this species varying from ten to thirteen. The general colour of the plumage is a clear dark brown, becoming paler on the crown of the head and cheeks and much darker on the primary quills; but there is such an extraordinary amount of individual variation in respect of colour, that scarcely any two birds can be found which are precisely alike. The under-parts are, however, generally yellowish white, with the feathers more or less streaked with brown; but the flanks and thighs are of a more uniformly brown hue. The under wing-coverts are also light coloured, and the under tail-coverts white; while the tail, which is brown above and greyish white below, is barred on both aspects. Some buzzards are, however, brown all over; while in others, as in our figure, the throat and chest are brown, and as well as the thighs, are as dark as the upper surface, only the remainder of the under-parts being

light coloured. The colour of the iris varies from dark hazel to light brownish yellow; the legs and toes are yellow, and the claws black. White specimens are occasionally met with. The length of the male is about 22 inches, and that of the female about an inch more. The common buzzard is distributed over the greater part of Europe, and is in many districts comparatively abundant. In Northern Africa and Eastern Europe it is, however, replaced by the nearly-allied desert-buzzard (*B. desertorum*), which also ranges into India; while in Japan and China its place is occupied by *B. plumipes*, distinguished by the greater extent to which the metatarsus is feathered. This species also ranges through the Himalaya to Gilgit, and occurs



COMMON BUZZARD ($\frac{1}{2}$ nat. size).

occasionally in India. America possesses another closely allied species in Swainson's buzzard (*B. obsoletus*), ranging over the greater part of that continent. In searching for their prey, which consists mainly of small mammals, birds, and reptiles, buzzards fly slowly and sluggishly; and their cowardly disposition, to which allusion has already been made, is exhibited by their generally selecting young or feeble animals for their victims. At times, however, and especially in the breeding-season, these birds will soar in circles high in the air, occasionally uttering their shrill and melancholy whistle-like cry. After feeding, they usually take up their station on a tree, from which, if disturbed, they fly in what appears to be a frightened manner. In England, according to Professor Newton, the nest is usually in a tree; while in the more mountainous districts of Scotland preference is given to rocks. The eggs, which are usually two or three, but occasionally four in number, much resemble

those of the red kite. In America Captain Bendire relates that Swainson's buzzard has been observed nesting in harmonious association with other birds, especially with Arkansas kingbirds and shrikes; the nests of these birds being sometimes only a few inches below those of the buzzards. Fossilised remains of the common buzzard have been found in caverns in Devonshire and Westmoreland; the metatarsus figured on p. 140 coming from the latter county.



ROUGH-LEGGED BUZZARD ($\frac{1}{2}$ nat. size).

Rough-Legged Buzzards. Although the rough-legged buzzards, of which there are but very few species, differ from the true buzzards merely in having the metatarsus feathered right down to the toes, it is found convenient to distinguish them by a separate generic name. Their range includes Central and Northern Europe, Northern Asia, and the whole of North America; the European species sometimes straggling as far as South Africa. The European rough-legged buzzard (*Archibuteo lagopus*)—the species represented in our illustration—is a bird somewhat larger than the common buzzard, and not exhibiting quite as much individual

variation in colour as the latter. Ranging over northern and central Europe and Siberia, this buzzard is met with yearly in the British Islands, where it sometimes occurs in considerable numbers, more especially in the autumn and winter. In the case of such a variable bird it will be unnecessary to give any description of the coloration, beyond stating that, according to Dr. Sharpe, the species is specially characterised by the brown colour of the markings on the flanks and thighs; and by the ground-colour of the head, throat, and chest being white or buffish white, upon which are buff streaks. In North America this species is replaced by St. John's buzzard (*A. sancti-johannis*), distinguished by its generally darker colour and the larger amount of black on the lower surface. The ferruginous buzzard (*A. ferrugineus*) of south-western North America differs by the white flanks and the chestnut fawn of the flanks. A fourth species (*A. strophiatatus*), characterised by its uniformly brown head, neck, and chest, inhabits Nipal and Tibet. The habits of the rough-legged buzzards are so generally similar to those of the members of the genus *Buteo*, that they require but brief notice. The individuals of the European species visiting Britain prefer, however, according to Professor Newton, open districts, more especially where rabbits are abundant; those rodents together with water-fowl, constituting a large proportion of their food. The same writer describes the flight of the bird as slow but smooth, and, except during the periods of migration, not of long continuance. The nest, which is made rather late in the season, is generally placed in a high tree, and may contain from three to five eggs, the latter being subject to great variation in form, size, and coloration. Breeding commonly in the higher parts of Norway and Sweden, the rough-legged buzzard ranges as far polewards as the North Cape, and at times nests in the British Islands. During the breeding-season it utters a kind of wailing cry, which has been compared to the mew of a cat. America possesses four other genera of buzzard-like hawks, of which only *Asturina* possesses more than two species; and a fifth genus (*Urospizias*), with one species, is confined to Australia.

Sparrow-Hawks. With the possible exception of some of the American forms just alluded to, the Accipitrines hitherto described have the metatarsus considerably shorter than the tibia. We now come to a group of long-legged hawks characterised by the great elongation of the metatarsus, which is approximately or quite equal in this respect to the tibia. This group, as represented by the sparrow-hawks, goshawks, and harriers, constitutes the subfamily *Accipitrinae*. For its size, the common sparrow-hawk is one of the most dashing and rapacious of all the Accipitrines, although its depredations are too frequently attributed to the harmless kestrel. In common with its congeners, the sparrow-hawk agrees with the great majority of the subfamily in having the sides of the face completely feathered, and the lores furnished with bristles, while it resembles a smaller number of genera in the absence of reticulated scales on the back of the metatarsus. Sparrow-hawks may be distinguished from all their allies by the great length of the third toe, which (exclusive of the claw) is more than double the length of the ridge of the beak, measured from the front edge of the cere. The short beak curves regularly from the base, and has a distinct festoon in the upper cutting-edge, while the nostrils are oval. The wings are short, not reaching

within a long distance of the end of the tail, and have the fourth and fifth quills nearly equal and longer than the others. The long metatarsus is ~~strong~~ ^{strong}, being covered with greave-like plates, and the toes are long and slender, with sharp, curved claws. There are more than twenty species of sparrow-hawks, which are distributed over the whole globe, with the exception of Oceania, the west of Australia, and New Guinea. A few are rather larger than the European species,



SPARROW-HAWK ($\frac{1}{2}$ nat. size).

while many are considerably smaller. The common sparrow-hawk (*Accipiter nisus*) is still an abundant bird in the wooded districts of England, and the female is the only Accipitrine which inflicts much damage upon game-preserves. It belongs to a group of the genus characterised by the banded thighs, the absence of a collar round the neck, and the number of bars on the tail not exceeding five. In the adult male the plumage of the upper-parts, with the exception of a white spot on the nape of the neck, is dark bluish grey, while the cheeks, chin, and under-parts are rufous, barred with bands of dark rufous brown, narrower than the intervening

light spaces; the tail being greyish brown, with from three to five dark bands. The beak is blue, and the iris orange; the legs and toes are yellow, and the claws black. The total length is about 13 inches. The female is some $2\frac{1}{2}$ inches longer than the male, and differs by the general colour of the upper-parts (save the white spot on the nape) being brown, with many of the feathers white at the base, and the primaries and tail lighter than the rest; the under-parts being greyish white barred with brown. This species is distributed over the whole of Europe and Northern Asia, and extends during the winter into the north of Africa, India, and China. In certain parts of Germany, Switzerland, and France, some individuals are found differing by their superior size and certain peculiarities in coloration. The sparrow-hawk is a frequenter of wooded districts, where it may always be distinguished from the kestrel when on the wing by its bold dashing flight. Its prey includes the smaller mammals and birds, and while young pheasants and partridges frequently fall victims to its swoop, the chickens in a farmyard are by no means secure from its rapaciousness. It is during the breeding-season that this hawk displays the greatest boldness and most frequently ventures into the farmyard; such visits being paid as much for the purpose of capturing sparrows and other small birds as for preying on chickens. The sparrow-hawk breeds from the extreme north of Europe as far south as the Himalaya; and although generally constructing a nest of its own, not unfrequently takes possession of that of a crow or some other bird. The eggs are four or five in number, and are remarkable for the beauty of their colouring, being generally blotched with large patches of brownish crimson on a pale ground; the dark markings being often collected on certain parts of the shell, leaving the rest bare.

In Europe the sparrow-hawk used to be extensively employed in hawking, and was flown against blackbirds, thrushes, quail, landrails, partridges, etc. Quail-hawking with this bird is still largely pursued in Hungary and the Danubian provinces; and it is stated that it was considered no uncommon feat for a sparrow-hawk to kill from seventy to eighty quail in a day. In India both this species and the smaller besra hawk (*A. virgatus*)—the latter distinguished by its uniformly coloured thighs—are largely trained. On this subject Mr. R. Thompson writes to Mr. Hume that though the sparrow-hawk is prized by the natives for its speed and pluck, "it does not really come up to the besra even for courage; its powers of endurance are much less, and it is less easily reclaimed. It is a delicate and difficult bird to keep, and with all its boasted speed is but second to the besra for every kind of hard field or wood work. What the besra would do at the first throw, the other could not accomplish till the quarry was exhausted. To hunt with the basha [the native name of the sparrow-hawk], requires a deal of tact; you must not throw it while the wind is high; you must keep well within the proximity of woods and trees, and not baulk it with birds larger than it can afford to strike and clutch." Both these kinds of hawks are commonly flown in India at sand-grouse and the cream-coloured courser. In North America the sparrow-hawk is represented by two nearly allied species known as the sharp-shinned hawk (*A. fuscus*), and Cooper's hawk (*A. cooperi*), in both of which the rufous bars on the under surface are wider than the intervening spaces. While the former is somewhat smaller than the sparrow-hawk, the latter is as much larger.

Goshawks. The European goshawk, or goose-hawk (*Astur palumbarius*), is the type of a very large genus, differing from the last by the length of the ridge of the beak from in front of the cere exceeding half the length of the third toe without the claw; and further distinguished by the fourth toe being about equal in length to the second, without the claws; by the overhanging tufts of feathers on the thighs; and the absence of any tubercle in the bony nostrils. The beak is short, with a distinct festoon in its cutting-edge; the short wings generally have the fourth quill the longest; the metatarsus usually has large scutes in front; and the toes are of only moderate length. Goshawks have an almost



ADULT GOSHAWK RABBIT HAWKING.

cosmopolitan distribution, although they are unknown in part of Oceania and the southern portion of South America. While the more typical forms are equal in size to the largest falcons, the smaller kinds are not larger than sparrow-hawks; and so closely are the goshawks and sparrow-hawks thus connected, that some writers, like Messrs. Seebohm and Bendire, unite the two genera. In general appearance the European goshawk is, indeed, very like a large sparrow-hawk; having, in the male, the plumage of the upper-parts of a deep bluish grey, darker on the head and neck, with a light band above the eye; while beneath it is white transversely barred with greyish brown; the tail having four dark bars, and a white tip. In the female the upper plumage has a browner tinge; while the young bird is brown above, with five dark bars on the tail. The colour of the beak, cere, and limbs is nearly the same as in the sparrow-hawk. The male

attains a length of $19\frac{1}{2}$, and the female of 23 inches. The goshawk has a range nearly the same as that of the sparrow-hawk, although it does not appear to descend from the Himalaya to the plains of India. In North America it is replaced by the American goshawk (*A. atricapillus*), distinguished by its slightly superior size, and by the plumage of the under-parts being merely flecked with ashy grey, instead of barred. Although rare in Britain, the goshawk is common in Germany and other parts of the Continent, breeding as far north as Lapland. Instead of "stooping" to its quarry, after the manner of the falcons, the goshawk flies along after it, and takes by the mode technically known as "raking." It is flown at the larger game-birds, as well as at hares and rabbits; and will not unfrequently follow its prey for some distance in covert. The nest is usually built in a tall tree on the outskirts of a wood or forest; and may contain from three to four eggs, which are white, and may be either unspotted, or more or less streaked with olive, or flecked with reddish brown.

Nearly allied to the goshawks is a group of African species (one of which is represented on the right side of the illustration on p. 246), characterised by the possession of a more tuneful voice than hawks in general. By recent observers the note of these birds is described as a mellow piping whistle; and, accordingly, it seems better that they should be designated whistling hawks, rather than "chanting goshawks," as they were originally termed, when somewhat exaggerated notions obtained as to the extent of their vocal powers. These hawks differ from the goshawks by the presence of a tubercle in the nostrils, situated near the upper margin; while they are distinguished from an allied South American genus by the small extent to which the metatarsus is feathered, and by the whole of the outer side of that segment of the leg being covered with reticulate scales.

The many-zoned hawk (*Melierax polyzonus*), which is the species represented in our illustration, is a large and handsomely-coloured bird inhabiting North-Eastern Africa, and ranging thence across the continent to Senegambia. The males measure $20\frac{1}{2}$ inches, and the females 21 inches in length. Like all the species save one, the general colour of the upper-parts is pearly grey, the chest ashy grey, and the abdomen white, barred with a number of very fine greyish black bands, so as to present a kind of speckled appearance. The species is particularly characterised by the absence of bars on the middle tail-feathers, and the white upper tail-coverts barred with slaty grey. The bill is blackish, with a vermilion base, the iris pale brown, and the legs, feet, and cere vermilion. A nearly allied species is the South African whistling hawk (*M. canorus*); but the much smaller and widely distributed black whistling hawk (*M. niger*) differs from all the others by its sable plumage, in striking contrast to which stands out the brilliant red of the iris, cere, base of the bill, and feet and legs. In Abyssinia the figured species is found at considerable elevations above the sea. Mr. Blanford states that it is usually to be seen perched on a tree, although occasionally on the ground; and that its food consists of reptiles and insects. Its flight is rather slow, and somewhat like that of a buzzard, and is seldom prolonged for any great distance.

Omitting mention of three unimportant genera, two of which are South American and the other West African, we come to the

Harrier-Hawks.

American harrier-hawks, and the cosmopolitan harriers; both of which are distinguished from all the foregoing types by having an imperfect disc of feathers round the eyes,—thus recalling the owls,—and also by the hinder aspect of the metatarsus being covered with reticulate scales, instead of large scutes. With regard to the harrier-hawks (*Micrastur*), of which there are several species, ranging from Southern Mexico over the greater part of South America, it will suffice to state that they are distinguished by having circular nostrils with a bony excrescence, and form an intermediate step between the goshawks and the harriers, having the heavy build of the former, and the facial discs of the latter.

Harriers. The harriers, of which there are some sixteen species, are long-winged and slender-built birds, remarkable for the great diversity existing in most cases between the plumage of the two sexes, and deriving their name from their harrying propensities. The nostrils differ from those of the harrier-hawks in being oval, and devoid of any bony excrescence; they are partly concealed by the radiating feathers of the lores. The beak is small, curving regularly from the base, and with only a slight festoon in its upper cutting-edge. The long wings have the first quill very short, and the third and fourth the longest; and the tail is of considerable length, and rounded. In length the metatarsus is relatively greater than in any other members of the family; the toes are somewhat short, and not very unequal in length; and the claws are very sharp, and but slightly curved. Harriers are distributed over the greater part of the globe, occurring in such widely distant countries as New Zealand and Britain, although they are absent from several regions, such as Malayana, Persia, and Arabia, where they might reasonably have been expected to occur. Of the numerous species of the genus, no less than three inhabit the British Islands; although the drainage of the fen-lands has sadly reduced their numbers, more especially in the case of the marsh-harrier. In habits all the harriers are very similar, although some, like the species last named, prefer low marshy spots, where they may be seen with their heavy flapping wings slowly skimming over the reeds; while others, like the hen-harrier, also frequent the drier hillsides. They all roost on or near the ground; and, when not hunting, may be seen, as in our illustration, perched on some low bough, post, or hillock. They hunt their prey to a great extent in the mornings and evenings, and feed on small birds, mammals, and reptiles; the marsh-haunting species supplementing this diet largely with frogs and fish, while others eat grasshoppers and other large insects. The nest is usually placed on the ground; and in the European species at least the eggs (three or four in number) are nearly uniform pale bluish or yellowish green. In addition to their facial discs and crepuscular habits, the harriers show another resemblance to the owls in their habit of laying their eggs at intervals, so that both eggs and nestlings may be taken from the same nest. In hunting, harriers frequently beat and quarter their ground almost with the regularity of a spaniel. Our remarks on the various species will be mainly confined to those inhabiting the British Islands. So different in appearance are the males and females of the hen-harrier (*Circus cyaneus*) that they were long regarded as distinct,—the female being termed the ringtail,—and it was not till Montagu brought up a brood from the nest that their specific unity was established. In the adult male the general colour



GROUP OF HARRIERS.

1, Hen-Harrier ; 2, Montagu's Harrier ; 3, Pale-Chested Harrier.

of the plumage is bluish grey above, with the throat and chest nearly similar; while the rest of the under-parts, inclusive of the thighs as well as the upper tail-coverts, are pure white. On the upper surface of the tail the two middle pairs of feathers are uniform grey, and the others more or less indistinctly barred. On the other hand, in the female, or ringtail, as shown in the left lower figure of our Plate, the prevailing hue of the upper-parts is brown, and the head is surrounded by a distinct ruff of mingled white and brown feathers; many of the feathers, especially the wing-coverts, having lighter margins. Below, the ground-colour is reddish buff, each feather having a larger or smaller dark brown central mark, and a still darker shaft. The tail is greyish brown, tipped with white, and all the feathers banded with darker brown. In both sexes the legs and toes are yellow, with black claws; but the cere is a more greenish yellow in the female than in the male. The young male resembles the female in colour, but may be distinguished by its relatively shorter wing. In length the male measures about 21, and the female 22 inches. This harrier is found throughout Europe and Siberia; extending in winter into the north-east of Africa, Northern India, and China. The American harrier (*C. hudsonianus*), commonly known as the marsh-hawk, replaces the hen-harrier in North America, and is distinguished by the more decided grey of the upper-parts and throat, as well as by some flecks of reddish brown on the white of the under surface in the male; the naked portion of the metatarsus is also slightly longer. In Britain the hen-harrier seems always to have been the rarest species, but the effects of drainage have not told so severely upon its numbers as on those of the marsh-harrier. The pale-chested harrier (*C. macrurus*), of which the male is represented in the right side of our plate, is a slightly smaller bird than either of the two last, from both of which it may be at once distinguished by the white upper tail-coverts being banded with grey. The uniformly-coloured middle tail-feathers distinctive of the males of this group of species are well shown in our plate. The pale harrier, although unknown in Britain, is pretty generally distributed over Europe as far north as the 60th parallel; it is also found over the great part of Africa, exclusive of the forest regions of the west coast, and eastwards ranges into India, Burma, and China. The harrier (*C. pygargus*) which takes its popular name from the distinguished ornithologist Montagu, by whom it was first recognised as a distinct species, and of which a male is represented in the upper figure of the plate, differs from the species referred to above by the white thighs of the male being flecked with reddish brown; and may be still more readily recognised by the three dark bands crossing the secondaries, one of which is visible when the wings are closed. The middle tail-feathers are uniform bluish grey, and the lateral ones white with reddish orange bars; the under-parts, behind the chest, being coloured like the latter. The general colour of the female is brown of various shades. Montagu's harrier is lighter and more slenderly built than the hen-harrier; and appears to have been the most common of the British species. Its distribution is almost identical with that of the pale harrier. The largest and most powerful of all the three British species is the marsh-harrier, or moor-buzzard (*C. aruginosus*), in which the female measures 23 inches in length. In this species the two sexes are nearly alike at all ages, the prevailing colour of the plumage of the upper-parts being

brown. It may be recognised by the nearly uniform rufous thighs and the plain bluish grey tail of the adult; young birds have the tail brown, with some slight rufous mottlings, and lack the blue-grey found on the secondaries of the old birds. The distribution of the marsh-harrier is likewise very similar to that of the two preceding species; this bird ranging from Britain to Japan, and from Siberia to South Africa and India. The draining of the fens and other of its haunts has rendered it a comparatively rare bird in England at the present time.



AFRICAN NAKED-CHEEKED HAWK AND MANY-ZONED WHISTLING HAWK ($\frac{1}{3}$ nat. size).

Naked-Cheeked Hawks. Resembling the whistling hawks in the barred plumage of the under-parts, the naked-cheeked hawks of Africa and Madagascar, one of which is represented on the left side of the accompanying illustration, differ from all the other members of the subfamily in having the region of the mouth and the sides of the face completely devoid of feathers. The African species (*Polyboroides typicus*) measures $27\frac{1}{2}$ inches in the female, and 2 inches in the male. Its general colour above is dark grey, this tint extending round the neck to occupy the throat and chest; while the remainder of the under-parts is marked with

rather broad alternating bands of black-and-white. The head is crested, and the black tail has a narrow white tip, and a broadish band of white at a distance of about one-third from the end. This species has a wide range in Africa; but it is replaced in Madagascar by *P. radiatus*, distinguished by its silver-grey colour above, and the finer banding of the under-parts. These birds prey chiefly upon lizards, snakes, and frogs; and they possess the unique peculiarity of being able to move the ankle-joint both forwards as well as backwards, thus giving an extraordinary range of movement to the lower part of the leg, which is said to be of the greatest advantage in extracting their reptilian prey from the crannies where they lie concealed. Like the harpy-eagles, these hawks often seek for reptiles along the line of jungle-fires, while they frequent marshes and swamps in search of frogs. The toes are remarkable for their extreme lateral compression, which is said to be also a feature admirably adapted for capturing the reptiles on which these birds prey. In addition to reptiles, it is stated that these hawks will also kill and eat small birds and mammals, especially such of the latter as, like shrews, frequent moist localities. Nothing appears to have been ascertained with regard to their breeding-habits.

The Caracaras.

The remaining members of the hawk family are mainly South American, and constitute a subfamily by themselves. These birds, which are commonly designated caracaras, from a corruption of the native name of their Brazilian representatives, differ not only in general appearance from more typical hawks, but likewise in the mode of life. In the first place, whereas in all other members of the family the third and fourth toes alone are connected together at their bases by a small web, in the caracaras both the second and fourth toes are so connected with the middle one. They are all long-legged birds, with the metatarsus naked; and the beak is generally characterised by its depth and compression, while there is more or less naked skin on the sides of the face. In their general habits they are chiefly terrestrial, and nest on the ground; and as they run well and rapidly, they recall in these respects the gallinaceous birds. Mr. W. H. Hudson remarks that they are "carrion-eaters, also killers on their own account, and, like wild dogs, sometimes hunt in packs, which gives them an advantage. They are the unfailing attendants of all flesh-hunters, human or feline, and also furiously pursue and persecute all eagles and true vultures that venture on the pampas." Formerly the caracaras were considered to be allied to the secretary-vulture, but their true affinities are now known to be nearer to the harriers, and, according to the observer just quoted, when on the wing the smaller species present a striking resemblance to the latter.

Brazilian Caracara.

The caracaras may be divided into two genera, according to the form of the nostrils. The largest member of the group is the Brazilian caracara, known in the Argentine as the carancha (*Polyborus tharus*), and belonging to the genus with oval nostrils. This fine bird, which ranges over the whole of South America, may be compared in size to a small eagle, attaining a length of fully 26 inches. Its head is crested, and the ground-colour of the upper-parts deep blackish brown, with the feathers of the back and wing-coverts marked with narrow whitish cross-bars. The tail is mostly buffish white, with darker bars; and the sides of the head and under-parts are of the same ground-colour,

marked, except on the head and throat, with narrow black bars. The large beak is pale blue, the cere and naked portion of the face are normally carmine-red, and the legs and feet yellow. Under certain conditions naked portions of the face



BRAZILIAN CARACARA.

may, however, assume a pale colour. In northern South America, as well as in Central America and southern North America, together with Cuba and Trinidad, there occurs the rather smaller Audubon's caracara (*P. cheriway*); and a third species (*P. lutosus*) characterises the island of Guadaloupe. Although largely carrion-eaters, these birds will attack living prey, the Brazilian species sometimes venturing to encounter the skunk. In North America they generally nest in cabbage-palms.

Falkland Island This species
Caracara. (*Ibycter australis*),
which is represented in the
upper figure of our illustration,
may be taken as a well-known
example of the second genus,

in which the nostrils are circular, and most of the species of considerably smaller dimensions than the last. This bird attains a total length of 25 inches, and has its plumage of a general black hue. The nape and neck are, however, marked with streaks of white; and there are also similar white markings on the throat and chest, which on the abdomen pass into minute spots. The quills are dark brown, with lighter tips, and the black tail has a broad white band at the end. The feathers on the inner surfaces of the thighs are tawny; the cere and feet are yellow; the greater part of the beak is yellowish, and the iris brown. This species is restricted to the Falkland Islands, and is replaced in the Amazon districts and some adjacent parts of South America by the black caracara (*I. ater*), which is a much smaller bird, measuring only 16 inches in length, and characterised by the whole plumage, with the exception of a white band across the base of the tail, being black, with greenish reflections. Agreeing in size with the black caracara is the very differently-coloured bird known as the chimachima (*I. chimachima*), of which an immature example is represented in the lower figure of our illustration. This caracara ranges from Brazil northwards of the tropic, through Colombia into Panama. In the adult the prevailing colour may be said to be white; a streak from the eye towards the back of the head, the back, wings, and tail being mainly dark brown, with lighter margins to many of the feathers. The first four primary quills are white with dark markings in the middle of their length, while the remainder are yellowish white at the base, with dark brown tips. The tail-

feathers have a lightish ground, marked with narrow brown bars for the greater part of their length, but near the end show a broad blackish band tipped with white. The iris of the large eye is greyish brown, the beak is bluish white at the base, becoming lighter at the tip; the cere and a bare space round the eye are orange tinged with red; and the feet are pale yellow. In young birds the top of the head and cheeks are dark brown; the sides and back of the neck brown with



FALKLAND ISLAND AND CHIMACHIMA CARACARAS ($\frac{1}{4}$ nat. size).

yellowish white streaks; the feathers of the back brown, with straw-coloured or fulvous margins; and the feathers of most of the under-parts ochrey coloured, with brown margins in the region of the chest, whereby a general striped appearance is produced. The chimango (*I. chimango*) of the southern portion of South America and Tierra del Fuego, differs by having the under-parts and under wing-coverts of a brownish ochre-colour in the adult; the feathers of the under surface of the body having dark brown shaft stripes.

Writing of the habits of these birds, which he collectively designates carrion-

hawks, Darwin states that chimangos may often be seen in company with caranchas, although the two are by no means friends. "When the carancha is quietly seated on the branch of a tree or on the ground, the chimango often continues for a long time flying backwards and forwards, up and down, in a semicircle, trying each time at the bottom of the curve to strike its larger relative. The carancha takes little notice, except by bobbing its head." Of the Falkland Island species he observes that "these birds in many respects resemble the caranchas. They live on the flesh of dead animals and on marine productions; and on the Ramirez rocks their whole sustenance must depend on the sea. They are extraordinarily tame and fearless, and haunt the neighbourhood of houses for offal. If a hunting-party kills an animal, a number soon collect and patiently await, standing on the ground on all sides. After eating, their uncovered craws are largely protruded, giving them a disgusting appearance. They readily attack wounded birds; a cormorant in this state having taken to the shore, was immediately seized on by several, and its death hastened by their blows." He adds that, like the caranchas, several of these birds will sometimes "wait at the mouth of a rabbit-hole, and together seize on the animal when it comes out." In addition to being exceedingly mischievous, these caracaras are "quarrelsome and very passionate, tearing up the grass with their bills from rage. They are not truly gregarious; they do not soar, and their flight is heavy and clumsy; on the ground they run extremely fast, very much like pheasants. They are noisy, uttering several harsh cries, one of which is exceedingly like that of the English rook; hence the sealers always call them rooks. It is a curious circumstance that, when crying out, they throw their heads upwards and backwards, after the same manner as the carancha. They build in the rocky cliffs of the sea-coast, but only on the small adjoining islets, and not on the two main islands; this is a singular precaution in so tame and fearless a bird." In the North American species of *Polyborus* the eggs are generally two or three in number, and have a pale ground-colour, almost concealed by dark blotchings.

THE VULTURES.

Family *VULTURIDÆ*.

As a matter of convenience it is found advisable to separate the true or Old World vultures from the hawk family, although it is difficult to draw any well-marked line of distinction between the two groups, which are intimately connected by the lammergeiers. All the vultures are, however, birds of large size; and, with the exception of the lammergeiers, characterised by the head and neck being more or less bare, or clothed only with short stubbly down, true feathers being absent from the crown of the head. The males are as large or larger than the females. In all, the beak is rather long, compressed, and straight for some distance from its base, after which it is sharply bent down; its upper mandible may be sinuated, but is never toothed. The cere is very large; and the metatarsus, which is generally naked, is comparatively short, stout, and covered with small reticulated scales. The toes have rather long and slightly curved claws; the third toe being always long and the first short, while the third and fourth are joined at their bases by a membrane.

As in the preceding family, the nostrils are separated by a median partition, and the feathers are furnished with after-shafts. The true vultures, together with the lammergeiers, are restricted to the warmer regions of the Old World, where they are almost universally distributed, although absent from the Malayan Islands, Ceylon, Madagascar, and Australia.

Lammergeiers. The magnificent bird known as the lammergeier, or bearded vulture (*Gypaëtus barbatus*), is the typical representative of a genus in regard to the systematic position of which there has been some difference of opinion among ornithologists. It differs from the true vultures in having the head covered with feathers, instead of being naked or downy, and thereby approaches the eagles, among which it is placed by Dr. Sharpe. Its general affinities, as remarked by Mr. Dresser, are, however, decidedly with the vultures, among which we accordingly place it. In addition to having the head fully feathered, the lammergeiers are characterised by having the oval nostrils concealed by a number of stiff bristles, and also by the presence of a tuft, or long beard of forwardly directed bristles. The long and compressed beak ascends in front of the cere, and then curves, with its tip much hooked. The wings are long, with the first quill rather longer than the second, and the third the longest; while the tail is also long, and distinctly wedge-shaped. The true lammergeier, which ranges from the mountains of Southern Europe and North-Eastern Africa through Asia Minor and Palestine, and thence to the Himalaya, Central Asia, and the north of China, is distinguished by the metatarsus being feathered down to the toes, and the presence of black markings on the cheeks, and commonly attains a length of about 42 inches. On the other hand, the somewhat smaller bare-legged lammergeier, from the mountainous districts of North-East and South Africa, has the lower part of the metatarsus naked, and the sides of the cheeks entirely white. In the adult of the common species, the crown of the head and sides of the face are white, with the bristles over the nostrils and a broad cheek-stripe, as well as some scattered streaks, black; the rest of the head and nape being whitish, with the lanceolate feathers of the latter more or less tinged with bright tawny. The upper-parts are black, tending to brown on the rump, and a tinge of ochre-brown on the scapulars, with all the shafts of the back-feathers whitish, as are those of the wing-coverts, wings, and tail. Beneath, the general colour is a rich orange-tawny, not unfrequently with a black gorget on the chest. The beak is horn-colour, and the feet leaden grey; while the iris of the eye is pale orange, and the surrounding sclerotic membrane or "white," a blood-colour, thus producing, with the black pupil, a most remarkable appearance. In the young bird, as shown in the upper figure of our illustration on the next page, the head, neck, and throat are blackish brown, and the rest of the body-plumage pale brown, with the exception of some creamy white patches on the upper part of the back. The female is somewhat larger than the male; and the expanse of wing often exceeds 9 feet. Indian examples are those which commonly show the black gorget on the chest.

The lammergeier is essentially a mountain-bird, and, in spite of numerous stories to the contrary, appears to subsist mainly on animals not killed by itself and carrion, although it may occasionally attack and kill some of the smaller animals; such at least are undoubtedly its habits in the Himalaya.

When on the wing, the lammergeier may be easily recognised by its long pointed wings and tail; and also by its mode of flight, which is even and gliding, with an occasional flap of the wings. When hunting, it skims along the sides of the



LAMMERGEIER AND NEST.

mountains, following every undulation of the hillside, and working backwards and forwards in regular "beats," so that scarcely anything escapes its search. In the Alps the lammergeier is now well-nigh exterminated, the last Swiss

specimen having been found poisoned in the winter of 1887. This was a female which had been known to haunt the Bietsch Horn for some twenty-five years previously, its mate having been killed in 1862. It is stated, however, that a single bird was seen in Switzerland in 1888. In the Italian Alps the lammergeier is still met with, while in Spain and the Caucasus it is abundant. In the Himalaya these splendid birds may be seen in numbers during the spring in the outer ranges, especially in the neighbourhood of the hill-station of Mari, but in the summer they migrate northwards to Kashmir, Baltistan, Ladak, etc. Usually a shy bird, in the neighbourhood of Abbotabad the lammergeiers became quite accustomed to the shooting on a rifle-range, and would approach close to the men. When driven down by cold and bad weather they will often collect in numbers round the military hill-camps to feed on the offal. Circumstantial stories of attacks by Alpine lammergeiers on children will be found in many works; but, as Mr. H. Saunders remarks, those who have examined the weak feet of those birds will form their own opinion as to their credibility. With regard to their alleged depredations on flocks, an anonymous observer writes in the *Asian* that "I never heard of the Himalayan lammergeier attacking anything, and in Kashmir have often watched them passing over flocks of goats, on one occasion close over some female ibex with kids. Also in Dagshai I frequently observed them sail round within a few yards of fowls and tame pigeons, but never saw them attempt a raid on any living thing, always contenting themselves with bones thrown out after the soldiers' dinners, or with offal from the slaughter-houses." Mr. R. Thompson also had a similar experience in the Himalaya, mentioning, that although these birds never molested the fowls and pigeons picketed as lures for hawks, they would always come down to a carcase or a heap of bones. The lammergeier seems indeed to be specially partial to bones, which it will sometimes drop from a great height on to rocks in order to smash them; while in Algeria it is stated to do the same with tortoises. In Spain these birds are commonly known by the name of bone-smasher; and there is little doubt that the "ossifrage" of Scripture refers to this bird. All these traits of character strongly confirm the view that the lammergeier is a vulture rather than an eagle; and Mr. Hume considers that its general habits and gait, more especially its manner of walking and holding its tail when feeding on the ground, ally it to the scavenger-vultures. In the Himalaya the lammergeier breeds from November to February, selecting almost inaccessible ledges for the construction of its nest, at elevations of five thousand feet and upwards. Mr. Thompson states that "the nest, a huge platform, some four or five feet in diameter, is constructed of small sticks and thick twigs, placed so as to form a footing for the young, and is lined with pieces of cloth, rags, etc." There is usually, both in the Himalaya and the Atlas, but a single egg to a nest; although, rarely, a pair may be met with. The eggs are oval, and rather small for the size of the bird, with their external surface dull and chalky, of a buff ground-colour, often clouded with darker markings. The young bird has been known to remain in the nest for upwards of four months.

Cinereous Vulture. The typical representative of the true vultures, and the only living member of its genus, is the common cinereous or black vulture (*Vultur monachus*), of which figures are given in the accompanying Plate, which

differs from all other members of the family in its circular nostrils. This bird derives its name from the plumage being generally entirely black, with chocolate reflections. The head is covered with thick velvety down, developed to form a conspicuous patch at the occiput, and on the cheeks more silky and produced into tufts. The naked portions of the head and neck are of a livid flesh-colour, while the iris is dark brown, the bill black, and the foot yellowish. In total length the bird is about 42 inches. This vulture inhabits the countries bordering both sides of the Mediterranean, whence it extends eastwards to India and China. Unlike the griffon vulture, to be next mentioned, this species is partial to wooded districts; although, as in our plate, both may frequently meet over the same carcase. It nests generally in trees, although failing these on rocks, and builds a bulky nest of boughs lined with twigs, in which a single large white egg, more or less richly marked with red, is laid. Like its kin, the black vulture is a bird of heavy and ungraceful form and a generally repulsive appearance; its habits, when not engaged in feeding, being sluggish and inert, its attitude slouching, and its disposition cowardly. It also resembles its allies in feeding entirely upon dead animals and other refuse; and it is these carrion-eating habits which render vultures so invaluable in tropical countries, where the care bestowed upon sanitary matters appears to vary inversely with the rise of the temperature. Repulsive and hideous-looking as are a group of vultures assembled round the carcase of a large animal, and gorging themselves to satiety upon its contents, their appearance is very different as they are seen wheeling in circles at a great height in the blue sky of a tropical noon; and no spectacle is more interesting than to watch the vultures flocking up from all parts when some of their number have detected a prey, and dropped to earth to feast upon it. Much discussion has taken place with regard to the manner in which vultures discover their prey, although it is now ascertained that this is mainly due to their marvellously keen power of sight. On this subject Jerdon writes that he has "known a small piece of fresh meat—a fore-quarter of a miserable sheep—exposed in the open bare plain where the eye barely discovered a few floating specks in the air high above, and in less than half an hour there would be a number of vultures feeding on it. It is out of the question that smell can have anything to do with this, and we know from experiments that vultures will discover and descend on a stuffed carcase of an animal, whilst they will neglect one well hidden, although putrid and offensive. I do not mean to assert that their sense of sight is illimitable, and, in the cases in which I have myself experimented, I do not mean to imply that the very distant birds, that looked like specks, were those to discover the piece of fresh meat; but ever and anon a bird at a much lower elevation, but still very high above the earth, would sail past, keenly urged by hunger to a closer investigation, and on his espying the morsel, and moving towards it, others at a greater distance, urged by his motions, would descend lower, and on being certified themselves, perhaps on the ground near, would drop down in a series of oblique plunges till they reached the ground also. That vultures, however, have also a strong sense of smell is undeniable; many experiments are recorded to show this; and I have myself frequently seen them flying closely and apparently in an excited and unusual manner, over a copse or thicket in which a putrefying carcase was placed." It is, however, only when



GROUP OF EUROPEAN VULTURES.

1, Black Vulture ; 2, Egyptian Vulture ; 3, Griffon Vultures.

the birds are flying at a low elevation that they are able to detect such hidden carrion. Not uncommon in the Himalaya at all seasons, the cinereous vulture visits the plains of Northern India during the winter, and is in some districts one of the commonest of its tribe at that season. Some individuals are of much lighter colour than the typical form; but there is every gradation in the colour of the plumage from the one to the other. In Bulgaria the breeding-season commences early in March; and the young birds are described as ugly in the extreme, being covered with brownish grey down, and having a pink cere and pale yellow legs and feet.

The second European representative of the true vultures is the griffon vulture (*Gyps fulvus*), of which examples are shown on the right side of our plate. Together with several other species, it constitutes a genus characterised by the somewhat oval and transversely placed nostrils, by the length of the metatarsus being less than that of the third toe, and the presence of fourteen feathers in the tail. The vultures of this genus range over the whole of Africa except the forest-districts of the west coast, the countries bordering the Mediterranean, a considerable portion of Eastern Europe, and thence through Persia to India, and so on to Siam and the Malay Peninsula. The griffon, or fulvous vulture, is a very variable species, ranging from Spain and North-Eastern Africa to India and Turkestan; the eastern form having a more rufous tinge of plumage. It is specially characterised by the feathers of the rump and lower part of the back having a pale centre along the shaft, and by the under wing-coverts being ashy or tawny rufous. In the typical form from Eastern Europe the large ruff round the throat is white, and the upper-parts of the body ashy fulvous, the rump and lower portion of the back being dark brown, with the above-mentioned fulvous centres to the feathers, while the wing-coverts are mostly edged and tipped with creamy white, and the upper tail-coverts pale ochrey buff. The quills and tail are black; and the under-parts pale creamy brown, with narrow whitish shaft-stripes to the feathers. The iris is reddish orange, the cere bluish black, the bill pale horn-colour, and the foot leaden grey. The total length of the bird is about 40 inches. The Himalayan griffon (*G. himalayensis*), ranging from the Himalaya to Turkestan, differs by the white under wing-coverts; while the African Rüppell's vulture (*G. rueppelli*), represented in the illustration on p. 258, may always be distinguished by the feathers on the lower part of the back and rump being brown with broad grey or fulvous margins, instead of with light centres. Moreover, the ruff is yellowish white, and the beak deep orange. The long-billed griffon (*G. indicus*) is rather smaller than the typical form of the common species, and differs from all the rest by its unusually bare head and thin beak, and is further characterised by the feathers on the lower part of the back and rump being whitish with faint brownish margins. It is an inhabitant of India and the countries bordering the eastern side of the Bay of Bengal. An extinct griffon vulture occurs in the Miocene deposits of Malta.

Unlike the black vulture, the European griffon vulture frequents open and rocky districts. Regarding its flight, Mr. O. Salvin writes that "it is a fine sight to watch the ease with which the griffon sails through the air; the apparently effortless extension of the wings seems amply sufficient to sustain its huge body, and no flapping motion is necessary to enable it to mount to

a great height. It is only on leaving a rock that a few strokes are requisite to attain the necessary impulse, after which, with primaries bent upward by the force of the air, it performs its stately evolutions by soaring only. In alighting, the bird drops its legs some distance from the rock, and, sailing to within a few yards, it checks its velocity by two or three heavy strokes of the wings." The griffon invariably nests on rocks, and in the south of Europe probably lays in February,



RÜPPELL'S VULTURE ($\frac{1}{2}$ nat. size).

as young ones are commonly found in most nests early in April. During incubation one bird sits constantly, and, if driven off, immediately returns. The nest is an immense structure composed entirely of sticks; and it is common to find from two to six nests placed near together. In the case of the Himalayan species, at any rate, but one egg is laid in each nest; the ground-colour being greyish white, upon which there may or may not be dark markings. In some cases the Himalayan griffon takes possession of the nest of an eagle, before its rightful owners have thought about breeding. Gifted with the power of undergoing long fasts, the

griffon, when it can obtain sufficient food, is a perfect glutton, Canon Tristram mentioning that he has seen one of these birds which was too gorged to stand, continue its feast while lying on its side. Griffon vultures, both of the common species and the kind confined to Africa, are exceedingly abundant in Abyssinia.

The long-billed vulture, which is found all over India, although it does not enter villages and towns, is remarkable for always building in large societies, which commonly include from ten to thirty pairs of birds. Such breeding-places are always situated on ledges of cliffs; and one near Ajmir described by Mr. Hume "was a cliff-face some one hundred feet high by three hundred wide, all broken up into irregular ledges, of which the highest overhung all the rest. In amongst the ledges were a few dwarf banyan trees, whose long bare roots and rootlets hung down, here and there, in dense, grey giant skeins. All the ledges, but the uppermost, when looked at from below, seemed garnished with heavy white fringes, the white droppings of the birds having run down in close parallel lines in a wonderfully symmetrical fashion over the weather-smoothed edges of the terraces. Seen from a distance, the whole cliff-face seemed mottled with huge patches of white-wash. Bleached bones and dusky quills strewed every little plateau, and nestled in every cranny." The young found at the end of March are described as presenting the appearance of huge unwieldy masses of yellow down, and were so fat that they could not support themselves on their feet for more than a few moments. According to native reports, they do not leave the breeding-place until three or four months old.

White-Backed Vultures. India and Africa each possess a vulture, agreeing with the long-billed griffon in having a white patch on the rump and lower back, but differing in having only twelve tail-feathers, on which account they are assigned to a separate genus—*Pseudogyps*. The Indian species (*P. bengalensis*) has the rest of the plumage nearly black, while in *P. africanus* it is browner. The former is the most common vulture in India, where it is found in immense numbers, both in the open country and in towns; it likewise extends to Burma and Malacca. Collecting round the carcase of every dead animal in numbers, these vultures may also at times be seen perched singly on a dead human body floating down the Ganges with their wings widely spread in order to steady themselves while they enjoy their ghastly meal. They breed both on rocks and in large trees, and, like all other Indian vultures, lay but one egg in a season.

Eared Vultures. Far less common than the members of the preceding genera are the two species of eared vultures, so termed on account of the large naked fleshy lappets on either side of the neck. In addition to these lappets, and other fleshy folds about the head, these vultures are distinguished by the completely bare head, and by the length of the middle toe being less than that of the metatarsus. Of the two kinds, the African eared vulture (*Otogyps auricularis*), which ranges from Abyssinia to the Cape, and occasionally visits the south of Europe, is considerably the larger, and is, indeed, only inferior in size to the condor, attaining a length of some 45 inches; the general colour of its plumage is brown, and the inner surface of the thigh is feathered. In the smaller Pondicherry vulture (*O. calvus*), on the other hand, the inner surface of the thigh is naked, and the plumage black; hence it is often spoken of as the black vulture, although that

name more properly belongs to the representative of the genus *Vultur*. Ranging from India through Burma to Siam, and by no means abundant in individuals, the Pondicherry vulture, according to Jerdon, is usually seen alone or in pairs, although occasionally four or five may be observed hunting in company over some rocky hill. Some of the other Indian vultures usually give place when this species arrives on the scene, on which account it is commonly known as the raj-sogno,



PONDICHERRY VULTURES GORGING ($\frac{1}{3}$ nat. size).

or king-vulture, among the natives of part of India. This vulture is a late breeder, generally laying in March, although some individuals begin as early as the end of January, and others delay till April. It appears to build invariably in trees; tall peepuls and banyans being its especial favourites. An anonymous writer to the *Asian* mentions that in April 1887 he came across a nest of this vulture in Sirmur. "Being on the hillside above, I could look right down into the nest; the owner was sitting very close, and it was only when I got quite near, shouted, and threw sticks at it, that it moved; then, standing up, it opened its beak and spread out its

wings by way of intimidation, at the same time disclosing to view one large white egg upon which it had been sitting. The nest, placed in the crown of the tree, was an enormous mass of sticks, with finer ones as a lining; and the large round white egg was very nearly hatched." A nest mentioned by Mr. Hume, which had been in use for several years, contained over 6 cwt. of material.

**Abyssinian
Vulture.**

Nearly allied is the Abyssinian vulture (*Lophogyps occipitalis*), distinguished by the head being covered with down, which forms a ridge on the occiput, and by the absence of the neck-lappets. It is a comparatively small species, with blackish brown plumage; and while probably inhabiting the whole of the east side of Africa, is found on the west only in Senegal.

**Egyptian
Vulture.**

The scavenger-vultures, of which there are two well-defined species, derive their name from the loathsome nature of the food of their typical representative, which consists chiefly of ordure, and are accordingly the most disgusting of their tribe. They are distinguished from all other vultures by their elongated longitudinal nostrils, and likewise by the slenderness and length of the beak, and are smaller than the other members of the family. The head and neck are partly bare, and the wings long and somewhat pointed, with the third quill the longest. The white scavenger-vulture, commonly known as the Egyptian vulture (*Neophron percnopterus*), which has occasionally visited the British Islands, and is represented in its adult and immature plumage in the centre of the plate on p. 255, is characterised by the general white hue of the plumage of the adult. The long hackles on the back of the head and neck have, however, a rusty tinge, and the secondary quills are mostly brown, and the primaries black. The typical form, which attains a length of 25 inches, and has the beak of a pale brown horny colour, inhabits the countries bordering both sides of the Mediterranean and Red Seas, from whence it extends southwards to the Cape, and eastwards to Persia and North-Western India. In Peninsular India it is replaced by a variety or species distinguished by its inferior size and yellow beak. In young birds the plumage is of a dirty brown colour, with the back and rump tawny; and during the intermediate stage the plumage becomes mottled with brown and white.

The Egyptian vulture is commonly seen in pairs or singly, and when on the ground stalks about with a peculiarly high action of the legs. In addition to the food already alluded to, these birds will also eat carrion; but their feeble beaks render them unable to tear open the tough hides of large animals, and they have to wait till the carcase is opened by their more powerful kindred. These birds build either on rocks or large buildings, or in trees, frequently in the suburbs of towns. The nest is large and composed of sticks and rubbish, usually lined with rags; its general shape being that of an irregular platform, with a slight depression in the centre. Mr. Hume observes that in many parts of India "wayfarers, as they pass particular trees, have a semi-religious custom of tearing a strip off their clothes to hang thereon, and the tree soon becomes loaded with rags and tatters. These are a perfect god-send to the neophrons of the neighbourhood, whom I have more than once watched robbing these local shrines of their trophies by the score. Sometimes the rags of various colours are laid out neatly in the nest, as if an attempt had been made to please the eye; sometimes they are irregularly jumbled up with the materials of the nest." The eggs, which are generally laid in the latter part

of March, are commonly two in number, although there may be three. In size, colour, and texture specimens differ much; but they are generally chalky, and vary from pure greyish or reddish white, with a few specks at one end, to a uniform dingy blood-red hue. The Egyptian vulture, or "Pharaoh's chicken," is well represented on the ancient sculptures of the country from which it takes its name, and is the bird alluded to in Leviticus under the name of Geier-eagle. On account of its value as a scavenger, it is still protected in Egypt, as it is in some other



PILEATED VULTURE ($\frac{1}{4}$ nat. size).

parts of Africa. In the Nile Valley its usual breeding-places are the tall mud-cliffs bordering the river.

A very different-looking bird to the foregoing is the African Pileated Vulture. (*N. pileatus*), in which the general colour of the plumage is chocolate-brown, with the quills and tail black: the naked portion of the head and neck being of a purple hue during life. In the typical South African form the total length of the bird is some 26 inches, but in North-Eastern and

Western Africa there is a rather smaller race, with a relatively longer and more slender beak, which has been regarded as indicating a distinct species. Compared with the Egyptian vulture, Mr. Blanford observes that the present species is "far more vulturine both in its flight and food. Numbers usually collect around a carcase, which is very rarely, if ever, the case with *N. percnopterus*. The difference is best shown in the fact that both Europeans and Eastern people frequently speak of *N. percnopterus* as a kite, whilst no one could ever consider *N. pileatus* as anything else than a vulture." The species is very common on the shores of Annesley Bay, but is less numerous in the Abyssinian highlands.

THE SECRETARY-VULTURE.

Family SERPENTARIIDÆ.

The well-known, but nevertheless very remarkable African bird (*Serpentarius secretarius*), represented in the figure on p. 264, differs so widely from all other Accipitrines in external appearance that an ordinary observer might have considerable hesitation in referring it to the same order. Doubts have, indeed, been entertained by some ornithologists as to its right to be included in the Accipitrines; but it appears, on the whole, to be allied to the vultures, next to which it is placed, as the representative of a distinct family. Needless to say, the secretary derives its name from the crest of long plumes rising from the back of its head, which have suggested a fanciful resemblance to a man with a bunch of quill feathers stuck behind his ear. Structurally, the secretary-vulture differs from all other members of the order by the great elongation of the tibia and metatarsus, which give it somewhat of the appearance of a crane with an eagle's beak; and it is also distinguished from the members of the two foregoing families by having basipterygoid processes on the rostrum of the skull, and its tufted oil-gland. It resembles both groups, however, in having the two nostrils separated by a median partition, and by the presence of a syrinx, or organ of voice, at the lower part of its windpipe. Its short-toed feet resemble those of the caracaras in having the three front toes joined by short webs at their bases.

In addition to the crest of plumes at the back of the head and its lanky limbs, the secretary is characterised by the great prolongation of the two middle feathers of the tail, which communicate an almost unique appearance. When adult, the bird will somewhat exceed 4 feet in height, while the length of the tail is just under 2 feet. The prevailing hue of the plumage is a delicate pearly grey, with the quills and primary coverts black, and the crest-feathers either grey tipped with black, or wholly black. The upper tail-coverts are white; and of the tail-feathers the long middle pair have white tips preceded by a broad black band, but are elsewhere pure grey, while the others are darker grey, with white tips and two blackish bars. On the under-parts the breast and under wing-coverts are white, with a faint ashy tinge, the thighs and abdomen black, and the under tail-coverts white. The iris is grey, and the leg and foot yellowish. The existing secretary-vulture ranges over the whole of South Africa, and extends along the eastern side of the Continent to the Sudan and Abyssinia; while on the west coast it is

found in Senegambia. During the Miocene period the genus was represented by a species inhabiting the south of France, distinguished by its relatively shorter and stouter legs.

Living generally in pairs, the secretary is far from uncommon in many parts of South Africa, although it is rare in the Abyssinian highlands. One of its



SECRETARY-VULTURE ($\frac{1}{2}$ nat. size).

peculiarities is the pace at which it can walk, a wounded individual being described by Mr. Blanford as walking away as fast as he could run after it. From the number of snakes, lizards, locusts, etc., taken from the stomachs of these birds, there can be no doubt but that they are in general large consumers of those reptiles and insects; although there may perhaps be some hesitation in accepting all the stories as to the large size of the snakes they habitually kill. Messrs. Nicolls and

Eglington are indeed disposed to throw considerable doubts on the snake-killing propensities of these birds, and state they have known them in South Africa endeavour to avoid coming into contact with even small snakes. On the other hand, they are declared by the same writers to be deadly foes to the young of all kinds of game-birds, as well as of hares and antelopes, on which account they advocate their destruction rather than their protection. In a specimen examined by Mr. H. A. Bryden the stomach was found to contain a small tortoise, a mouse, four lizards, and a large quantity of locusts. "There were no snakes," writes the narrator, "or remains of snakes; nor were there any indications that the great bird had been recently feeding on hares or game-birds." We have, however, graphic accounts by Jules Verreaux of combats between the secretary-bird and snakes of 5 or 6 feet in length, which always ended in the victory of the former. And other writers state that in some districts these birds feed largely on tortoises. With these differences of opinion, it is obvious that further observations are required before we can speak decisively as to the mode of life of the secretary.

With regard to its breeding-habits, it appears that during June or July the males begin to fight among themselves for the possession of the females; and, as soon as the victor goes off with a consort, the two set about the repair of the nest. The latter is placed in a tall bush or a mimosa tree, and is said to be used for several years in succession. It is formed of sticks and clay at the base, while its flat top is covered with vegetable wool, feathers, and other soft substances. In August the hen-bird lays from three to four eggs, which are about the size of those of a goose, and are generally either pure white, or white faintly spotted with red. During the time that the hen is sitting, she is regularly fed by the cock-bird, and in the course of about six weeks the young are hatched. For a long period the young are completely helpless and unable to stand upon their long legs; and it appears that they do not leave the nest for five or six months.

In spite of spending such a large portion of its time on or near the ground, the secretary-bird can fly well and strongly, although in a somewhat heavy manner. It may at times be seen soaring high in the air, with motionless, outstretched wings, after the manner of a vulture, and may always be recognised by having its head stretched out straight in front, and its legs extended backwards below the tail. When pursued, these birds generally keep to the ground, and if hunted from horseback they give a good chase, which does not end till they fall from pure exhaustion.

THE AMERICAN VULTURES.

Family *CATHARTIDÆ*.

That birds so closely resembling in general appearance the true vultures as do the vultures of the New World should be far less closely related to them than are the falcons or even the secretary-vulture may seem extraordinary, but it is nevertheless a fact: and the external resemblance between the members of the two groups must accordingly be attributed to the effects of that parallelism in development to which we have before alluded. So different, indeed, are these birds from other Accipitrines, that it is probable the three preceding families should be brigaded in

one great group equal in rank to a second including only the present family. Some ornithologists go even further than this, and refuse to admit the American vultures within the limits of the Accipitrine order; but the correctness of this view we are not yet prepared to admit. Agreeing in general appearance and their bare heads and necks with the vultures of the Old World, the American vultures can be distinguished at a glance by the absence of any partition between the two nostrils, so that (as seen in our figure of the turkey-vulture on p. 275) there is a hole right through the upper part of the beak. They also differ from the *Falconidae* and *Vulturidae* by the absence of after-shafts to the feathers; in which respect, as also in the presence of basipterygoid processes on the rostrum of the skull and in the naked oil-gland, they resemble the owls. A remarkable peculiarity of the group is the absence of a syrinx, or voice-organ, in the lower part of the windpipe, in consequence of which the only sound that these birds can utter is a kind of hiss. In their length of limb these vultures agree with the Old World group, but the first toe is more elevated. There are, altogether, about nine species of these birds, of which the majority are at least partly South American, although the range of the family extends about as far north as the northern boundary of the United States.

Condor.

Largest of all the birds of prey, the condor of the Andes (*Sarcorhampus gryphus*) is the type of a genus characterised by the head of the male being furnished with a large erect fleshy wattle, which forms a median crest immediately behind the beak; and also by the rounded wings, in which the primary and secondary quills are of nearly equal length, exceeding twice the length of the tail. The first toe is very short; while the second and fourth toes are of nearly equal length. The female lacks the head-wattle of the male; but in both sexes the beak is characterised by its comparative shortness and depth. In the male condor the general colour of the plumage may be described as glossy black with grey on the wings; most of the wing-coverts, as well as all the secondaries and the inner primaries, having their external margins ashy white. The large downy ruff round the neck is pure white; and the bare parts of the head, neck, and chest have a wrinkled and mostly dark coloured skin, developed into a wattle on the throat and another on the chest. Horny brown at the base, the bill becomes ivory-white at the tip, while the feet are blackish, and the iris of the eye pale brown. In the smooth-headed and smaller female the iris is red, and there are no wattles on the neck and chest. According to Darwin, the length of the male is about 48 inches, and the body is of immense size and weight, while the span of the wings probably reaches 9 feet. A smaller condor from Ecuador and Quito has a uniformly brown plumage, and the whole beak blackish.

The condor is especially characteristic of the Peruvian and Chilian Andes, where it is usually found in the zone lying between nine thousand and sixteen thousand feet; its range extends, however, from Quito to the extreme southern point of the Continent, and in Patagonia it frequents the steep cliffs on the coast. It has been often stated that these birds may be seen soaring round the highest peaks of the Andes, from whence they suddenly descend to the level of the plains, but the observations of Mr. Whymper have shown that this is incorrect. In the neighbourhood of Chimborazo that traveller never observed these birds anywhere near the mountain summits, whence he concludes that the upper limit

of their ordinary range cannot be more than sixteen thousand feet; while in the same district they do not appear to descend below some nine thousand feet. Since, however, condors in Patagonia are commonly seen at the sea-level, it is probable that there is an upland and a lowland race, and that the same birds do



CONDORS FLOCKING TO A DEAD GUANACO.

not range from the level of the sea to elevations of sixteen thousand feet. In regard to their habits when on the wing, Mr. Whympers writes that "on the few occasions upon which we were approached by condors in a menacing manner, we became aware of their presence from their shadows being cast upon us by a nearly vertical sun. They never came near when the sun was concealed, and if they hovered in our neighbourhood they always kept the sun at their backs. This cannot be their invariable habit in a country where the sun is so often invisible, though possibly it is adopted whenever there is a chance, and the motive is obvious. The objects to be attacked are dazzled by the sun's rays, while the

assailants are enabled to inspect their brilliantly-lighted intended victims at their ease, whose eyes are picked out at the earliest opportunity, and are thus rendered completely defenceless. The herdsmen on Autisana had lifelong familiarity with the condor, and did not stand in awe of it. They told me that the bird was particularly addicted to old horse and young calf, and might, after feeding, be easily caught with the lasso." Darwin writes that the old birds generally live in



MALE AND FEMALE CONDORS ($\frac{1}{3}$ nat. size).

pairs, but on the inland basaltic cliffs of Santa Cruz there is a spot which used to be haunted by scores of these birds. "On coming suddenly to the brow of the precipice, it was a grand spectacle to see between twenty and thirty of these grand birds start heavily from their resting place, and wheel away in majestic circles. Having gorged themselves with carrion on the plains below, they retire to their favourite ledges to digest their food. From these facts the condor must to a certain degree be considered as a gregarious bird. In this part of the country they live altogether on the guanacos which have died a natural death, or, as more

commonly happens, have been killed by the pumas. I believe, from what I saw in Patagonia, that they do not on ordinary occasions extend their daily excursions to any great distance from their regular sleeping-places. The condors may often be seen at a great height, soaring over a certain spot in the most graceful circles. On



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GATCHOS LASSOING CONDORS.

some occasions I am sure that they do this only for pleasure, but on others, the Chileno countryman tells you that they are watching a dying animal, or the puma devouring its prey. If the condors glide down, and then suddenly all rise together, the Chileno knows that it is the puma which, watching the carcass, has sprung out to drive away the robbers. Besides feeding on carrion, the condors frequently

attack young goats and lambs; and the shepherd dogs are trained, whenever they pass over, to run out, and looking upwards to bark violently." From the feeble grasping power of their feet, and especially the small size of the first toe, it is perfectly evident that condors cannot carry off animals of any size, and all the legends of their flying away with children may be discredited.

Frequently roosting in trees on the lower grounds during a considerable portion of the year, in the breeding-season condors retire to the most inaccessible parts of the mountains or sea-cliffs. Here during the summer months of November and December the female deposits two large white eggs on some rocky ledge, without any attempt at making a nest. The young are clothed with grey down, and remain a long time in the breeding-place, where they have been observed as late as May. Owing to their destructive propensities, condors are incessantly persecuted by the natives, and have thus been greatly reduced in numbers in many districts. Mr. Whympers states, however, that as many as a dozen may still be seen at a time in the neighbourhood of Chimborazo. The birds may be either lassoed when gorged, or noosed while roosting in trees; while the Chilenos also capture them by surrounding a carcass with a fence of sticks, in which an opening is left, and then galloping up on horseback when the birds are gorged, and thus enclosing them. As a condor requires a certain space in which to run before being able to rise from level ground, the fence effectually prevents their escape. To shoot a condor on the wing requires some stratagem, as at a distance of thirty or forty yards a charge of buckshot produces no effect. Mr. J. R. H. MacFarlane relates that he was able to draw the birds within distance by tying up his dog and concealing himself behind a rock close by. "Soon," he writes, "I perceived that the plaintive noises made by my dog had produced an effect; gradually the condors passed and repassed in their majestic flight, curiosity bringing them each time nearer and nearer, till at last I saw the most inquisitive bird passing within five yards of my retreat, when to drop the lock and deliver the contents of both barrels was the work of a second. To see a heavy bird such as a mallard suddenly drop with a thud, is generally satisfactory, so my feelings may be understood when my raptorial friend plumped down about two hundred feet below, sliding and rolling down the sand of the precipice, at the foot of which I found him lying as dead as a stone."

King-Vulture. The brilliantly-coloured king-vulture (*Cathartes papa*) is distinguished generically from the condor, to which it is far inferior in size, by the second toe being longer than the fourth, and by the whole of the front of the head of the male being covered with wattles, while the female has a single upright wattle over the nostril. During life the naked portions of the head and neck of the male are coloured with shades of orange, purple, and crimson; while the plumage of a large portion of the upper-parts is cream-colour tending to fawn; the greater wing-coverts and quills, together with the lower part of the beak, rump, upper tail-coverts and tail, are black; and nearly the whole under surface white with a tinge of cream. Round the neck the feathers are deep grey; the beak is yellowish horn-colour, with a brown base; the feet are greyish black; and the iris is white. The female is more soberly coloured, having the whole of the upper surface dark.

The king-vulture has a more northerly range than the condor, extending from Brazil to Mexico, Texas, and Florida, and also occurring in Trinidad. Reaching in the mountains to an elevation of about five thousand feet, this splendid bird has its true home in primeval forest or well-wooded plains; and it is utterly unknown in dry open districts, or on barren mountains. A comparatively scarce bird, it roosts at night in low trees,—frequently in company,—and sallies forth at early



KING-VULTURE ($\frac{1}{2}$ nat. size).

dawn in search of carrion and other food. Although the female is known to lay two white eggs, there is some uncertainty as to the location of the nest. Azara was told by the natives that it was always placed in hollow trees, but this has been doubted by other writers; and Burmeister states that the nest is built high up on a tree, frequently on the very summit of one that is dead and bare.

American Black Vulture. The two remaining genera of the New World vultures are readily distinguished from the preceding ones by the absence of an erect wattle on the naked head in both sexes; while they are further characterised by the wings

being pointed and less than twice the length of the tail, with their primary quills considerably longer than the secondaries. The present species (*Catharista atrata*), which is the sole representative of its genus, is characterised by the squared extremity of the tail, and by the interval between the tips of the primaries and secondaries being less than the length of the metatarsus. In colour the black vulture is a nearly uniform black, although the shafts of the primary quills are



AMERICAN BLACK VULTURE ($\frac{1}{2}$ nat. size).

white on both sides, and those of the tail-feathers brown above and white beneath. Both the beak and feet are bluish, while the iris is dark brown. The total length is only about 25 inches. Its regular range extends from about the northern frontier of Patagonia to North Carolina and Texas; while irregularly, or casually, the bird is found as far north as New York and South Dakota. In the States it is commonly known as the carrion crow. With the exception of the extreme northern portion of its range, the black vulture is a resident species in the districts it frequents; and is far more abundant near the coast than in the interior, in the United States being more numerous than the turkey-vulture

in the former situations, while it is outnumbered by that bird in the heart of the country. As the habits of this vulture are very similar to those of the turkey-vulture, it will suffice to say that these birds are more or less gregarious, frequently breeding in small companies, and making little or no nest for the reception of their two eggs, which appear to be always placed on the ground, either under the protection of low bushes, logs, or rocks, or in perfectly open situations. They rarely breed north of latitude of 39°; and in the Southern United States the eggs are laid early in March. The ground-colour of the eggs is pale greyish green, upon which are more or fewer reddish markings. Describing a breeding-place of these birds on a small island off South Carolina, Mr. W. Hoxie states that, under a dense growth of yucca, he has "taken nineteen eggs in one afternoon, and seen at the same time five or six pairs of newly-hatched young. There is never the slightest attempt at forming a nest, or even excavating a hollow. The eggs are laid far in under the intertwining stems of the yuccas, and, in the semi-shadows, are quite hard to be seen. The parent birds have, however, the habit of always following the same path in leaving and approaching their precious charge; and, after a little experience, I learned to distinguish these traces so well that I seldom failed to follow them up, and secure the coveted treasure."

Turkey-Vulture.

The name of the turkey-vulture, or turkey-buzzard, as it is commonly called in North America, will always be associated with that of Charles Waterton, as being the bird which gave rise to the great dispute between that original observer and Audubon as to whether vultures detected their prey by sight or smell. Although the English naturalist stoutly maintained that Audubon's experiments were inconclusive, and that the turkey-vulture was solely guided by scent, the views of his adversary have been now very generally accepted. The turkey-vulture (*Rhinogryphus aura*) is one of several species, distinguished from the black vulture by the rounded form of the tail, and by the interval between the tips of the primary and secondary quills exceeding the length of the metatarsus. The present species is one of the smaller representatives of the genus, measuring 30 inches in length, and characterised by its plumage being generally black, with the wings washed with brown, the shafts of the primaries brown on the upper surface, and the red head. The allied *R. perniger* has the plumage all black, and the head yellow; while in *R. falclandicus* the wings are washed with grey, and the head pink; and *R. urubitinga* differs by its orange head and the white shafts on both sides of the primaries. All these three latter species are exclusively South American. The turkey-vulture, on the other hand, has the widest distribution of any member of the family, ranging over nearly the whole of temperate and tropical America, inclusive of the West Indies. Southwards it extends to Patagonia and the Falkland Islands, while its northern limits are marked by New York and British Columbia. In the southern and middle United States these birds are exceedingly common; and in some of the southern towns and villages, when not molested, they may be seen perambulating the streets, or roosting on the housetops, with perfect unconcern of the passers-by. Capt. Bendire writes that they look their best aloft, as their flight is exceedingly easy and graceful; while the apparent absence of all effort as they sail in stately manner overhead, in ever-changing circles and without

any apparent movement of their well-shaped wings, makes them really attractive objects to watch." Like all their kin, they are, however, essentially scavengers, and when on the ground are by no means pleasing creatures. Dr. W. J. Ralph writes that although carrion-eaters, they prefer fresh meat to that which is tainted, but that being unable to kill game for themselves, while their weak bills are incapable of tearing open the skins of large animals, they have seldom an opportunity of exercising their preference. "When they find a dead animal they will not leave



A GROUP OF TURKEY-VULTURES ($\frac{1}{2}$ nat. size).

it until all (but the bones and other hard parts) has been consumed, and if it be a large one, or if it have a tough skin, they will often remain near it for days, roosting by night in the trees near by. After they have eaten—and sometimes they will gorge themselves until the food runs out of their mouths when they move—they will, if they are not too full to fly, roost in the nearest trees until their meal is partly digested, and then commence eating again. Many times I have seen these birds in company with the black vulture floating down a stream on a dead alligator, cow, or other large animal, crowded so closely together that they could hardly keep their balance, and followed by a number on the wing." In spite of

this close crowding, they never seem to fight much when feeding, although one will at times peck and hiss at another; and at times two will tug at a particularly tough fragment, until it either break or the weaker bird gives up his hold."

The nesting-habits are very similar to those of the black vulture, although, instead of always laying its eggs on the bare ground, the present species will also nest in caverns and crevices of rocks, or in hollow trees, while it has been known to take possession of a deserted heron's nest in a cactus. Generally, the smell of a nest is unbearable; and when disturbed the parent birds have sometimes the habit of disgorging the contents of their stomachs at an intruder, instead of moving. The young, which are covered at first with soft white down, are fed in a similar manner. The eggs are usually two, but may be three in number, and an instance of four young in one nest is recorded. In colour the eggs are creamy white, thickly blotched with red and chocolate. At times the nests, if such they can be called, are in companies, but at others singly. The only sound uttered is a kind of hissing wheeze, generally heard only when the birds are disturbed.

Californian
Vulture.

Far larger than either of the other members of the genus is the Californian vulture (*R. californianus*), which, according to Mr. F. A. Lucas, may even exceed the condor in expanse of wing. In this bird there is no distinct ruff of downy feathers round the neck, while the general colour of the plumage is brownish black; the tips of the greater wing-coverts are, however, whitish, forming a line across the closed wing, and there is a broad band of white along the under side of the wing, which renders the bird easily recognised when flying overhead. This vulture always had a very restricted distribution, being confined to the Pacific coast region of the United States from Oregon to Northern Lower California; and it now appears to be found only in California, where its home is in the almost inaccessible secondary ranges running parallel to the Sierra Nevada. Never very numerous, the Californian vulture has been decimated by the poisoned meat laid out by the stockmen for the destruction of carnivorous mammals; and in 1891 Mr. Lucas considered that the bird was likely to be exterminated before many years. More recently, however, Capt. Bendire states that in some of the most barren and inaccessible mountains these vultures have again commenced to hold their own, so that there is a possibility of their increase. Although from the weakness of their claws and beaks the powers of offence of these vultures are comparatively small in proportion to their size, yet their strength is very great, as is attested by the fact that four are known to have dragged the carcass of a young bear weighing one hundred pounds for a distance of two hundred yards. The flight of this bird, according to Capt. Bendire, "is graceful beyond comparison, as it sails majestically overhead in gradually contracting or expanding circles, now gently falling with the wind, and again rising easily against it, without a perceptible motion of its pinions. While on the wing, it looks more than the peer of any of our birds, the golden eagle not excepted." Little is known of its breeding-habits, but it appears that the huge nest may be placed either on rocks or in trees; one that is described being situated on the limb of a large redwood tree, at a height of seventy-five feet from the ground, and close to the stem. The eggs are of a uniform greenish white colour.

CHAPTER XIII.

THE CORMORANT GROUP,—Order STEGANOPODES.

THE two ordinal groups of birds forming the subject of this and the next chapter agree with those considered in the two previous chapters in having bridged, or desmognathous palates, and likewise in the want of a projecting external process at the lower end of the humerus. The first order, which includes not only cormorants, but also darters, gannets, pelicans, and frigate and tropic-birds, may be known as the cormorant-like, or steganopodous group, and is at once distinguished from all others by the whole four toes being connected together by a web, which



RIGHT FOOT OF PELICAN.

generally extends to their extremities; while the angle of the lower jaw is not produced behind its point of attachment to the skull. These birds are further characterised by the shortness of their legs,—this shortness being most marked in the frigate-birds,—and also by the plumage of the neck being without gaps, and continuous. Their skulls lack the deep grooves for glands on the frontal region characterising many other aquatic birds; and its rostrum has no basipterygoid processes for the articulation of the pterygoid bones. There is a tufted oil-gland, and the young are helpless, and pass through a downy stage.

As a rule, their bodies are elongated, the neck of medium length, and the head small; while the beak may be either long or short. The wings may be long and rounded, or exceedingly elongated and pointed; and although the tail is variable in form, it is always very different from that of other swimming birds. Although several members of the group frequent the coast, it is only the representatives of two families that are purely pelagic in their habits; while many species inhabit rivers or lakes far removed from the sea. All are carnivorous, subsisting almost entirely on fish; but their breeding-habits vary considerably, although both parents take their share in incubation. The eggs, which may be either one, or from two to four in number, are of relatively small size, much elongated, and generally invested with a chalky coating over the uniformly coloured shell. Occasionally, however, they are smooth-shelled, with dark markings upon a light ground. While some fish by diving into the water from a height, others capture their prey by thrusting their necks down into the water as they swim, while yet others follow the fish of which they are in pursuit beneath the water. Some diversity of view obtains among ornithologists as to the number of family groups into which these birds should be divided.

CORMORANTS, DARTERS, AND GANNETS.

Family *PHALACROCORACIDÆ*.

The cormorants, of which there are some thirty species, are the typical representatives of the first family of the order, and are characterised by their elongated



COMMON CORMORANT.

but powerful body, the long neck, which may vary considerably in thickness, the moderately long and narrow beak, of which the tip is sharply deflected, and by their lineal and concealed nostrils. The face and throat are naked, the legs short and stout, with the first toe articulated to the inner side of the metatarsus; and the claw of the third toe has a serrated inner margin. The wings are of moderate length, with the third quill the longest; and the tail has either twelve or fourteen feathers remarkable for their extreme stiffness. Cormorants, although far more numerous in the warmer regions of the globe than in northern climates, have an

almost cosmopolitan distribution, inhabiting countries as remote from one another as Britain and New Zealand. Whereas, however, some seldom leave the neighbourhood of the sea, where they take up their stations on rocky islands, others frequent reedy swamps and marshes, or the banks of rivers and lakes, and rarely, if ever, visit the sea. While the more northern species are migratory, this is not the case with their more southern cousins. Fossil cormorants date in Europe from the lower portion of the Miocene period. All cormorants are characterised by the dark blackish, bluish, or greenish hue of the plumage of the upper-parts, which generally has a more or less marked metallic tinge; and the head may be ornamented with one or two crests of feathers. The best known, and at the same time the typical representative of the genus, is the common great or black cormorant (*Phalacrocorax carbo*), which ranges over the whole of Europe, a large part of Eastern North America, Northern Africa and Egypt, and the greater portion of Asia, and is represented by a closely allied form in Australia and New Zealand. The species is characterised by the presence of fourteen tail-feathers, and attains a length of about 36 inches. In the adult bird the plumage of the head and part of the neck during the spring and summer is black, with a number of hair-like white feathers intermingled, while the feathers of the back of the head are elongated into a crest. The back and wing-coverts are dark brown, with black margins to the feathers; the quills and tail are black, and the lower portion of the neck and under-parts, save a white patch on the thigh, are bluish black. Of the naked portions, the base of the upper mandible, together with the dilatable membrane of the lower jaw, are yellow, the greater part of the beak is horny, and the legs and toes are black. In the northern part of its range the common species is accompanied by the smaller green, or crested cormorant or shag (*P. graculus*), as it is indifferently called, which also ranges still farther to the north. This British species, in addition to its smaller size, may be distinguished by the presence of only twelve feathers in the tail, and the general green hue of the plumage, which lacks the white patch on the thigh. Like the larger species, both sexes have a crest in the breeding-season; but this is wanting during the winter, and in young birds at all times. This cormorant is essentially a marine species. It is replaced in the Mediterranean by an allied form, *P. desmaresti* or *pygmaeus*, which has brighter coloured plumage, and is generally said to lack the crest. This form extends eastwards to Java, and is likewise an inhabitant of salt or brackish water. The South African *P. capensis* is also nearly related. Cormorants are by far the most expert divers of the order to which they belong, and both swim and dive with a speed and power which cannot fail to arouse the admiration of all beholders. On land their movements are awkward and ungainly, but their flight, although heavy, is strong and comparatively swift. Feeding almost exclusively on fish, these birds are the very type of greediness, and, after having eaten till they can swallow no more, will not unfrequently still try to catch any prey that may come within their reach. When fishing, cormorants often swim with their heads below water, and they also capture a large number of fish by pouncing down upon them from a perch near the bank as they appear at the surface of the water. In general, cormorants are social birds, and frequently associate in vast flocks, as is the case with the South African species, which is found in such numbers

on the rocks near Cape Town as at times to darken the air when on the wing. Such companies continue together during the breeding-season, and may make their nests either in the neighbourhood of swamps, or on ledges of rock. In Burma Mr. Oates describes vast flocks of the common species breeding on low trees at a height of from fifteen to twenty feet above the water on the margin of a swamp; and Mr. Doig records another similar breeding-place in India. In the latter instance "the nests were large platforms of sticks, about two feet in diameter one way and two and a half feet the other; that is, they were more oval than circular. The eggs were laid on a thin bedding of rush and grass, and the greatest number in one nest was seven. Some had only three, others four, five, and six; the latter seeming to be the normal number, although some nests had only four young ones." That this breeding-place was a very ancient one, was evident by the circumstance of the nests being built on the top of those of previous years. The eggs have a very pale blue shell, much encrusted with chalky matter, and become very dirty during the process of incubation. In Kerguelen's Land Moseley states that the warty cormorant (*P. verrucosus*)



CORMORANTS FEEDING THEIR YOUNG.
(From Sclater, *Proc. Zool. Soc.*, 1882.)

breeds in companies on the ledges of the cliffs sloping down to the sea. They make a neat, compact, round nest, raised about a foot from the ground, and composed of mud, with a lining of grass. The number of eggs in this place was only two to three in a nest. He also says that the young birds, with their coat of black down, were exceedingly ugly; and that "when there are three in the nest nearly full-fledged they form an absurd sight, since the nest is then not big enough to hold more than one properly, so the greater part of the bodies of the three young projects out; and then, to crown the absurdity, the mother comes and sits on the top of these three young as big as herself." The young feed themselves by poking their heads far down into their parents' throats, and extracting the half-digested fish from their stomachs. Although often roosting on rocks, in some places cormorants spend the night in trees; and on some parts of the Nile in Egypt they congregate at night by hundreds in the palm-trees fringing its banks.

In China and Japan cormorants have been trained to fish for their masters from time immemorial, and early in the seventeenth century this practice was introduced into Europe as a sport, which was followed both in Holland, France, and England. In the East the cormorants are taught to fish either from the bank or from a raft, and although young or imperfectly trained birds wear a collar, to which a cord may be attached, to prevent them swallowing their prey, in many cases the fully trained birds are allowed to fish without any kind of restraint. Till they receive permission to forage for themselves, they invariably bring all their captures to their owner; and it is said that when the bird has seized a fish too large for it to carry unaided, another immediately comes to its assistance. In captivity cormorants are readily tamed, and exhibit considerable intelligence and attachment. Although generally considered highly unpalatable, their flesh is relished by Arabs and Lapps. Not only on account of being the largest member of the genus, but as having been exterminated comparatively soon after its discovery, Pallas's cormorant (*P. perspicillatus*) claims a passing notice. The plumage both above and below was a deep lustrous green, with a blue gloss on the neck, and purplish reflections on the scapulars. Long straw-coloured feathers were interspersed on the neck, and the shaft of the tail-feathers was white. Pale naked rings round the eyes suggested the specific name. Discovered on Behring Island in 1741, this fine species seems to have become extinct within about a century from that date.

Darters. The darters, snake-birds, or snake-necks, form a group of four species, readily distinguished from the cormorants by the much elongated body, the extraordinarily long and thick neck, and the small flat and narrow head, terminating in a straight, conical beak with a point as sharp as a dagger, and the edges of its mandibles finely serrated at the tip. The limbs are placed very far back on the body, and have long toes; the wings are elongated, but bluntly pointed, with the third quill the longest; and the long tail is rounded, and composed of twelve stiff feathers gradually increasing in width towards their tips. Both the quills and body-feathers are lustrous, and generally show metallic tints, those on the upper-parts being more or less elongated. Of the four species, one (*Plotus levaillanti*) is African, another (*P. ankinga*) South American, a third (*P. melanogaster*) inhabits India, Burma, and the Malay region, while the fourth is Australian. In the African species the prevailing hue of the plumage is black, with a metallic green lustre; the feathers of the back and wing-coverts having white shaft-streaks. The neck is rusty, with a blackish brown streak running backwards from the eye, and beneath this a line of white. The iris is generally reddish yellow, the naked areas on the head yellowish green, the beak horn-colour, and the foot greenish grey. In the female the tints are less bright. The New and Old World species, although externally so alike, differ remarkably in the structure of their internal organs.

Darters frequent the banks of rivers, lakes, and swamps, where they may be found either singly, in pairs, or in immense flocks; and generally select localities where trees are abundant, well-wooded islands being their especial favourites. On the rivers of the Chobi Valley, Livingstone states that one of these birds may be

seen perched on almost every rock and stump, "either sunning itself over the stream, or standing erect with outstretched wings. Occasionally it may be seen fishing, with its body so much submerged that hardly anything but the neck appears above the water. Its time of feeding is by night, and, as the sun declines, it may be seen flying in flocks to the fishing-grounds. It is a most difficult bird to catch, even when disabled, in consequence of its expertness in diving; it goes



AFRICAN DARTER ($\frac{1}{2}$ nat. size).

down so adroitly and comes up again in such unlikely places, that the most skilful boatmen rarely secure them." Of the black-bellied Indian species, Mr. G. Reid writes that "during the day it is fond of sunning itself on the grassy banks of lakes and on the bare branches of trees, on their margins flying off or darting into the water on the approach of danger. It is capable of moving for considerable distances under water, and usually swims with nothing but its head and neck exposed, though, when danger threatens, everything but its bill disappears, till it considers it has gone far enough to be perfectly safe, when it gradually shows up

again." When swimming with only the head and neck exposed, these birds may easily be mistaken for snakes; while their flight is exceedingly like that of cormorants. Their food consists exclusively of small fishes, which they capture in the water and transfix with their sharp beaks. From observations made on a captive specimen by Mr. Beddard, it appears that when fishing the darter swims beneath the surface of the water with its wings partially expanded, and with a peculiar jerky action of the head and neck, suggestive of a man poisoning a spear before throwing it. When within striking distance, the bird, by a vigorous lunge of the neck, impales the fish on the tip of its beak, and immediately afterwards rises to the surface, when it shakes off its prey by a series of jerks of the head and neck. In order to accomplish this bayoneting process, the darter has a peculiar "kink" in the vertebræ of the hinder part of the neck, which can be suddenly straightened out by muscular action, when the head is necessarily shot forwards. Darters build in trees; the African species generally placing its nest, which is very like that of the tropic-bird, on a bough from four to eight feet above the water. The eggs, which are three to four in number, have light green shells, thickly encrusted with the usual chalky coating. Soon after they are hatched the young have naked heads, but are elsewhere covered with dirty white down. In India the nests are frequently built in association with those of the little cormorant and herons. Certain gipsy tribes who travel in boats on the rivers of Eastern Bengal are very fond of taming darters, each of their vessels having one of these birds sedately perched on its stern.

Gannets.

The large and somewhat goose-like birds known as gannets and boobies, of which there are some nine species, are much more stoutly built than the darters, and have shorter and thicker necks and beaks. The beak is strong and conical, with its horny covering composed of several pieces, its cutting edges serrated, and its gape extending behind the level of the eyes; the nostrils being, as in the cormorants, situated at its base and almost invisible. The legs are short, and the claw of the third toe is pectinated like that of the cormorants. The wings are of great length, with the first quill the longest; and the twelve-feathered tail is rather short and wedge-shaped. A naked area occupies the face and throat. The skeleton differs from that of the cormorants and darters in that the furcula is not united by bone to the summit of the breast-bone.

The common or white gannet (*Sula bassana*), as the typical and best known example of the genus, will serve as our chief example. Measuring about 34 inches in total length, the adult gannet has the plumage entirely white, with the exception of that of the head and neck, which is buff, and the black primaries of the wings. The beak is horny white, the naked part of the face bluish black, the iris straw-colour, and the front of the leg and foot green, and the remainder nearly black. In young birds the plumage of the upper-parts is blackish brown flecked with white, while beneath it is mingled ashy and buff. Although occasionally driven inland by stress of weather, the gannet, like its congeners, is a coast-haunting bird, associating on certain cliffs, such as the well-known Bass Rock, in countless swarms. Its range extends over the coasts of the Northern Hemisphere as far north as latitude 70°, and as far south as the tropics; although the birds only frequent the southern portion of their habitat during the winter, and are but seldom seen at any

time in the Mediterranean. In Southern Africa, the place of this species is taken by the Cape gannet (*S. capensis*), distinguished by its nearly black tail; and the greater number of the representatives of the genus are inhabitants of the Southern Hemisphere. Although still breeding on the English coast at Lundy Island, it is on the Scotch and Irish shores that the gannet is found in great numbers; the Bass Rock being, however, the only station on the eastern coast where these birds resort



COMMON GANNET ($\frac{2}{3}$ nat. size).

for breeding. Gannets are also abundant in the Orkneys and Hebrides, and although less numerous on the Norwegian coasts, reappear in vast swarms on the shores of North America. The gannets on the Bass Rock have been so frequently described, that it will be unnecessary to give any account of the wondrous scene here. It may be mentioned, however, that the birds usually assemble in March, although laying does not generally commence till May; and some idea of the vast numbers of these birds may be obtained from the fact that formerly from fifteen hundred to two thousand young have been taken in a season. The nest, which is generally some

six inches in height, is formed of a mass of seaweed and grass placed upon the bare rock; and in this is laid a single egg, which is at first chalky white, with a faint blue tinge. During incubation, the birds become so tame that they will allow themselves to be handled; and it is somewhat curious, that on the ledges of the Bass Rock almost all the sitting birds have their heads turned towards the cliff. Gannets feed exclusively upon fish, and commit great devastation upon the shoals of herrings and pilchards, in search of which they often wander for long distances. Couch observes that "the gannet takes its prey in a different manner from any other of our aquatic birds; for, traversing the air in all directions, as soon as it discovers the fish, it rises to such a height as experience shows best calculated to carry it by a downward motion to the required depth; and then, partially closing its wings, it falls perpendicularly on the prey, and rarely without success, the time between the plunge and immersion being about fifteen seconds." The serrated third claw of the gannet, like that of the cormorant, appears to be for the purpose of dressing the plumage, and not for aiding in the capture of the prey, which is taken entirely by means of the beak.

On many of the islands of the southern seas gannets, or boobies, of various species, breed in vast numbers and exhibit remarkable tameness, or rather absence of fear. Among such breeding-places may be mentioned St. Paul's Rocks, Booby Island off Fernando do Noronha, and Raine Island off North-Eastern Australia. The white-bellied gannet (*S. leucogaster*) of St. Paul's Rocks and Raine Island, makes a slight nest of green twigs and grass on the ground; while the blue-eyed gannet (*S. cyanops*) merely digs a hole about an inch and a half deep. The latter species is nearly white, with the naked parts of the face blue and the iris bright yellow; while the smaller Australian, *S. piscatrix*, differs from both the others by its bright red feet. Moseley writes that "on the low cliffs of Booby Island the noddies [terns] and boobies nest on all the available ledges, and sat on their nests quite undisturbed as we rowed past them. It was curious to see the doves nesting together with these two sea-birds on the same ledges and with their nests intermingled." Remains of extinct gannets are found in the lower portion of the Miocene deposits of France; while the rocks belonging to the middle portion of the same period have yielded bones of a gannet-like bird with wings even longer than those of the albatross, for which the name of *Pelargornis* has been proposed. Nearly allied to the latter is the so-called *Argillornis* from the much older London Clay of England. Still more remarkable is the tooth-billed cormorant (*Odontopteryx*), of the latter formation, which, while apparently allied to the cormorants, differs from all existing birds in having the bony margins of the jaws produced into a number of tooth-like processes.

THE PELICANS.

Family PELECANIDÆ.

Although pelicans are now quite unknown in Britain, the occurrence of their bones in the fens of Norfolk and Cambridge indicates that comparatively recently they were at least occasional visitors. The largest representatives of their order, these birds are distinguished from all others by the enormous development of the

beak, which is of great length, much flattened, and marked by a number of furrows. To the lower mandible is affixed a large dilatable pouch of great capacity; so that the whole beak may be compared to a bag-net, to which the upper mandible acts as a lid. The extremity of the latter ends in a slightly hooked knob, of which the horny covering is from time to time shed. The body is very



EUROPEAN PELICAN.

massive, the neck long and comparatively slender, the head small, and the legs are short with very elongated toes. The wings, in which the third quill is the longest, are large and broad; and the tail, which contains from eighteen to twenty-four feathers, is short, broad, and rounded. Although thick, the general plumage is remarkable for its harshness and roughness, the feathers of the breast ending in narrow points; while on the back of the head there is generally a helmet-like crest. The adults of the two sexes are nearly similar in coloration, but the young are

very different. In the skeleton the furcula is welded to the breast-bone, as in the cormorants; but the vertebræ of the back differ from those of the latter in having saddle-shaped, instead of ball-and-socket surfaces for articulation with one another. All the bones, and likewise the integuments, are penetrated to a most remarkable extent by air-cavities. Pelicans, of which there are some half-score of kinds, are restricted to the tropical and warmer regions of the globe, where they have a very wide distribution. They are all very similar in general appearance and habits, although the American white pelican (*Pelecanus trachyrhynchus*) differs from the rest in being an expert diver. The common European pelican (*P. onocrotalus*), as the best known representative of the genus, will serve to illustrate the habits of all. It belongs to a group characterised by the feathers of the forehead extending forwards in a point on to the upper part of the beak. During the breeding-season the back of the head carries a somewhat elongated crest; the upper mandible is reddish at the base and yellowish at the tip, with a line of crimson along the middle, while the lower mandible is pale red, and the pouch and naked space round the eye, as well as the feet, are flesh-coloured. Of the plumage, the primaries and bastard-wing are black; the long feathers on the front of the lower part of the neck yellow; and the remainder white, with a tinge of rose-colour. The tail has eighteen feathers. In birds of the first year, the plumage is a uniform greyish brown, the lanceolate feathers of the breast being wanting; and it is not till some years that the full plumage is acquired, the depth of the rose tint being most marked during the breeding-season. This species, which attains a length of about 5 feet, inhabits the more southern parts of Europe and Northern Africa; while it also occurs in West Africa at Senegambia and Mozambique. While common in Hungary, the Crimea, Egypt, and the Ionian Islands, it only occurs occasionally in France and Algeria. In India there is a rather smaller form (*P. minor*) distinguished by the presence of a long pendent crest at all seasons; this form also ranging over Greece, Egypt, Abyssinia, and Western Africa. As to whether the common Bengal pelican is identical with the European species, there is some doubt. The other European species is the crested pelican (*P. crispus*), which belongs to the group in which the feathers of the forehead are truncated in front and terminate more or less squarely on the base of the beak. In this species the general plumage is white tinged with grey, the wing black, and the feathers of the crown and back of the head crinkled and elongated into a large crest. The eye is silver-white, the beak greyish yellow above, the pouch blood-red shaded with blue, and the foot black. Fossil pelicans occur commonly in the Miocene deposits of Europe, and also in the Pliocene of Northern India.

Habits.

Pelicans commonly occur in enormous flocks in the neighbourhood of swamps, estuaries, and rivers, and are sometimes so numerous that in India Mr. Hume speaks of having seen *miles* of them. Their food is mainly fish, of which they consume immense quantities, but crayfish have been taken from the stomach of the American species. In fishing they generally select water of sufficient depth to swim in, but which is not too deep to prevent them touching the bottom when swimming with their heads beneath the surface. In this posture a flock will frequently form a line or horseshoe, each bird stationed about a yard from its neighbour, and will fish the water in a most regular and systematic



FRIGATE - AND TROPIC-BIRDS.

manner from bank to bank. On reaching the opposite bank, the birds will either waddle on shore to preen and dress their feathers, and afford time for the digestion of their meal, or take flight to another piece of water. In general their periods of feeding and repose are marked out with great regularity. The females attend to the feeding of the young, this being effected by the old birds pressing their beak against their breast and raising the upper mandible, upon which the young, help themselves to the fish in the pouch; and it is doubtless from this action that the fable of the pelican feeding her offspring from the blood of her own breast took its origin. The eggs, from two to three in number, have thick bluish white shells, encrusted with chalky matter, and it is not uncommon to find both eggs and half-fledged young in the same nest. In India, at least, the male and female birds not unfrequently associate in separate flocks. In spite of their bulk and clumsy form, pelicans display extreme activity when on the wing, flying in lines with the neck bent back over the body, and all who have seen flocks of these birds under such circumstances, describe it as one of the most imposing and striking scenes that can be imagined.

FRIGATE-BIRDS.

Family *FREGATIDÆ*.

The two remaining families of the order—each represented by a single genus—differ from all the foregoing in being completely pelagic in their habits. The frigate, or man-of-war birds, are characterised by their slender body, short and thick neck, long and powerful hooked beak, of which both mandibles are deflected at the end, the extremely short legs, feathered down to the toes, their elongated and sharply-pointed wings, and the deep, swallow-like forking of the long tail. The feet differ from those of all other members of the order by the webs only extending a short distance up the long and sharply-clawed toes; and in the wings the first quill is the longest, while the tail has twelve feathers. There is a tract devoid of feathers around the eye and on the throat. The bones are more permeated by air-cavities than in any other bird, and there is a large dilatable air-sac beneath the throat. In the great frigate-bird (*Fregatus aquila*), which inhabits the warmer regions of the Atlantic, Indian, and Pacific Oceans, the plumage of the adult male is brownish black, shot with metallic green and purple on the head, neck, back, breast, and sides, and shaded with grey on the wings. The eye is brown, with the surrounding bare space purplish blue, the beak is light blue at the base, white in the middle, and dark horn-colour at the tip, the throat-sac orange-red in the breeding-season, and the foot carmine-red above and orange beneath. The females differ by their duller tints, and the presence of a larger or smaller pure white area on the breast. The lesser frigate-bird (*F. minor*) is confined to the Indian and Pacific Oceans.

The frigate-bird, which has received the title of the Son-of-the-sun, is one of the most swift and active of all pelagic birds, spending much of its time on the wing, often far away from land, and subsisting largely on the fish which it compels terns and other birds to disgorge. In regard to their predatory habits, Mr. H. O. Forbes writes that in the Cocos-Keeling Islands hiding in the lee of the cocoa-

nut trees, the frigate-birds would sally out on the successful fishers returning in the evening, and perpetrate a vigorous assault on them until they disgorged for their behoof at least a share of their supper, which they caught in mid-air as it fell. The swoop after the falling spoil was so elegant an evolution, that I always hoped that the poor noddy would give up as heavy a morsel as possible, in order to necessitate a correspondingly eager dive after it. Refractory gannets were often seized by the tail by the frigate-birds, and treated to a shake that rarely failed of successful results. Fierce foes as they were in the air, on *terra firma* they roosted near each other like the best of friends. On the island of Fernando do Noronha Moseley describes the frigate-birds as building their nests on the verge of an inaccessible precipice; these being visible on looking down from the top, and each containing a single egg. On the other hand, in the unmolested Raine Island, these birds nest on the ground.

THE TROPIC-BIRDS.

Family PHAETHONTIDÆ.

The tropic birds, or "boatswains," as they are commonly called by sailors, are represented by three species, and are somewhat inferior in size to the common English gull. In general appearance they are not unlike terns, from which they are, however, distinguished at a glance by the greatly elongated middle pair of feathers of the tail. In addition to this feature, they differ from the frigate-birds in their conical and pointed beak, near the base of which are situated the very large nostrils; by the longer and naked metatarsus, the completely webbed toes, and the absence of a bare space round the eye, and of a throat-sac. The best known and most widely distributed species is the red-beaked tropic-bird (*Phaethon aethereus*), ranging over the tropical regions of the three great oceans. In the adult the body plumage is white, with a reddish tinge, and black shaft-stripes to the feathers; the outer webs of the primaries are white, the hinder secondaries mingled black and white, and the two long tail-feathers white. The beak is coral-red, the eye brown, the leg yellow, and the web and toes black. In younger birds the feathers of the back have black bands at the tips; while in a still younger stage the middle tail-feathers are not elongated, and the beak is brown. The yellow-beaked tropic-bird (*P. flavirostris*) is distinguished by its yellow beak, and the red middle tail-feathers. Tropic-birds often follow in the wake of vessels for long distances, and display great boldness. During the breeding-season they frequent the Bermuda and Pacific Islands in great numbers, generally breeding in companies, and making their nests in holes in the rocks.

The writer once had the good fortune to see a living specimen of the white-tailed tropic-bird, which came on board the R.M.S. *Magdalena*, in the South Atlantic on September 5, 1893, during the night, in an apparently exhausted condition. After a night's rest it recovered, and flew away on being liberated. The pearly lustre of the lovely grebe-like plumage of the head and neck was particularly striking; and the beauty of the two long tail-feathers of this child of the ocean excited the admiration of all the beholders.

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FLORICAN AND MACQUEEN'S BUSTARD.

CHAPTER XIV.

HERONS, STORKS, AND IBISES,—Order HERODIONES.



STORKS ASSEMBLING FOR MIGRATION.

Agreeing with the members of the preceding order in their bridged palates, the absence of basipterygoid processes on the rostrum of the skull, the tufted oil-gland, and the presence of a downy stage in the helpless young, the herons and their allies the storks and ibises differ very markedly in general appearance, and present several important distinctive features. In the first place, their limbs—especially the metatarsal segment—are greatly elongated; and if the toes are webbed at all, the first toe is not involved. Secondly, the plumage of the neck, instead of being continuous, has a large bare tract reaching upwards from the spine. In all, the rather small and slit-like nostrils are placed near the root of the long, powerful, and generally sharp-pointed beak; but whereas in the

majority of the group the hinder end of the mandible is truncated, this is not the case with the ibises. Mostly birds of considerable size, the members of this order all have long and powerful wings, while in habits they are essentially waders and they generally nest in trees. Externally, herons and storks present a marked general similarity to cranes; but, as we shall see in the sequel, the latter differ in the structure of the palate, in their "precocious" young, and also in the conformation of the bones of the leg. In the cannon-bone the two outer trochleæ are of nearly equal length.



LOWER END OF THE LEFT
CANNON-BONE OF THE
INDIAN WOOD-STORK.

THE HERON TRIBE.

Family *ARDEIDÆ*.

The members of this family have the body thin and much compressed, the neck generally long and thin, and the beak straight, narrow, and pointed, with the



FURCULA OF HERON.

grooves in which the nostrils are placed stopping short of its extremity, and its cutting-edges serrated at the tip.¹ On the chin the feathering generally or always extends considerably in advance of the line of the nostrils. The leg is of medium length, with the front surface of the metatarsus covered with more or less scute-like plates, the toes are mostly three, and the claw of the third one is pectinated on the inner side. The wings, although large, are somewhat blunt at the tip, owing to the second, third, and fourth quills being nearly equal in length. The short and rounded tail has either ten or twelve feathers; and there are bare spaces round the eyes and on the lores. The presence of a so-called powder-down patch of crumbly downy feathers on each side of the rump is absolutely characteristic of the family; and there are no bare tracts on the sides of

the neck. The general plumage, which is very variable in colour, is soft and loose; the feathers on the crown of the head, back, and upper breast being frequently elongated. Externally the two sexes are chiefly distinguishable by difference of size. In the skeleton the lower mandible is not produced posteriorly to its articulation with the skull; and the V-shaped furcula is characterised by the projection of its median process within the angle, as shown in the figure. With the exception of the extreme north, herons—of which there are some seventy species—are met with in all parts of the globe, and at almost all habitable

¹ The boat-bill is exceptional in the form of the head and beak.

elevations. They are, however, most numerous in tropical and subtropical regions, where they form the predominating element in the bird-life of swamps and marshes. A few seem to prefer the sea-coast, others more generally frequent rivers, while the majority confine themselves to lakes and marshes. Some, again, are to be met with in the open country, while others are partial to thickets or woods. Their gait is slow and measured; and their flight of considerable strength, but uniform, and accompanied by continual flapping of the wings. Many of them habitually associate in large flocks, and all build in company; their large nests containing from three to six unspotted whitish or bluish green eggs. Essentially waders, most members of the family are able to swim to a certain extent; and, like the other members of the order, the whole of them are carnivorous; fish forming the greater portion of their diet, although many of the smaller species are large eaters of insects, and all will devour animals of any kind that they are able to capture.

True Herons. The common grey heron (*Ardea cinerea*) is the type of a large and widely distributed genus, characterised by the long, straight, sub-conical beak, in which the nostrils are pierced in a groove at the base, and partially concealed by a membrane. The long and slender legs are naked for some distance above the ankle-joint; the front of the metatarsus is covered with large scales; and the toes, of which the third and fourth are partially joined by a web, are of moderate length, the third being much shorter than the metatarsus. The wings are moderate, with the second quill the longest; and the short tail has twelve feathers of nearly equal length. Formerly strictly preserved in Britain for the royal sport of hawking, the common heron is in most parts left to look after itself, although several of its breeding-places are still well protected. Its distinguishing features are the crest of long blackish feathers depending from the back of the head; the white forehead and cheeks; the grey hue of the plumage of the upper-parts, tail, and wings; the black primaries; and the long white feathers covering the chest, above which the front of the neck is white marked with elongated bluish grey spots; the under-parts being greyish white with black streaks. The beak is yellow, the lore yellowish green, the iris yellow, and the legs and toes greenish yellow, with the claws brown. In total length the heron measures about 3 feet. The female is less brightly coloured and has shorter plumes than the male. The common heron ranges over the greater part of Europe, although it is not found in the extreme north, while in the south it is mostly a winter visitant only, although it breeds on the Lower Danube. Eastwards it ranges through Asia to China and Japan, and is common in many parts of India and Ceylon; while it has been recorded from Australia. It also ranges over Africa to the Cape, although it is doubtful if it breeds in the south of that continent.

Nearly allied to the preceding is the more slender-necked purple heron (*A. purpurea*), in which the crown and back of the head, together with the plumes, are purplish black; the cheeks and sides of the neck fawn with bluish black streaks; the back and wing-coverts slaty grey; the long feathers on the back chestnut; the tail grey; the chin pale, and the neck reddish buff; the point of the shoulder and under wing-coverts chestnut; and the under-parts maroon-red anteriorly, and a mixture of maroon, grey, and black posteriorly. The beak and iris are yellow, as is the tibia; while the greater portion of the meta-

tarsus and feet is brown, the claws being black. A straggler to Britain, the purple heron is common in Holland and Spain, and ranges over the greater part of Europe to the southward of Central Germany. To the eastward it ranges from the Mediterranean to the Indian region, the north of China, and the Philippines, in such districts as are suitable to its habits, but only breeds in the warmer regions. Common and resident in Egypt, it appears to be mainly a winter



GOLIATH HERON IN BREEDING PLUMAGE ($\frac{1}{2}$ nat. size).

visitor to most other parts of Africa, although it is a permanent inhabitant of certain marshy districts. The last member of this group of the genus we shall notice is the goliath heron (*A. goliath*), of which the total length is about half as much again as that of the common species. In this splendid bird the crest takes the form of a number of moderately long pointed feathers. The head and crest, the point of the shoulder, and the under-parts, with the exception of the white throat, are reddish chestnut-brown; the sides and back of the neck bright bluish grey; the upper-parts a more ashy grey; and the long loose plumes on the front

of the neck externally white and internally black, frequently with reddish shaft-stripes. The iris is yellow, the lore green, the upper mandible black, the lower mandible greenish yellow at the tip and many-coloured at the base, while the legs



GREY HERONS AND THEIR NEST.

and feet are black. This heron is widely distributed over Africa; and in 1845-46 numerous specimens were obtained by Blyth in the market at Calcutta, since which date, according to Mr. Hume, there is no definite record of its occurrence in India, although it may have been seen in Ceylon.

Water of every kind, from the sea-marge to the mountain-stream, forms the favourite haunt and hunting-ground of the herons; and there the common species may be seen standing alone and silent, knee-deep in the flood, watching patiently for a passing fish, with its head drawn back and ready to strike with unerring aim at a moment's notice. Although the chief food of these birds consists of fish, all kinds of water-animals, not too large for their capacities, are captured easily, among them being frogs, snakes, water-voles, young water-fowl, crustaceans, insects, and worms. The usual time for fishing is early in the morning and late in the evening, while on moonlight nights the business is continued till a later hour. In spite of its extreme voraciousness, the heron is not considered a wholly unwelcome visitor to trout-streams, on account of the number of voles and coarse fish it destroys. Mostly solitary during the winter, the common heron assembles together in the early spring for nesting in large numbers; the "heronry" being generally situated in tall trees, and occupied for generation after generation. Heronries, like the well-known one at Cressy Hall near Spalding, have been so often described, that it will be unnecessary to repeat the details here.* It may be observed, however, that the nest, which is of large size, and relatively flat and wide, is formed of sticks and lined with twigs, fibres, and grass; and that the three or four eggs are bluish green in colour. While the hen is sitting, the male bird takes his stand during his hours of rest on a branch hard by, where he may be seen maintaining his position in the face of a gale. Both parents take a part in feeding the young, and after the first brood is able to take care of itself a second clutch of eggs is laid. In English heronries the nests are commonly built in oaks, elms, or wych-elms, but in Kashmir the magnificent chunars or plane-trees are the favourite breeding resorts of these birds. Occasionally the nests are built on rocky cliffs overgrown with ivy or low shrubs. The alarm-cry of the heron is the well-known hoarse *crank, crank*, but in the breeding-season the note is more prolonged. In Sind, where the common heron is very numerous, it is employed by the natives as a decoy-bird for other water-fowl. "About every fisherman's village," writes Mr. Hume, "hundreds may be seen perched about on the boats, on stacks of brushwood thrown into the water, and on poles, perfectly motionless, and more like stuffed than living birds. The eyelids of all are sewn up; they dare not move, poor things, and, wherever they are placed for the day, there they remain immovable. Generally they are lightly tethered by one leg, but I saw several, perhaps old prisoners, in no way tied." Occasionally, a bird gets loose and flies skywards in the usual circling manner, and in such cases they are never known to return, but wander forth to perish miserably from hunger.

The purple heron is a more nocturnal bird than the common species, approximating in its habits to the bittern. The goliath heron, according to observations made by Major E. A. Butler in Natal, does not appear to breed in companies. A nest seen by this officer "was situated in the centre of an open valley, and placed on the top of a patch of green sedge beaten down by the wind and rain, and forming, as it were, a sort of small island, being raised about two feet above the level of the water. It consisted of a dense mass of dry sedge and reeds lined with dark-coloured sedge and a species of aquatic creeper, being about two feet in diameter and very flat on the surface, and exposed to view from all sides.

The male bird was sitting, and as we approached raised himself off the nest and walked slowly away in an erect attitude for a few yards before taking flight." The three eggs, although larger, were similar to those of the common species.

Great White Heron. Very different in appearance to the more typical representatives of the genus is the great white heron (*A. alba*), which, together with the numerous smaller forms known as egrets, is characterised by its more slender



GREAT WHITE HERON ($\frac{1}{2}$ nat. size).

body and limbs, the extremely long neck, less robust bill, the white plumage, and the beautiful elongated plume-like feathers of the back. On account of these differences some writers have referred these birds to a separate genus (*Herodias*). The great white heron is a few inches longer than the common species, and has the whole plumage of a glistening silvery white; the feathers at the back of the

head are but slightly elongated, but those on the lower part of the front of the neck attain a considerable length; while the long filament-like feathers of the back are developed only during the breeding-season. In the latter period the bill is black, although yellow in the autumn; the lore is green, the iris yellow, and the limbs nearly black. An exceedingly rare straggler to Western Europe and the British Islands, this splendid heron is more common in Spain and the south of France, while it is abundant in Sicily and along the south-eastern borders of the Mediterranean. Eastwards it extends through Asia Minor, Turkestan, and the warmer parts of Asia to Manchuria and Japan; being migratory in the more northern districts, but resident in India, Burma, etc., where its size is somewhat smaller. It also occurs during the winter in North Africa; while in Australia and New Zealand it is replaced by a closely allied form (*A. flavirostris*), in which the beak is stated to be yellow at all seasons.

This species feeds on small fish, reptiles, molluscs, and insects. As a rule silent, it leaves its feeding-ground early in the evening to seek a roosting-place among tall trees; and in Ceylon and India breeds in company with spoonbills, common herons, and other waders in similar situations. The nest is described as being remarkably flat, with scarcely any hollow for the reception of the three or four greenish eggs. Writing of the New Zealand species, Sir W. L. Buller observes that "it is very interesting to watch this stately bird stalking about in its haunts, or fishing in the shallow water, its snow-white plumage rendering it a very conspicuous object. I have always found it very shy and difficult to approach, the slightest sound exciting its suspicion, and making it take wing. It flies high and in wide circles, the wings forming slow and regular flappings, the head being drawn in upon the shoulders, and the legs trailing behind." In New Zealand the white heron breeds in several places near the sea in company with the white-throated cormorant; upwards of twenty-five nests having been counted in one of these haunts. When this species breeds in association with the common heron, it usually occupies the middle region of the trees, of which the tops are occupied by the herons, while the lower boughs may be tenanted by night-herons.

The little egret (*A. garzetta*), which is one of the rarest stragglers to Britain, may be taken as a well-known example of small white herons, collectively known as egrets. The male bird, which measures about 25 inches in length, during spring and summer has the whole plumage pure white, with a crest of two long, narrow feathers, some elongated plumes on the lower part of the front of the neck, and the filament-like feathers of the back greatly developed. The beak is black, the lore lavender, the iris varying from yellow to pale lavender, and the legs mostly black, although yellowish interiorly. The winter dress lacks the crest and the plumes on the back. In Southern and South-Eastern Europe this egret is a common species; and it ranges thence through Asia Minor and Persia to India, China, and Japan; while it occurs locally throughout Africa, and has been obtained from Northern Australia. The little egret nests in bushes and trees in the neighbourhood of swamps, in company with the other waders; the nest being a platform-like structure of sticks intermingled with a few reeds, upon which are laid from three to six bluish green eggs. The bird differs from the white heron in being generally very noisy. Both this and the

preceding species occur in great numbers on the inland waters of Sind; and both, like the common heron, are kept in confinement by the fishermen. Mr. Hume says that a single boat of about twenty feet in length will contain "a man and his wife, an old man, some relatives, six children, six or eight herons (grey and white), a couple of cormorants, a kid, a dog, and otter-spears, nets, lines, hooks, and the like, of all descriptions."



LITTLE EGRET ($\frac{1}{4}$ nat. size).

Other Species Among other species, brief reference must be made to the beautiful buff-backed heron (*A. bubulcus*)¹, which is so common along the banks of the Nile, and is frequently pointed out to tourists as the sacred ibis. During the breeding-season this bird has the plumage of the head, neck, and breast, rufous buff, and some long plumes on the back also of the same tint; the remainder being white, with a tinge of creamy on the wing-coverts. The beak is reddish at the base, and yellow at the tip; the eye and lore are golden pink; and the limbs yellowish red. This bird always displays great partiality for cultivated grounds, feeding not only upon frogs and locusts, but likewise on worms and larvæ turned up by the plough, as well as on ticks from the backs of cattle,—from which habit it is frequently termed the cattle-egret. The squacco heron (*A. ralloides*) is

¹ Sometimes referred to a distinct genus *Bubulcus*.

a still smaller species, measuring only 19 inches in length; and is of special interest as forming a connecting link between the others members of the genus and the night-herons. Its distinctive features are the great length of the beak, and the presence of a mane-like crest extending from the back of the head all down the neck. In the full plumage the feathers on the top of the head are yellowish brown, with dark streaks; those of the crest are white, with black borders; the sides of the head and neck are reddish buff; the interscapulars and long hair-like feathers of the back pale reddish brown; and the remainder of the plumage white. The beak is blue at the base and black at the tip; the lore green; and the legs are yellowish green, with black claws. Essentially a South European and African form, the squacco ranges in summer over the more northern parts of the continent, and has been taken on a considerable number of occasions in the British Islands.

Night-Herons.

The night-herons, of which the European species (*Nycticorax griseus*) is the best known, are comparatively small birds, taking their name from their habit of spending the day in sleep and waking up in the evening to pass the greater part of the night in searching for food. They are distinguished by the relatively short beak being very thick at the base and slightly bent down at the tip; by the moderately long and stout legs, in which a portion of the tibia is naked, and the metatarsus is longer than the third toe; the very broad wings; and also by the plumage, with the exception of some three thread-like plumes from the back of the head being smoother and more compact than in the true herons. The scutes on the front of the metatarsus are six-sided, and the tail has twelve feathers. In the adult of the common species, the crown of the head, nape, upper back, and shoulders are blackish green, the remainder of the upper-parts and the sides of the neck ashy grey; the under-parts pale straw-colour; and the head plumes (which in old birds may be increased above the ordinary three) pure white. The iris is a fine purple-red, the beak black with a yellow base, the lore green, and the foot greenish yellow. In the young bird the head plumes are absent, the general colour of the upper plumage is brown with longitudinal rusty yellow and yellowish white flecks, while the under-parts have a whitish, and the neck a yellow ground with brown markings; both the iris and beak being brown. In total length the night-heron measures about 23 inches.

The genus has an almost world-wide distribution, being found in regions as remote from one another as Britain and New Zealand; and the common European species has likewise a very wide range. In Northern Europe the latter is a comparatively rare visitor, and it is said to be becoming less numerous in the north of Germany and Holland, where it breeds; but it is abundant in Spain, Italy, and the Danubian provinces. Thence it extends eastwards through Palestine to India, Burma, China, and Japan, as well as the Malayan Islands; while it ranges throughout Africa, and is represented in North America by a rather larger race, which in South America passes into a darker variety. The habitat of the night-heron is generally in thickly-wooded districts, and by preference in the near neighbourhood of swamps; although not unfrequently these birds inhabit groves at considerable distances from water, from whence they make long nocturnal flights to their fishing-grounds. Except during the breeding-season, they seldom,

unless disturbed, rouse themselves from their slumbers in the daytime; but when the young are hatched, the parents are compelled to go abroad in search of food during the daylight hours. Perching with its neck resting on its shoulders, the night-heron when disturbed from its slumbers flies but a short distance, and again settles. When on the wing, the head is drawn in between the shoulders, and the legs stretched out behind; the flight being slow and flapping, and the course of the bird indicated in the darkness by the utterance from time to time of a characteristic hoarse croak. In Europe the breeding-season lasts from May to July; the nests being generally placed in bushes or low trees near swamps, but at other times in groves which may be also tenanted by other members of the order, and rarely among reeds. Large numbers of birds associate in these breeding-places; and when the young are hatched, the noise made by the birds as darkness comes on is described as deafening. The nests in some places are made of rice-straw, and are remarkable for their size and solid structure; and the pale greenish blue eggs vary from three to five in number. The food of these birds comprises aquatic insects, worms, molluscs, frogs, and small fish.

Omitting mention of some important genera, brief reference must be made to the little bittern (*Ardella minuta*), as the representative of a small genus in some respects connecting the night-herons with the true bitterns. These birds are much smaller than the night-heron, measuring only 13 inches in length, while agreeing with the foregoing genera in having the second quill of the wing the longest (although but slightly so), and the third toe shorter than the metatarsus; they differ in having only ten short feathers in the tail, in the tibia being feathered nearly to the ankle, and in the greater length of the toes. The legs are rather short; and the straight, slender, pointed beak is slightly longer than the head. In the male the plumage of the crown of the head, nape, back, and shoulders, as well as the primaries and tail-feathers, are shining greenish black; and the wing-coverts and under-parts tawny buff, marked on the breast and flanks with black. The beak, lore, and iris are yellow; and the legs and feet greenish yellow. The smallest member of the heron tribe found in Britain, where it is an occasional visitor, the little bittern ranges over Southern Europe to Northern Africa, and extends eastwards to Kashmir and North-Western India. Migrating to South Africa, it is represented there by a distinct resident species; while in America its place is taken by a smaller form.

Before the drainage of the fens and the general advance of cultivation, the boom of the bittern was a familiar sound in many parts of England, but the bird is now only a somewhat rare visitor, although a nest was taken as late as the year 1868. The common bittern (*Botaurus stellaris*) belongs to a genus easily characterised by the great length of the toes, of which the third is as long as the metatarsus, by the three first quills being of nearly equal length and the longest in the wing, and by the short tail comprising ten soft feathers. The strong beak is rather longer than the head, somewhat higher than broad, and with the extremity of its upper mandible slightly curved downwards; the longitudinal slit-like nostrils being partially covered by a bare membrane. The legs are of medium length, feathered nearly down to the ankle, and with large scutes on the front of the

metatarsus; while the toes are very unequal length, and the first unusually elongated. Owing to the equality in length of the first three quills, the somewhat elongated wings are rounded at their extremities. There is but little difference between the plumage of the young and mature birds. Although inferior in size to the heron, from which it differs markedly in its much shorter and thicker neck, larger and plumeless head, and shorter beak, the bittern is a decidedly striking bird; and its mottled plumage of buff, brown, and black, is adapted to harmonise with the dead stalks of the reeds and flags among which it habitually skulks. As



COMMON BITTERN IN ITS VARIOUS POSTURES ($\frac{1}{4}$ nat. size).

regards coloration, the crown of the head is black with a tinge of bronzy green, the elongated feathers at the back of the head and nape being barred with black and buff; the remainder of the body-plumage is characterised by having a buffish ground variously marked with reddish brown and blackish brown flecks, bars, and streaks, with a dark stripe from behind the angle of the beak and another down the front of the throat. The primaries are mingled greyish black and chestnut, and the tail-feathers reddish brown with black markings. The beak is greenish yellow, tending to horn-colour at the tip, the lore green, the iris yellow, and the leg and foot green with pale horn-coloured claws. In length a male bittern may vary from 28 to 30 inches. The American bittern (*B. lentiginosus*), which is an accidental visitor to Britain, differs from the common species, not only by its

inferior size and more slender limbs, but likewise by the uniformly lead-brown hue of the primary quills of the wings.

The common bittern, like so many members of the present family, has a wide geographical distribution, extending all over Europe as far north as latitude 60°, and even to 64° on the Yenisei, in Asia, and ranging eastwards through Central Asia to China and Japan. It also occurs in Persia and Northern and Central India, as well as in Burma; and likewise ranges over the whole of Africa, in localities suited to its habits. The New World species is found over the greater part of North America. The bittern is essentially a bird of the swamps, among the reeds and bulrushes of which it either skulks in the rail-like manner shown in the central figure of our illustration, or stands erect, as depicted in the background, when it presents a strange resemblance to a pointed stump. When disturbed in the day among a bed of reeds, it generally rises within easy shot, and after flapping lazily along for a short distance, once more takes to covert. While on the wing, it utters a resounding cry, replaced during the breeding-season by the hollow *boom*, from which the bird derives its name; and in its evening flights the bittern is said to soar in circles to vast heights. The breeding-season in Europe commences in March and April; and the nest, which is formed of a mass of reeds and flags, is placed either in thick covert, or on the marge of a swamp. The four eggs are olive-brown in colour, but may be tinged with green when fresh laid. Among our ancestors the bittern was regarded as a favourite dish; and in Landseer's well-known picture a bittern figures among the offering sent to the abbot of Bolton Abbey. Instead of booming, the American species during the breeding-season utters a cry which has been compared to the sound produced by hitting a stake with a mallet. Writing of the American bird, Dr. Coues observes that "when the bittern is disturbed at his meditation, he gives a vigorous spring, croaks at the moment in a manner highly suggestive of his displeasure, and flies off as fast as he can, though in rather a loose, lumbering way. For some distance he flaps heavily with dangling legs and outstretched neck: but when settled on his course he proceeds more smoothly, with regular, measured wing-beats, the head drawn in closely, and the legs stretched out behind together like a rudder. He is very easily shot on the wing, dropping at a touch of even fine shot. When winged, he croaks painfully as he drops, and no sooner does he touch the ground than he gathers himself in defensive attitude to resent aggression as best he can. He fights well, and with more spirit and determination than he might be expected to show. He has a very ugly way of pointing his resistance with quick thrusts of his spear-like bill, capable of inflicting no slight wound on an incautious hand. The food of this bird consists of various kinds of small aquatic animals. In its stomach may be found molluscs, crayfish, frogs, lizards, small snakes, and fishes, as well as insects. Such prey is captured with great address, by spearing, as the bird walks or wades stealthily along"; the thrust of the bill being marvellously quick and skilful. It may be added that in America as well as in the Old World bitterns are to a certain extent migratory.

Boat-Billed
Heron.

The last member of the family to which it will be necessary to allude is the remarkable boat-billed heron (*Cenchroma cochlearia*) of South America, which, while agreeing with the other representatives of

the group in essential characters, differs by the broad head, terminating in the wide and boat-like beak, from which the creature derives its name. The boat-bill is about the size of a night-heron, and resembles the more typical members of the family in the pendent plumes at the back of the head, and the presence of twelve comparatively stiff feathers in the tail. The broad beak is rounded off in front, where it is somewhat bent down; the legs



BOAT-BILLED HERON ($\frac{1}{10}$ nat. size).

are rather short and feathered to the ankle, with toes of moderate length; the wings are strong and large, with the fourth quill the longest; and the tail is short and truncated. The crest is large, and formed by the feathers of the back of the head and nape, but there are no elongated plumes on the back; the front of the throat is, however, naked. In colour, the forehead, throat, fore-neck, and cheeks are white; the lower neck and breast yellowish white; the back clear grey; the hinder region of the upper part of the neck and the under-parts rusty reddish brown, passing into black on the sides; and the wing and tail-feathers

whitish grey. The iris is mostly brown, the beak brown with a yellow border to the lower mandible, and the leg and foot yellowish.

The savaku, as the bird is called by the natives of South America, frequents the thick woods bordering the Brazilian rivers, where it may be seen either solitary, or in pairs during the breeding-season. These birds are more numerous in the interior than near the coast; and may be observed either in the low bushes on the banks or perched on boughs high above the river. Their food consists of various aquatic creatures, especially worms; but from the conformation of their beak, which is probably used for grovelling in the mud, it is doubtful if these birds can catch fish. Practically nothing has been ascertained as to their breeding-habits, although it is known that the eggs are uniformly white, and very similar in general appearance to those of a heron.

THE WHALE-HEADED STORK.

Family *BALÆNICIPITIDÆ*.

The extraordinary-looking and gigantic bird known as the whale-headed, or shoe-billed stork (*Balæniceps rex*), which is peculiar to certain parts of Africa, forms the sole representative of a distinct family, whose nearest relationship, according to Mr. Beddard, appears to be with the herons, and from which family it may be a highly modified offshoot.¹ While agreeing with the herons in the presence of powder-down patches on the rump, and the absence of bare tracts on the sides of the neck, as well as in several internal features, the whale-head is distinguished by the absence of pectination on the claw of the third toe, and likewise in the V-shaped furcula having no process jutting forth into the angle. Apart from these morphological features, the large size of these birds, and their extraordinary beaks, render them perfectly distinguishable at a glance from all their allies. The broad and depressed beak, unlike that of the boat-billed heron, is concave in profile, with a strong ridge down the middle of the upper mandible, the tip produced into a bold hook, and the cutting-edges highly curved; the minute nostrils being situated at its base and not placed in a groove. The lower mandible is covered with a soft, leathery skin for the greater part of its length, although horny at the tip. The legs are very long, and naked for a considerable distance above the ankle; and the elongated toes are not webbed. The long and broad wings have the third and fourth quills the longest; the tail is of moderate length, with twelve feathers; and there is a short bushy crest at the back of the head. The prevailing ground-colour of the plumage is a fine ashy grey, the larger body-feathers being bordered with lighter grey, and the wing and tail-feathers greyish black. The iris is yellow, the beak horn-colour, and the leg and foot black. In size this bird comes between the white and the marabou stork, although much nearer to the latter than the former.

Known to the Arabs as *abu markub* (father of a shoe), this giant bird is restricted to the White Nile and its affluents, and although everywhere rare is most numerous in the districts of Kitsh and Nuer in Northern Equatoria, where

¹ This relationship is not admitted by Professor Newton.

it may be found either singly, in pairs, or in small companies. It always frequents regions the most remote from human habitations, where it may be seen standing—sometimes breast-deep—in the water by the side of some tall papyrus stem, and frequently resting on one leg only. But seldom is this bird seen away from the neighbourhood of tall reeds, although it sometimes takes its station on a white-ant hill on the bank, and occasionally resorts to open reaches of the river. When first disturbed by a boat, it will fly off slowly above the reeds with a great noise, and again settle; but if roused a second time, it rises high into the air, and will not again return to its haunt until the danger is past. Its flight is not unlike that of the marabou stork, but the heavy beak is generally kept resting on the crop. The only sound it utters is a loud snapping of the beak, in which respect it resembles the storks. Its principal food is fish, in order to capture which the bird often stands breast-deep in the stream with its enormous beak lowered to the surface of the water; while at other times several individuals will combine to drive the fish towards the shallows by marching in a semicircle through the water, and making a great flapping of their wings. It has been asserted that these storks will kill and eat snakes; but it is probable that the statement has arisen from their devouring the fish known as the bisher (*Polypterus*), which the natives sometimes term a water-snake. That dead carcasses and carrion are also consumed appears to be well ascertained. The breeding-season takes place during the rains; the nest being situated on some slight elevation among the reeds, especially one surrounded on all sides by water. Here the birds collect a vast quantity of stalks and water-plants, often solidified with mud, so as to form an accumulation of about a yard in height. The eggs, which are small in proportion to the size of the bird, have thick white shells, which are, however, bluish when first laid, but become brownish as incubation progresses; they are overlain with a chalky coating. Young taken from the nest thrive well on a fish diet, and are easily tamed.

THE HAMMER-HEAD.

Family *SCOPIDÆ*.

From a structural point of view the small brown African bird, known as the hammer-head or umbre (*Scopus umbrella*), is even more remarkable than the preceding, since it combines many features common to the herons and storks, and is accordingly regarded by Mr. Beddard as nearly allied to the common ancestral stork from which those two groups have sprung. It differs from the herons in the absence of powder-down patches on the rump, and of pectination in the claw of the third toe, as well as in having the angle of the furcula without any median projection; but it resembles them in having the rings of the bronchial tubes incomplete behind, and closed with membrane. In some other parts of its internal anatomy it agrees with the herons on the one hand and the storks on the other; but it differs from all herons except the boat-billed species in the shortness of its triangular tongue, and thereby resembles the whale-head and the storks, while it is peculiar in having large bare tracts on the sides of the neck. The hammer-head measures about 25 inches in total length, and has a somewhat cylindrical

body, a short and thick neck, a very large head, and a beak rather longer than the head, much compressed, straight, and bent down at the tip. The legs and toes are of medium length, the latter connected at their bases by a web; the wing is broad and rounded, with its third quill the longest; the tail is moderately long and has twelve feathers; and the contour-feathers are thick and long, those on the back and sides of the head being developed into a broad and bushy crest. The



HAMMER-HEADS AND THEIR NEST ($\frac{1}{2}$ nat. size).

coloration is a uniform umber-brown, generally brighter on the under surface; the quills of the wings being shining and darker than the back, while those of the tail have a broad purplish brown band at the tip, and smaller bars near the root. The iris is brown, the beak black, and the leg and foot blackish brown or black.

Nowhere abundant, the hammer-head is spread all over Africa, as well as Madagascar and the south of Arabia; and although generally inhabiting the plains, in Abyssinia ascends to an elevation of some nine thousand feet in the mountains. It frequents the neighbourhood of water in wooded districts, and

appears to be generally found singly or in pairs. Resembling in many of its general habits the ibises, the hammer-head when passing from lake to lake flies strongly and ascends high into the air; and is reported to utter a kind of croaking cry. The most interesting feature connected with this singular bird is, however, its nest. This is a huge, dome-like structure of sticks, so firmly built that it will bear the weight of a man, and frequently from a yard and a half to two yards or more in diameter. Generally placed in a fork of a tree near the ground, although sometimes in a rocky cleft, the nest has a single entrance situated on its most concealed side. Internally it contains three chambers—a hall, a drawing-room, and a sleeping apartment, with entrances so small that the bird can only creep in. The sleeping-chamber occupies the highest portion of the nest, in order to be safe from floods, and in it, upon a bed of water-plants, are laid the white eggs, which are from three to five in number and are incubated by each parent in turn. The middle chamber serves for the young when they are too big for the inner one, while the hall is used as a look-out station. In Angola the nests of other birds are said to be taken by the hammer-head. The chief food of these birds appears to consist generally of fish; but in some districts, at least, river-mussels, frogs, lizards, small snakes, and worms and insects, constitute a portion of the diet. Although the two members of a pair do not always remain together, they appear to be associated for life; and at times the two birds, or occasionally three, will go through a peculiar kind of dance-like performance. Everywhere these birds are mainly crepuscular, and are but seldom seen in the full daylight.

THE STORK TRIBE.

Family *CICONIIDÆ*.

The storks may be distinguished externally from the herons by the absence of pectination on the inner edge of the claw of the third toe, by the metatarsus being covered with reticulate scales, by the absence of powder-down patches on the sides of the rump, and by the feathering on the under surface of the lower mandible not extending in advance of the line of the nostrils. In the skeleton the furcula, which is generally U-shaped, is characterised by the absence of any median projection into its angle. All storks have short triangular tongues, whereas herons (except the boat-bill) have long ones; and, with the exception of two genera, they are characterised by the rings of the bronchial tubes being complete. There are certain other anatomical features, into the consideration of which it will be unnecessary to enter. As supplemental characters, it may be mentioned that in all the members of the family the body is plump; the beak in the form of a long compressed cone, with a sharp point, but may be either turned up at the extremity, or gaping in the middle; the leg is long, strong, and naked for a considerable distance above the ankle; the toes are short, and the three front ones connected by a short basal web; the wings large; and the short and rounded tail with twelve feathers. The contour-feathers of the head and neck may be either narrow and elongated, or short and rounded; while in some cases they may become woolly or hairy, or even, in old age, with horny lance-like tips. The two

sexes may be distinguished by a difference in size, while the colours of the young are duller than those of the old birds. Storks, of which there are some twenty species, have a world-wide distribution; those inhabiting the northern regions of the globe being migratory. They are all diurnal in their habits, and the only sound they utter is produced by a sharp snapping of the beak. Extinct genera carry the family back to the early part of the Miocene period.

True Storks. The true storks are characterised by their perfectly straight sharp beaks, in the horny covering of which the nostrils are perforated, by the webs of the front toes extending to their first joints, and by the third, fourth, and fifth quills being of nearly equal length. By far the best known species is the white stork (*Ciconia alba*), in which the whole of the plumage, with the exception of the black greater wing-coverts and quills, is pure white, the beak being red, the bare space round the eye black, the iris brown, and the foot and leg red, with brown claws. The whole length varies from 42 to 44 inches. With the exception of the extreme north, the stork ranges over the whole of Europe, although not breeding everywhere, and being merely an irregular visitor to the British Islands. Eastwards its range extends through Turkey and



FURCULA OF STORK.

Persia to Central Asia and a great part of India, while in winter the bird visits Northern Africa in large numbers. In France, where it is much persecuted, it is now only a passing visitor; but it breeds in large numbers in Holland, Germany, and indeed over the greater part of Central and Eastern Europe, where it enjoys protection on the part of the inhabitants. The stork has become thoroughly habituated to human habitations and the presence of man, by whom it is esteemed, not only on account of its value as a scavenger, but likewise from its well-known fidelity to its young, which has become proverbial. In Palestine, where they only exceptionally breed, storks make their appearance at the latter part of March on their northern journey, while in Holland and Denmark they generally arrive about the middle of April. They arrive and depart (as shown in the illustration on p. 289) in immense flocks; and on their arrival spread themselves over the country in search of food, which comprises small mammals and birds, reptiles, frogs, insects, etc. In most parts of Europe the stork generally builds on chimneys, where boxes or other receptacles for the nest are frequently placed for its accommodation; and as it returns year after year to the same spot, the nest, which is originally a shallow structure of

sticks, gradually attains a height of several feet. In the absence of buildings, trees or rocks are, however, adopted for nesting. The eggs, usually from three to five in number, are pure white. During the breeding-season the birds keep up a constant clapping noise with their beaks, and this noise not unfrequently betrays their whereabouts when soaring at such a height as to be quite invisible to the naked



WHITE STORK ($\frac{1}{2}$ nat. size).

eye. As an instance of the constancy displayed by the males and females of this species it is stated that for three years a female which remained during the winter in Europe, was visited annually by her mate, when both nested as usual. In the fourth year, however, the male bird also remained with his partner during the winter, and this continued for three years. Eventually both birds were shot, when it was discovered that the female had been prevented from migrating by an

old wound. On the other hand, there are well-authenticated instances of tame storks having been mobbed and killed by their fellows, and the same fate is stated to have overtaken a female stork whose eggs had been replaced by those of a hen, which in due course were hatched into chickens.

Black Stork. The second European representative of the genus is the black stork (*C. nigra*), which is likewise an occasional visitant to England. In this bird the plumage of the head, neck, and upper-parts is brownish black, with a variable metallic lustre; the under-parts, from the lower breast, being white, and the wings and tail lacking the lustre of the contour-feathers. The iris is reddish brown, the beak blood-red, and the leg and foot carmine. The black stork, which is a rather smaller bird than its white cousin, inhabits Central and Southern Europe, occasionally ranging northwards, and is found all over Africa, while eastwards it extends to China, and, in winter, India. Unlike the white species, it shuns human habitations as widely as possible, frequenting the most secluded swamps on the banks of lakes and rivers, and nesting in tall forest trees. In Jutland Mr. Elwes describes the nests as being lined with moss, and having a diameter of some four feet; the four greyish white eggs being deposited in a shallow cavity in the centre. Writing of the habits of a captive individual of this species, Montagu observes that the stork does not gorge an eel instantly like the cormorant; on the contrary, it retires to the margin of the pool, and there disables its prey by shaking and beating with its bill, before it ventures to swallow it. I never observed this bird attempt to swim; but it will wade up to the belly, and occasionally thrust the whole head and neck under water after its prey."

There are a few other Old World representatives of this genus, but there are none in North America; while the Maguari stork of South America (*Dissura maguari*) and the West African white-necked stork (*D. episcopus*) are more generally referred to a distinct genus, characterised by the tail being deeply forked and its lower coverts stiffened so as to resemble true rectrices.

White-Bellied Stork. Although externally not unlike the black stork in general appearance, the white-bellied stork (*Abdimia sphenorhyncha*) of Africa is made the type of a distinct genus, as it differs from the more typical storks in having the rings of the bronchial tubes incomplete behind and closed with membrane; thus indicating that it is a generalised type retaining evidence of the original kinship of the family with the herons. Considerably smaller than the black stork, this species has the head and neck black, with a purple lustre; the back, wings, and tail black tinged with green, and the bend of the shoulder and under-parts white. The iris is brown, the naked space around the eye blue, and that on the throat red, the beak greenish with a red tip, and the leg and foot brownish grey, except at the ankle-joint, where it is red. From Dongola in the Sudan, nearly to South Africa, this stork is found in vast numbers, although it frequents the villages only during the breeding-season. There, however, it nests but seldom on houses, preferring trees in the neighbourhood, and in the south generally selecting mimosas. Not unfrequently it breeds in large companies, as many as thirty nests having been observed in a single tree. The eggs are rather smaller than those of the white stork, but vary considerably in form and dimensions. The simbil, as this bird is

called in the Sudan, receives from the natives of that district the same veneration and protection as is accorded to its white cousin in Holland, while it closely agrees in its general mode of life.

Jabirus or Giant Storks. This group is typically represented by the American jabiru (*Mycteria americana*) of Brazil, but may also be taken to include the saddle-billed jabiru (*M. senegalensis*) of West Africa, and the black-necked jabiru (*M. australis*) of Australia and Southern New Guinea,



WHITE-BELLIED STORK ($\frac{1}{2}$ nat. size).

although the two latter are frequently referred to a distinct genus, under the name of *Xenorhynchus*. These birds are of large size, and easily recognised by the greatly elongated beak being nearly straight along its upper border, but curving upwards inferiorly towards the tip, and its cutting-edges presenting a similar curvature; while at its base it often has a saddle-like waxy growth. The leg is much elongated, with the toes very short; the wing long and rounded, with the third quill the longest; and the short tail sharply truncated. In the African and Australian species the upper rings of the

bronchial tubes are incomplete behind, as in the white-bellied stork, but in the third they are complete like those of the true storks, although narrower at the back than in front. In the American jabiru the head and neck are bare and black, and the remainder white; but in the African species the feathered head and neck, the wing-coverts, the shoulders and the tail are black, with a metallic lustre, while the rest of the plumage, inclusive of the quills, is dazzling white. In the latter species the iris is yellow, and the beak red at the base, then black for a short distance, and blood-red in its anterior half, while the fleshy saddle on the upper-part of its base is variously coloured. The legs are mostly greyish brown, but the toes are carmine-red. In length the male measures upwards of 59 inches. The saddle-billed jabiru is described as being one of the handsomest of all the storks when in its native wilds, being especially beautiful during flight, when the white quills of the wings stand out in marked contrast to their black coverts. It is found on both the White and Blue Nile to the southward of the 14th parallel of north latitude, and thence through the Sudan, but it also occurs on both the east and west coasts. Living in pairs, it frequents sandbanks on the rivers, as well as the margins of lakes and swamps; but it is so shy, and at the same time generally so rare, that but little is known of its habits.

Adjutant or
Marabou Stork.

The largest and at the same time by far the ugliest of the storks, are the adjutants or marabous of the Oriental region and Africa, which apparently derive their military title from their measured walk. These ungainly birds are primarily distinguished by the presence of a large, naked, pendulous pouch on the front of the throat, which may measure as much as 16 inches, and has no connection with the gullet, although probably communicating with the respiratory organs. They are further characterised by the large body, thick and naked neck, by the head being either bare or thinly clad with down, and by the enormous size of the beak, which is very thick, four-sided, and somewhat wedge-shaped, with a sharp point. The legs are of great length. The whole plumage is rough and untidy-looking; the large and rounded wings have the fourth quill the longest; while the moderately long tail is characterised by the great development of its under-coverts, which form the well-known marabou or comerecolly feathers. Our illustration represents the African species (*Leptoptilus crumeniferus*), known to the Arabs as *abu scin* (father of the leather bottle¹), in which the head is reddish flesh-coloured, sprinkled over with short hair-like feathers. The plumage of the back is a dark metallic green, while that of the neck and under-parts is pure white; the quills of the wing and tail being black and lustreless, and the greater wing-coverts having their outer webs bordered with white. The iris is brown, the beak a dirty whitish yellow, and the leg and foot black, generally with a superficial coating of white. The total length of a male is about 63 inches. In India and the Burmese countries the genus is represented by the great Indian adjutant (*L. dubius*), of which there is a larger and a smaller race; while the Javan adjutant (*L. javanicus*) is a smaller Oriental species. Remains of extinct adjutants occur in the Pliocene rocks of the north of India, and probably in the Miocene deposits of France.

¹ This is the derivation given by Brehm; but Sir S. Baker says that the name is *abu scin*, or father of the beak.

In India the adjutant is a summer visitant, arriving towards the close of the hot weather about the end of April or May, and remaining through the rainy season till October. It is, however, a somewhat local bird, being most common in Bengal and the north-eastern districts, and well known to all residents in



AFRICAN ADJUTANT ($\frac{1}{2}$ nat. size).

Calcutta, where these birds are in the habit of perching in numbers on the parapets of Government House during the rains. They breed in Burma and the Malayan countries, a favourite nesting-place being some lofty scarped limestone rocks called the Nidong Hills on the Attaran River, to the south-east of Moulmein. On account of their value as scavengers, these birds are protected

by law in Calcutta and some other Indian cities, nothing seeming to come amiss to them in the way of food, from the carcase of a large animal to a dead cat, or from small birds to frogs and fish. Adjutants generally congregate in vast flocks, although in the neighbourhood of towns solitary birds may often be observed, either stalking about alone or standing with outspread wings to dry their plumage, or perched on one leg while asleep on some building or tree. Their flight, although heavy and flapping, is powerful in the extreme, and they frequently soar at immense heights in the air, from which they descend to join the vultures at their feasts. Writing of the arrival of one of these birds at such a carnival, Sir S. Baker observes that "a pair of long, ungainly legs, hanging down beneath the enormous wings, now touch the ground, and abu seen has arrived, and he stalks proudly towards the crowds, pecking his way with his long bill through the struggling vultures, and swallowing the lion's share of the repast." In the Nidong Hills the adjutant, according to Mr. C. T. Bingham, nests in vast numbers during November and December, and in January the parents may be seen feeding the young birds on the topmost pinnacles of their almost inaccessible rocks. The nest is a large mass of sticks and twigs, devoid of lining, and scarcely any depression in the centre; the number of eggs varying from two to four, and these being large chalky-white ovals. Occasionally, it is stated, the nests are placed in trees, and the young birds are thickly covered with fluffy white down.

The shell-storks or shell-ibises as they are often called, of which there is one African (*Anastomus lamelligerus*) and one Indian species (*A. oscitans*), are much smaller birds than any of the preceding, from all of which they are at once distinguished by the two mandibles of the compressed and serrated beak being in the adult in contact at their two extremities, but gaping widely in the middle. On account of the second and third quills being the longest, the large wings are pointed, and the tail is short. Although the Indian species has a normal plumage, that of the African kind is remarkable in that the shafts of all the feathers of the throat, under-parts, and thighs are prolonged into small horny processes at their extremities. In colour the whole plumage is blackish with green and purple reflections; the iris is red, the beak yellowish, and the leg and foot black. Young birds lack the horny plates at the tips of the feathers. In length the African species measures about 26 inches. The latter species is widely distributed over Central and South Africa, and is also met with at Mozambique. Like its Indian congener, it feeds almost exclusively on molluscs, especially *Ampullaria*, and according to Livingstone breeds among reeds, although it has also been stated to nest in trees. In the Barotse country the breeding-places are occupied year after year by vast numbers of these birds, and the natives are accustomed to make a regular harvest of the young. With regard to the peculiar gaping of the beak, Professor Ball writes that "this was at one time supposed to be due to attrition of the edges, caused by the nature of the food upon which the bird is generally believed to subsist. Jerdon, however, stated that the bill of a young bird which he examined exhibited the same gaping. This I did not find to be the case with any of the large members which I saw. The bills were very much smaller than in the adult birds, were conical in shape, and the edges were in distinct apposition, or slightly

overlapping, throughout. The change does not appear to me to be due to any loss of material of the bill by attrition, but to a structural bowing or arching of the mandibles."

Wood-Storks. Although agreeing with the other members of the present family in the general form of the beak, the wood-storks, or wood-



WEST AFRICAN WOOD-STORK ($\frac{1}{4}$ nat. size).

ibises, form a kind of connecting link between the typical storks and the ibises, and are frequently referred to a separate family. In these birds the neck is of medium length; the head large; the beak thick, long, rounded, tapering, and curving downwards at the tip; the foot long-toed, with large webs; the wing long

and broad, with the second quill the longest; and the tail short and truncated. Unlike the storks, the plumage of the adult differs considerably from that of the young. Although the skull agrees in essential characters with that of the true storks, the furcula is V-shaped. The American wood-stork (*Tantalus loculator*) is the sole representative of its genus, and is characterised by the whole head and upper part of the neck being bare. On the other hand, the African (*Pseudotantalus ibis*) and Indian wood-stork (*P. leucocephalus*) have only the forehead naked; while the beak, legs, and tail are much longer. All resemble the ibises in their mode of feeding.

In the African wood-stork the general colour of the plumage is white, with a tinge of rose on the back; the scapulars and wing-coverts being marked with small purplish streaks below their white tips. The tail-feathers and quills are shining greenish black; the eye being yellowish white, the beak waxy yellow, and the leg and foot red. In size the bird is somewhat inferior to the white stork. Young birds have the neck and upper-parts ashy grey, and the rest of the plumage yellowish grey. The species is restricted to Western Africa.

The American wood-stork is a common bird in many parts of the United States, where it associates in large flocks. According to Audubon, it feeds entirely upon fish and aquatic reptiles, of which it consumes enormous quantities. To procure their food, these birds walk in numbers through shallow, muddy lakes; and "as soon as they have discovered a place abounding in fish, they dance, as it were, all through it, until the water becomes thick with the mud stirred from the bottom by their feet. The fishes, on rising to the surface, are instantly struck by the beak of the ibises, and on being deprived of life they turn over, and so remain. In the course of ten or fifteen minutes, hundreds of fishes, young alligators, and water-snakes, cover the surface, and the birds greedily swallow them until they are completely gorged, after which they walk to the nearest margins, place themselves in long rows, with their breasts all turned to the sun, in the manner of pelicans and vultures, and there remain for an hour or so." In the adult bird the head and upper-part of the neck are bare and of a livid blue colour, tinged with yellow on the forehead; the legs are blue, tinged with yellow on the webs; while the plumage is white.

IBISES AND SPOONBILLS.

Family PLATALEIDÆ.

The last group of the order comprises the medium-sized birds known as ibises and spoonbills, represented by some thirty species distributed all over the globe, and which may be conveniently included under a single family heading. All these birds are distinguished from the storks by the beak being soft for the greater part of its length, although hard at the tip, and marked by a deep groove extending from the slit-like nostril on each side of the base of its upper mandible to the very tip, which is truncate and bent down. The limbs are stout and of moderate length, with the front toes connected by a short basal web; the wings are generally pointed; and the tail is short and truncated, and the plumage soft. As regards their skeleton, the lower mandible has its angle produced into a

recurved process behind its articulation with the skull; instead of being truncated as in the storks; the skull has a pair of small vacuities on the occipital surface; and the nasal apertures are in the form of extremely long slits (shizorhinal), in place of being ovals. Finally, the furcula resembles that of the storks. All these birds associate in large companies, and differ from the typical members of the preceding family in their habit of probing about with their beaks in water in search of food, till they come in contact with some object, which is then seized. They nest in trees, and lay white eggs.

Owing to the general interest attaching to the sacred ibis, and likewise from the gorgeous coloration of the scarlet ibis of America, the ibises are some of the best known representatives of the order under consideration. These birds, of which there are several genera, form a subfamily characterised



HEAD OF BERNIER'S IBIS. (From Sclater, *Proc. Zool. Soc.*, 1870.)

by the slender and nearly cylindrical beak, which tapers gradually towards the tip, and is more or less arched from its base. In all of them the head is more or less bald, although occasionally only the lores are naked; and they generally have plume-like scapular feathers at the hinder end of the back. The sacred ibis of Africa (*Ibis aethiopica*) is the type of a genus characterised by the very long and moderately stout bill; the long wing, in which the second

quill is slightly longer than the third; the short, twelve-feathered tail; and the general white hue of the plumage. The African species attains a length of about 29 inches, and has the naked head and neck black, while the plumose feathers of the back and the tips of the quills are greenish black; the rest of the plumage being white, tinged here and there with buff. It is represented by the closely-allied black headed ibis (*I. melanocephala*) in India; while in Madagascar there is Bernier's ibis (*I. bernieri*), distinguished by the much smaller extent of the naked black portion of the neck; and a third species (*I. strictipennis*) inhabits Australia. The Japanese ibis (*Nippono nippon*) differs by having only the face bare of feathers; it inhabits both Japan and China.

Although so common in the country of the Pharaohs during its times of greatness, the sacred ibis is now unknown in Egypt; and Leith Adams has doubts whether it was ever indigenous there. As he observes: "There could have been no difficulty in procuring individuals from the shores of the Red Sea; and to a people so well practised in taming wild animals (as were the ancient Egyptians), we may

conclude that it was soon domesticated, and bred freely. Moreover, like the black-headed ibis of India, which usually lays from four to five eggs, we can easily suppose that the numbers rapidly increased. On the contrary, when its protectors vanished from the land, so did the ibis." This species now breeds in the Upper Nile, in Nubia, and the Sudan, as it does in Abyssinia, and it extends through the continent to the Cape, where it is, however, of rare occurrence. It is essentially a water-loving species, and, like its Indian cousins, may be met with in small or moderate-sized flocks on the margins of rivers or lakes, or in the flooded rice-fields,



THE SACRED IBIS ($\frac{1}{2}$ nat. size).

where it wanders in search of the molluscs, insects, crustaceans, and worms, which constitute its chief food. The flesh has a fishy taste, which renders it quite uneatable to Europeans. In the lore of Ancient Egypt the ibis was the emblem of Thoth, the secretary of Osiris, and was consequently held in the greatest veneration, as is proved by the numbers of its mummified remains found in the temples. At what date it disappeared from Egypt is unknown, but it remained at the conquest of the country by the Romans, by whom it was introduced into Italy. Among the other genera of the subfamily we may first refer to the warty-headed or black ibis (*Geronticus papillosus*) of India, and the bald-headed ibis (*G. calvus*) of South Africa, as well-known representatives of an Old World genus dis-

tinguished from the last by the longer and more slender beak, the shorter toes, and the bald part of the head being confined to the crown, as well as by the dark hue of the plumage. The Indian species has a triangular patch of red warts on the top of the head; the general colour of the upper plumage being dark brown, passing into black, with the wings and tail steel-blue, the quills dusky black, and the under-parts blackish brown. An exceedingly common bird in India, where it is generally known as the curlew, this ibis is usually found in the open country away from water, where it feeds largely on insects. It builds on high trees, laying from two to four eggs.



WHITE SPOONBILL ($\frac{1}{3}$ nat. size).

The glossy ibis (*Fulcinellus igneus*), which is an occasional visitant to the British Islands, represents a third genus, differing from the last by the still greater length of the beak, by the elongated metatarsus being covered in front with large scales instead of hexagonal scales, and the longer toes. In the wings the second and third quills are the longest, and the face alone is naked. This ibis is a dark-coloured bird, the prevailing tints of the plumage being various shades of reddish brown, with purplish reflections; and is remarkable for its wide distribution, ranging over the greater part of Europe and Asia, and also occurring in North America, and rarely in the north of Africa, as well as in Australia. The genus also contains other species, and has an almost cosmopolitan distribution. In

Eastern Europe and India, this bird is found breeding in colonies comprising thousands of individuals; the nests being generally placed in low bushes.

The last genus we have space to mention is exclusively American, and comprises the beautiful scarlet ibis (*Guara rubra*), ranging from Northern South America to Central America and the West Indies; and the white ibis (*G. alba*), which is South American. While agreeing with the preceding in having the front of the metatarsus covered with large scales, they differ in that the whole front of the head is naked in the adult. Both have the tips of the wings blackish; the rest of the plumage being scarlet in the one, and black in the other.

Spoonbills. While the glossy ibis appears never to have been anything

more than a casual visitor to England, there is good evidence to show that the beautiful bird known as the white spoonbill (*Platalea leucolodia*), nested in Suffolk and Sussex some three centuries ago, although now it is but rarely seen in Britain. The genus to which the spoonbill pertains represents a subfamily distinguished from the ibises by the beak being very broad and depressed, widening out at the tip into a spatulate expansion, and except at the extremity being almost straight. Like the storks, spoonbills have no true organ of voice; but they differ from the members of the former group in having the lower end of the windpipe folded in a figure of eight. Their tongues are short like those of the storks, but blunted at the end. Spoonbills, of which there are several species, have a cosmopolitan distribution, although they are not found in Malaysia and Oceania. In the common species, which attains a length of about 32 inches, the whole plumage of the adult, inclusive of the crest at the back of the head, is white, with the exception of a band of buff feathers on the front of the lower part of the neck, and a streak of the same tint up each side of the same. The roots of some of the feathers of the back also display a rosy tinge. With the exception of the extremity of its rounded portion, when it is yellow, the beak is black, as are also the legs and feet; while the iris is bright red, and a patch of naked skin on the throat is yellow. Young birds have no crests, and the shafts and tips of the primary quills black. The spoonbill ranges over the greater part of Europe except the extreme north, while eastwards it extends across Southern Siberia to Amurland and the north of China; its southern range including India and North Africa. In Japan it is replaced by the greater spoonbill (*P. major*), and this country is also the habitat of the lesser spoonbill (*P. minor*).

The spoonbill frequents either marshes, lakes, or sandbanks in rivers, where it may be met with in small parties or large flocks. It feeds in shallow water, in which it dabbles with its broad beak in search of insects, crustaceans, molluscs, frogs, and small fish. It breeds in numbers in a marsh near Amsterdam, which is, however, being drained; and there are numerous nesting-places in India. In Holland the nests are situated on the mud among reeds, and are raised to a height of from twelve to eighteen inches, being composed of reeds and mud, and tapering from base to summit, upon which is a slight depression for the white eggs,—usually four in number. The eggs are laid at intervals of several days and incubated at once. In colour the eggs are dull white, with reddish brown streaks and spots. In India and Ceylon the spoonbill nests in tall trees, the pipal and the tamarind being favourites.

CHAPTER XV.

FLAMINGOES, DUCKS, AND SCREAMERS,— Orders ODONTOGLOSSI, ANSERES, AND PALAMEDEÆ.

TAKING the general term "ducks" as including the geese, swans, etc., the members of the three groups above named will comprise the remaining orders of birds with bridged (desmognathous) palates, all of which are broadly distinguished from those hitherto described by the circumstance that their young are covered with down when hatched, and are able to run within a few hours of their first appearance in the world. The members of these three orders are accordingly the only birds which have bridged palates, and "precocious" young. In regard to the flamingoes, it has only been recently ascertained that the young are hatched in this forward condition. In the collective group the three front toes are either completely webbed, or united by a fold of skin; and in most cases the beak is either depressed and expanded, or has its extremity so bent down as to be at right angles to its base, while its angle is produced in a recurved process behind the points of articulation with the skull. Generally the rostrum of the base of the skull has oval basipterygoid facets placed relatively far forwards; and in all cases the oil-gland is tufted. Many of the group are more or less completely herbivorous.

THE FLAMINGOES.

Order ODONTOGLOSSI,—Family *PHÆNICOPTERIDÆ*.

With an apparently intuitive perception of its zoological relationship, the Persians apply the name of kaj-i-surkh (red goose) to the flamingo, and have thus forestalled the ornithologist, by whom these birds were always associated with the storks and herons, as indeed they still are by some. Possessing the above-mentioned features in common with the other two groups treated in this chapter, the flamingoes, if we had only existing forms to deal with, might be readily distinguished by the peculiar form of their beaks; but it happens that there are certain nearly allied extinct birds in which the beak appears to have been of a more normal form; and we are accordingly compelled to rely largely on other features in defining the order. The whole group is readily characterised by the great length of the legs, in which the tibia may be not greatly longer than the metatarsus, while the first toe is rudimentary, or even wanting. The lower end of the tibia differs widely from that of the duck tribe in that its lower end is not bent inwards; while the corresponding extremity of the metatarsus is very similar to that of the storks, having

the trochlea for the second toe markedly shorter than either of the others, and much bent back, whereas in the storks and herons these three trochleæ are of nearly equal length. In the existing forms the basipterygoid facets on the rostrum of the skull are rudimentary; and in all the metacoracoid (as figured in Vol. III. p. 294) is characterised by its shortness and breadth, and its firm articulation with the breast-bone. In their long legs and neck, and the absence of unfeathered areas on the latter, as well as in many features of their internal anatomy, the flamingoes resemble the storks, near which they are placed by some authorities. Their extinct allies are, perhaps, still more stork-like; so that the family may probably be regarded as somewhat intermediate between the storks and ducks, being ancestrally connected with the former.

True Flamingoes.

The true flamingoes, of which there are some nine existing species, constitute the genus *Phoenicopterus*, and are readily characterised by the beak being sharply bent down at an angle in front of the nostrils; its upper mandible being broad and flattened, and the lower one deep and channelled. The leg is also of great length, with the metatarsus but little shorter than the tibia. While some species have a small first toe, in others this is completely wanting; and in all nearly the whole length of the tibia is devoid of feathers. The neck is of great length and slenderness; and the wing of moderate size, with the first quill slightly the longest; while the tail is short and even. Flamingoes, although unknown in Australia, are distributed over the warmer regions of the greater part of both hemispheres, a few individuals occasionally wandering as far north as the British Islands and Northern Germany. With the exception of two species inhabiting the Chilian Andes, these birds frequent open country in the neighbourhood of large rivers, where the water may be either fresh, brackish, or salt. In a fossil state flamingoes occur in the lower Miocene rocks of France. All the members of the genus are characterised by the general red hue of the plumage,—either rosy white or full scarlet,—with black on the wings. In the adult of the European flamingo (*P. roseus*) the whole of the plumage is rosy white, with the exception of the quills of the wings, which are black, and the light scarlet wing-coverts. The iris and naked skin round the eyes are yellow; the beak is rosy red at the base and black at the tip; and the legs and feet are pinkish red. Young birds, on the other hand, lack nearly all the rose-colour, while their secondary quills are barred with black, and all the naked parts are of a leaden hue. A full-grown bird may vary from 5 to as much as 6 feet 5 inches in length. In this species there is a small third toe, which is, however, wanting in the two Chilian forms. The common flamingo visits the salt-marshes and lagoons at the mouth of the Rhone and other districts in the south of France during the breeding-season, where it may at times be met with in thousands. It is also abundant in similar localities in Spain; and its range extends southwards to the Cape, and eastwards to Lake Baikal, India, Ceylon, etc. The American flamingo (*P. ruber*) is, however, distinct, having the general colour of the plumage a full vermilion-scarlet. Flocks of flamingoes, as they may be seen by the lakes



FRONT VIEW OF THE
LOWER END OF THE
RIGHT TIBIA OF THE
FLAMINGO.

a, bony bridge; *b*,
tubercle.

of North-Western India, form one of the most wonderful sights in the world. On the lakes of Sind, Mr. Hume describes the flocks as comprising tens of thousands of individuals, which may be seen either massed upon the water, looking like huge rosy islands, or floating above it like a cloud at sunset. Still more wonderful is it



EUROPEAN FLAMINGOES ($\frac{1}{2}$ nat. size).

"to see one of these enormous flocks rise suddenly when alarmed; as you approach them, so long as they remain on the water at rest, they look simply like a mass of faintly rosy snow. A rifle is fired, and then the exposure of the upper and under-coverts of the wing turns the mass into a gigantic, brilliantly rosy scarf, waving too and fro in mighty folds, as it floats away."

Although essentially a wader, the flamingo in deep water can swim well and

powerfully, carrying the neck nearly straight and inclined somewhat forwards, and moving in a series of jerks. In flight, the neck and legs are stretched straight out in front and behind; the flock progressing in the same formation as geese, and uttering "gagging" cries almost indistinguishable from those of the latter. Although flamingoes doubtless consume a number of small aquatic animals, it would appear that their chief food consists of various water-plants, which are pulled up from beneath the surface. When feeding, the flamingo turns its head the wrong way up, in which position its bent beak forms a most efficient spoon-like instrument. The nests, as described by Mr. Abel Chapman at the mouth of the Guadalquivir, are in the form of round basin-shaped elevations of mud placed in close continuity on the mud-flats. They may vary from 2 to 6 inches in height, but the majority are very shallow, and present somewhat the appearance of a number of plates spread over the plain. Other single nests were, however, situated in the water, and were in consequence much taller. The eggs, two in number, have a chalky external coating, beneath which is a greenish blue shell. During incubation Mr. Chapman states that the birds have "their long red legs doubled under their bodies, the knees projecting as far as beyond the tail, and their graceful necks neatly coiled away among their back feathers, like a sitting swan, with their heads resting on their breasts." According to Brehm, the period of incubation lasts a month; and the young take to the water almost immediately after hatching, swimming to a much greater extent than their parents. When conditions are not favourable for building, nests like the above cannot be formed, and the eggs are dropped anywhere; while, in some seasons, from persecution or want of water, the birds do not breed at all.

Short-Legged Flamingoes. During the Miocene period there existed in Europe numerous flamingo-like birds which cannot be referred to the existing genus, even if they belong to the same family. The best known of these have been named *Palalodus*, and were smaller birds than modern flamingoes, from which they were distinguished by their relatively shorter and stouter legs and longer toes, while it is highly probable that the beak was not deflected in the manner characterising the true flamingoes.

THE DUCK TRIBE.

Order ANSERES,—Family ANATIDÆ.

Nearly related as are the members of the duck tribe to the flamingoes, yet they are very different-looking birds, easily distinguished by external characteristics. In the first place, their legs are always short, and inferior in length to the wings; the tibia being usually feathered nearly or quite to the ankle, and scarcely free from the body. The cannon-bone, or metatarsus, differs from that of the flamingoes in its shortness, although the two resemble one another in the shortness and backward direction of the trochlea for the second toe, while the tibia is at once distinguished by the marked inflection of its lower extremity. The first toe, although generally small, is always present; while, as in the flamingoes, the three front toes are, except in one instance, completely webbed. The relatively short

beak is comparatively straight, and more or less depressed and laterally expanded, with peculiar laminations on its edges; while the rostrum of the lower surface of the skull shows well-marked basipterygoid facets for the articulation of the pterygoid bones. In the skeleton of the body the metacoracoid is much longer and narrower than that of the flamingoes, and is also much less firmly articulated to the breast-bone. The plumage is characterised by its dense and compact nature, and the facility with which water is thrown off from its surface. In the wings there are always ten primary quills, but the number of tail-feathers is liable to

variation. All the members of the order moult annually in the autumn, and the quills of the wings are generally shed so rapidly as to incapacitate the birds for flight for some days. In the true ducks, however, the males change their contour-feathers twice in the year. Although the ducks resemble the flamingoes in laying uniformly-coloured eggs, they differ in that the number in a clutch is large, instead of being generally but a pair; the eggs themselves are further characterised by their hard and usually very smooth shells.

The general external appearance of the members of the duck tribe is too well known to need special mention. It may be observed, however, that their build is that best adapted for rapid progress through the water; the breast and fore-part of the body being broad and rounded, the hinder extremity narrow and tapering, and the legs placed relatively far back.

FRONT AND LOWER VIEWS
OF THE RIGHT CANNON-
BONE OF A DUCK.



Although it has been attempted to divide the members of the order into several distinct families, the whole of them are so nearly allied that it seems impossible to do more than group the genera of the one family *Anatidae* under several subfamilies, and even some of these are very difficult of definition. The species of the family, which are probably about one hundred and sixty in number, are distributed all over the globe, although more numerous in the higher latitudes of the Northern Hemisphere than elsewhere. All are thoroughly aquatic in their habits; but while the majority are swimmers, the members of one group are expert divers. As a rule, they associate in flocks of larger or smaller size, and migrate in numbers to the northern portions of their habitat for the breeding-season. They are all birds of strong flight, and when on the wing fly in the well-known chevron-shaped formation, frequently at a great height in the air. Although the majority of the species are more or less omnivorous in their diet, the mergansers subsist exclusively on fish, while the greater part of the food of the geese consists of grass. The group is not a very ancient one, the earliest known forms occurring in the lower beds of the Miocene division of the Tertiary period.

Spur-Winged Geese. The African spur-winged geese (*Plectropterus*), of which there are two species, take their name from the long spur on each wing, which is sharply pointed and attached to the outer side of the wrist-joint; and as they differ in several important points from the other members of the order, they constitute a subfamily by themselves, some writers even making them the repre-

sentatives of a distinct family. The lores are naked, and the metatarsus is covered in front with large scutes; thus differing in both these characters from the geese. The beak is of considerable length and of nearly equal width throughout, terminating in a nail-like knob, and having at its base a large protuberance. In the adult the front of the head is bare and warty, and the cheeks and part of the neck are also naked. The leg is of considerable length, with the lower part of the tibia bare, the metatarsus wide and compressed, and the first toe relatively long, simple, and elevated, the front webs being somewhat deeply incised. In the common *P.*



SPUR-WINGED GOOSE ($\frac{1}{2}$ nat. size).

gambensis the plumage of the upper-parts and the sides of the breast is black, tinged with coppery green; the wings are mottled with white, the abdomen white with patches of black behind the thighs, the naked parts of the face reddish, and the beak and legs reddish and orange-yellow. In size the bird nearly equals the English wild goose. The spur-winged goose inhabits tropical Africa, ranging from Senegambia southwards to the Transvaal and Zambesia, being replaced in Abyssinia and the adjacent regions by Rüppell's spur-winged goose (*P. rueppelli*). A few stragglers have been observed in Britain. In the Sudan these birds are generally found in small parties, which for a considerable part of the year frequent the

banks of rivers, although during the moulting-time, when unable to fly, they seek the retirement and shelter of reedy marshes and swamps; and in the breeding-season the flocks divide up into pairs. Farther south, according to Messrs. Nicolls and Eglinton, they frequent the reedy margins of Lake Ngami and the Chobi and Zambesi Rivers, where they breed in immense numbers. When, however, the smaller water-courses and pools are filled with water, these birds desert the impenetrable swamps, to wander in pairs over the country. "The broods usually number from eight to twelve, the old birds remaining with their progeny for the remainder of the season following the nesting. They do not feed in the day, but may be then observed in the open water, or standing motionless on some dry bank, rocky prominence, or island. When on the wing, they continuously utter a low, hissing noise, and shortly after sundown, just before darkness sets in, leave their day-resorts and fly to the feeding-ground, which is generally some very shallow pass or swamp overgrown with grass, and here they spend the night in search of leeches and water animalculæ." The nest is a huge structure of reeds and flags, generally built among the reeds, but occasionally in a low bush; and to the northward the number of eggs is said to be much less than that above mentioned. During the night they generally fly low; and, in accordance with the length of their legs, they walk less awkwardly than the true geese. Shy and wary, as well as endowed with great vitality, these birds are difficult to kill, and the flesh of the old ones is rank and tough. They are easily tamed, and thrive in confinement, although their disposition is pugnacious.

Half-Webbed Goose. A still more peculiar form than the last is the half-webbed or pied goose (*Anseranas melanoleucas*) of Australia, in which the front toes are only webbed at the base, and the hind one is very long and not raised above their level, and furnished with a large claw. The lores are naked, and the metatarsus is reticulate and longer than the third toe. This remarkable bird, which is about the size of the brent goose, constitutes a distinct subfamily by itself, and has a dull black and white plumage, and a hooked beak, with a large, warty, comb-like prominence on the front of the head. The claws are long and sharp, and the whole foot is adapted for perching. In accordance with this structure, these birds sit for hours on the branches of the Australian tea-trees, and but seldom enter the water. Their cry is loud and hoarse, but quite unlike that of the common goose; and the windpipe is folded on itself, although on the side of, instead of within, the breast-bone, as in the swans.

Cereopsis Goose. The large cereopsis goose (*Cereopsis novæ-hollandiæ*) of New Zealand and Tasmania is the sole existing representative of another subfamily characterised by the extreme shortness of the beak, which is covered at the base with a waxy skin, and has its extremity bent down and truncated so as to approximate in appearance to that of a fowl. The body is very stoutly built and massive, the neck short and thick, the head small, the leg long, and the foot with short toes, powerful nails, and deeply incised webs. The wings are broad, with strong quills; the tail is rounded, and the body-plumage soft. The colour of the plumage is a clear ashy grey, with brown reflections, passing into lighter grey on the crown of the head, and marked on the back with blackish brown spots near the tips of the feathers; the under tail-coverts and the tips of some of the wing-

feathers being also blackish brown. The eye is scarlet, the beak black, with its waxy covering greenish yellow, and the leg and foot blackish.

In habits the cereopsis goose—commonly known in Australia as the Cape Barron goose—is much more of a land than a water bird, its gait being very unlike that of an ordinary goose, and its rate of swimming slow. The flight is, moreover, heavy. Essentially diurnal in their habits, these birds are nowhere common, and are rapidly diminishing in number, having been even exterminated in some of the smaller Australian islands. During a long sojourn in Victoria, the "Old Bushman" states that he only saw these birds on two occasions—"once in a small flock, and once when two pitched with the tame geese at Mordialloc (as they are fond of doing), and which were caught alive. They soon became tame, and used to stalk about the paddock; but they were very pugnacious with the other geese. Their call-note was a deep, trumpet-like sound." The nest, although no great work of art, is better built than that of most members of the family, being smoothly rounded inside, and decorated with feathers and down. In size the eggs are relatively small, while in form they are rounded, and in colour yellowish white. The period of incubation varies from thirty to thirty-eight days, according to the weather, and the young are able to run immediately after breaking the egg.

New Zealand
Goose.

Till within a comparatively recent date New Zealand was inhabited by a nearly allied but larger goose (*Cnemiornis calcitrans*), which, like so many of the large birds of those islands, had totally lost the power of flight, the wings being very small, and the keel of the breast-bone wanting. In all probability these birds were exterminated by the Maories. As in the cereopsis goose, the metacoracoid of this extinct species was much wider and shorter than it is in the other members of the family.

The True Geese.

The true geese (*Anser*), together with several allied genera, constitute a fourth subfamily distinguished by the following characteristics, and including some forty species, having an almost world-wide distribution. In size the geese occupy a middle position in the family, none of them being large. The neck is of moderate length, being always shorter than the body; the lores are feathered; the beak is not longer than the head, and tapers to the extremity, which is covered by a large nail-like knob; while the metatarsus is rather long, exceeding the third toe in length, and is covered on all sides with reticulate scales. The tail-feathers may be either fourteen or sixteen; and although the two sexes are usually very much alike, there is great specific variation in colour. But a single autumnal moult of the plumage takes place; and all these birds are essentially vegetable feeders, many of them grazing in the well-known manner of the domestic breeds. They are all birds of strong, though somewhat heavy flight; and although some are confined to the Southern Hemisphere, the majority seek the remote regions of the north in which to breed, ranging in winter over the warmer parts of the same hemisphere. As compared with the swans, their more elevated bodies and relatively longer legs (in which the tibia is feathered nearly to the ankle) are indicative of more terrestrial habits. In the members of the genus *Anser*, there is but little if any black in the plumage of the head and neck; the beak and feet are light-coloured, and usually reddish in the adult; and the tail has sixteen feathers.

The genus is represented by some twenty species, ranging over the cold and temperate regions of the globe, but becoming almost cosmopolitan in the winter. Of these the typical member is the grey-lag goose (*A. cinereus*), which is probably the parent form of the domesticated breeds, and is the only species which nests in the British Islands. It is characterised by the white or whitish nail on the beak; by the remainder of the beak, together with the feet, being usually flesh-coloured, although liable to vary from creamy white to purplish red; while the wing-coverts and rump are slaty grey. In length, the male measures about 35, and the female 30 inches. Breeding at the present day in the British Islands only, in the north



WHITE-FRONTED GOOSE.

of Scotland and Ireland, the grey-lag goose ranges all over Europe and North and Central Asia as far east as Amurland, while in winter it spreads over Southern China and Upper India. The white-fronted goose (*A. albifrons*), of which there is a larger and a smaller variety, is another British species, although only a winter visitant, also found in India during the cold season. It is a much smaller form than the preceding, the length of the larger race only reaching 27 inches, while in the smaller it varies from 24 to 20. The beak is generally orange-yellow, with a white nail; the feet being likewise of the former hue; while the forehead is characterised by the presence of a variable amount of white feathers at the base of the beak; and the plumage

of the breast is much mottled in the adult with brownish black. The Old World distribution of this species is very similar to that of the last; but it is found during winter in North-Eastern Africa, while it also occurs in Greenland, and is represented in the rest of North America by a variety (*A. gambeli*). The smaller form is often termed the dwarf goose. Agreeing nearly in size with the grey-lag goose, the bean-goose (*A. segetum*)—another well-known British species—may be readily distinguished by the black nail of the beak; the middle portion of the beak being orange-yellow, and its base black; while the legs and feet are also orange-yellow or orange. This species also ranges over the greater part of the northern half of the Old World, occurring during the winter in Britain, the shores of the Mediterranean, India, and Japan. It is, however, essentially a northern form, only breeding in Scandinavia to the north of latitude 64°, and in Siberia on the tundras near lakes and pools beyond or near the limits of forest. The pink-footed goose (*A. brachyrhynchus*) is a closely allied smaller

species or variety, measuring only 28 inches in length, and characterised by the middle portion of the beak being generally pinkish, although sometimes orange-yellow; while the feet are usually flesh-coloured. Breeding in Spitzbergen, probably Iceland, and perhaps Novaia Zemlia, this small goose visits the British Islands in great numbers during the winter, while it occurs rarely in Northern India. The snow goose (*A. hyperboreus*), of which there is a large and small race, belongs to a second group of the genus¹ characterised by the very stout and slightly convex beak, and by the head and neck, or the whole plumage of the adult, with the exception of the primaries, being entirely white. The snow goose is one of those in which the primaries are black, and the rest of the plumage white; the smaller variety measuring 23 inches in length. Distributed over the whole of North America, this essentially northern species probably has a circum-polar distribution, and nests on the barren Arctic tundras, although but little is known of its habits. Ross's goose (*A. rossi*) of north-western North America, is a smaller form, with numerous caruncles at the base of its shorter beak; while the American blue-winged goose (*A. caerulescens*) has a large portion of the plumage of the body greyish brown, with bluish grey wing-coverts and rump.

Habits.

The true geese for the greater part of the year frequent marshes, lakes, moors, or open plains, where there is water; but during the winter not unfrequently seek the sea-coast. Their harsh "gagging" notes are among the most discordant of sounds; and although they associate in flocks during the winter, and frequently also breed in company, each male has but a single consort. The nest is of large size, with the numerous eggs of a creamy white colour; and both sexes take part in the work of incubation. In undisturbed districts they feed during the day, but, when frequently fired at, their feeding-hours are mostly nocturnal; shoots of young grass and corn forming their favourite food. The snow goose, however, subsists largely on berries in the summer. Writing of the grey-lag goose in India, Mr. Hume observes that when not feeding, these birds "spend their time dozing or dawdling about on the margin of some lake or the bank of some river, always by preference choosing some island in these for their noontide siesta. Unless disturbed, they very rarely take to the water. Although they rise rather awkwardly and slowly, with violent and rather noisy flappings of their wings, they fly very strongly and easily when once off, and I do not know a more beautiful sight than the sudden and rapid descent of a large flock from high in the air to some sandbank. The flock comes along in sober state, circles round decorously once or twice, and then suddenly down they come with incredible rapidity, twisting and turning with an ease and grace for which no one could at other times have given them credit." When passing from one piece of water to another, they frequently fly in an irregular mass, but, when journeying long distances, the flock generally ascends to a great height, and flies either in a line or a chevron. During the winter in India these geese are commonly seen in flocks of from thirty to a hundred, but at times a thousand or more may be collected together. The grey-lag does not go so far north to breed as the bean-geese; and its northward, and sometimes also its southward migration, is consequently earlier. The nest of the grey-lag is built of grass and flags,

¹ Frequently separated as a distinct genus *Chen*.

without lining, and is usually placed either at the base of a tussock of coarse grass or among heather; the general number of eggs being six.

Shy and wild as is the grey-lag goose in many districts, on the larger Indian rivers, according to the experience both of Mr. Hume and ourselves, it may be easily approached within range, with the aid of a boat protected in front by a screen, behind which the sportsman lies concealed. In this manner a flock standing on a sandbank may be approached within a hundred yards without causing much disturbance. "As you approach nearer," writes Mr. Hume, "all begin to walk slowly away, and, as a rule, if you persist in coming within twenty yards, and coming on quicker than they can walk, they rise and fly; or if you stand up in the boat, or make any sudden noise, they will equally take to wing, but if you drift quietly down on them, they will let you come within twenty or thirty yards without quitting the bank." With the first shot they rise with a deafening clamour, generally circling round the boat, and often affording the chance of a second shot.

**The Brent or
Sea Geese.**

Although nearly allied to the snow geese, the typical brent geese of the Northern Hemisphere (*Bernicla*) are distinguished from the true geese by their darker plumage, in which the head and neck are chiefly black, and the beak and feet entirely black, at all ages. All these birds are characterised by their short subconical beaks, of which the length is considerably less than that of the head; the mandibles having their inner edges nearly straight, and their lamellæ nearly or completely concealed; while the nail at the tip is ovate, and the nostrils oval and nearly central. The long wings are also more pointed than in the true geese, and the tail is short and rounded.

Of the more typical representatives of the genus, we may first mention the brent goose (*B. brenta*), characterised by the head and neck being black, with the exception of a white patch on each side of the latter. The length is about 22 inches; and in the typical form the upper part of the breast is black, while the lower part of the latter and the abdomen are slaty grey. There is, however, a variety (*glaucoaster*) in which the under-parts below the breast are nearly white. The brent goose inhabits all Arctic Europe and part of Asia, wintering in the British Islands, North Germany, France, Belgium, etc., and occasionally ranging to the Mediterranean and the Valley of the Nile. It breeds in Spitzbergen, Novaia Zemlia, and the islands of Arctic Siberia, and thence to the extreme north; while in America it nests in Greenland, and ranges southwards on the east side of that continent as far as New York, or even Texas. In western Arctic America it is replaced by the American brent goose (*B. nigricans*), distinguished by the white of the middle of the neck forming an almost complete collar; the winter range of this species extending along the Pacific seaboard as far as Lower California. The bernicle goose (*B. leucopsis*)—anciently supposed by some extraordinary confusion of ideas to have been produced from the well-known ship-barnacles—is a larger species, measuring upwards of 25 inches in length, and easily recognised by the greater part of the front of the head being white, although the lores and the feathers at the base of the upper mandible are black. The plumage of the upper-parts is largely lavender-grey; the scapulars, wing-coverts, and many of the wing-feathers tipped with a bluish black

crescent edged with white at the end, while the primaries and tail-feathers are almost black; the breast and abdomen being greyish white, and the under tail-coverts pure white. This species is an inhabitant of the coasts of Northern Europe, ranging in winter to the British Islands, and occasionally found as far south as Spain and Italy. How far eastwards it extends in Northern Asia is at present unknown; while there is no definite information as to its breeding, although it probably nests in Novaia Zemlia, Spitzbergen, and the regions still



MALE AND FEMALE HALF-BRED UPLAND GEESSE. (From Sclater, *Proc Zool. Soc.*, 1876.)

further north. It probably also breeds in Greenland, being occasionally found on the Atlantic coasts of North America. A fourth very distinct representative of the genus is the Canada brent goose (*B. canadensis*), easily recognised by its black head and neck, with a large triangular patch of white on each cheek, usually joined by a band beneath the throat, but sometimes separated by a narrow black line. Occasionally there is also a white collar encircling the lower part of the neck. As regards the rest of the plumage, the tail, rump, and primaries are brownish black, the upper tail-coverts and region of the vent white, and the

remainder greyish brown, lighter below than above, with the tips of the feathers paler. This goose, which is very variable in size and coloration, inhabits the whole of North America, as far south as Mexico. Very different from all the above is the handsome bird known as the red-breasted goose (*B. ruficollis*), which may be recognised by the black forehead, white lores, and the rich chestnut of the neck and upper breast bordered above with white. The ear-coverts have also an angular patch of chestnut bordered with white; the upper-parts are blackish brown; the top of the head, part of the sides of the face, the back of the neck, the throat, the primaries, tail-feathers, and lower breast are black; and the upper and lower tail-coverts and the abdomen white. In length this bird measures from 21 to 22 inches. Its native home is the tundras of Siberia, whence it wanders occasionally during the winter to Scandinavia, Northern Germany, Holland, the British Islands, and other parts of Europe.

Habits. From being such exclusively Arctic birds, our acquaintance with the habits of the more typical brent geese is not so intimate as would be desirable. In Europe during the winter they generally frequent the neighbourhood of the coasts, although at times penetrating some distance inland. Usually collecting at this season in considerable flocks, these birds always indicate their near presence by the constant gagging kept up as they feed, or by the hoarse *cronk* of their call-note. The food of the bernicle goose consists chiefly of grasses and bents growing on the sandhills; while the brent goose eats seaweeds and other water-plants, as well as crustaceans and other small aquatic creatures. On the other hand, the Canada goose subsists largely on berries and corn. During its migrations the latter species assembles in flocks, which unite together to form a vast column, with each section under an appointed leader. At such times they generally fly throughout the night, although occasionally resting in the daytime. When about to alight, pioneers descend from the flock to select a favourable and safe feeding-ground; and during the whole time that it is on the ground, the flock is guarded by sentinels. The watchfulness of these guardians renders a flock of Canada geese almost impossible to approach by stalking; and the plan adopted in many parts of the States is to dig pits in a stubble-field, in which the sportsmen take up their position surrounded by a number of decoys. The geese are then shot during their morning and evening flights from lake to lake, when they are attracted within easy range by the decoys. In the Magdalen Islands this species makes its nest in marshy plains, occasionally laying as many as nine eggs in a clutch. The brent goose, on the other hand, breeds on the sides of slopes on the bare space left between the line of snow and the sea-ice; the four eggs being deposited on a bed of grass, moss, and saxifrage, overlain with down. Occasionally the nest of another bird is adopted by some of the members of this genus. All the brent geese are readily tamed, and breed in confinement, several of the species crossing with one another.

Southern Species. The brent geese of the Southern Hemisphere differ more or less markedly from their northern cousins, and some or all of them have accordingly been separated (as *Cloëphaga*) from the genus *Bernicla*, although we follow Mr. Selater in including the whole of them under that name. Several of these lack the black heads and necks of the northern species; and in some, such as

the upland goose (*B. magellanica*), ranging from the Falkland Islands to Chili, and the kelp goose (*B. antarctica*) of the Falkland Islands and Patagonia, the male is mainly white, while the female is mottled brown. In other cases, however, as shown in our figure, which is taken from hybrids between the upland goose and another species known as *B. dispar*, the difference between the two sexes is less marked, although the male still has a lighter head and neck. Other species are the small Australian brent goose (*B. jubata*), which is of the size of a duck, and characterised by the extreme shortness of its beak, and its blackish head and neck; and the Sandwich Island goose (*B. sandvicensis*). According to Mr. W. H.



EGYPTIAN GOOSE ($\frac{1}{2}$ nat. size).

Hudson, the upland goose, which, like some other members of the genus, has a small spur on its wing, visits Patagonia in great numbers during the winter, and inflicts much damage on the growing crops of young corn and clover.

The Egyptian goose (*Chenalopex aegyptiaca*) is the best known member of a genus typically represented by the knob-winged goose (*C. jubata*) of South America. It is characterised by the beak being equal in length to the head, and of rather slender form, with the tip bent suddenly down so as almost to conceal the lower mandible, and the nostrils placed near its base. The wings are rather long and broad, and are each armed with a small bare knob, while the tail has fourteen rounded feathers. The legs are relatively long,

Egyptian and
Knob-Winged
Geese.

with the metatarsus exceeding the length of the third toe; and the first toe is well developed.' The windpipe of the male differs from that of ordinary geese in being dilated at the lower end. In colour the Egyptian goose has the sides of the head and front of the neck mottled yellowish white; a patch round the eye, the hinder-neck, and a collar round the lower part of the latter are chestnut-brown; on the upper-parts the general hue is mingled grey and black, and that of the under-parts yellowish brown, marked with black and white, and becoming lighter on the hinder-part of the breast and abdomen; the breast having a patch of chestnut brown. The carpal portion of the wing and wing-coverts is white, with black tips to the smaller coverts; the secondaries are tinged with reddish bay, and edged

with chestnut; and the primaries and tail-feathers are brilliant black. The iris is yellow; the beak is horn-colour above, with the tip pink, the nail, margin, and base dark brown, and the lower mandible cherry-red; the legs and feet being pink.

This handsomely coloured bird, which is the vulpanser of Herodotus, was domesticated by the ancient Egyptians, and, although not sacred, was the emblem of Seb, the father of Osiris. It now occurs in the Nile Valley southwards of Cairo, and thence ranges over the greater part of tropical Africa, and is the common wild goose of the Cape Colony. Going about either singly or in



AMERICAN KNOB-WINGED GOOSE.

pairs, the Egyptian goose frequents both rapid running streams and pools and lakes, and its nest may be situated either on dry land or among long swampy grass in the Zambesi district. Further north these birds have, however, been known to rear their young on ledges of steep cliffs. The young brood leave their parents as soon as they are strong enough to fly. When on the wing, a loud, harsh, grating noise, which has been compared to the bark of a dog, is continually uttered. This goose has been more or less completely acclimatised in England, where it may not unfrequently be seen on ornamental waters; and in confinement it has bred with several other members of the family,—among them the spur-winged goose. The flesh is superior in quality to that of the latter species. The windpipe of the male is peculiar in having a large bony capsule on the left side of its lower extremity.

The Swans.

So indissolubly was the attribute of whiteness connected among the ancients with the swans, that the idea of a black swan, as ex-

pressed in the well-known line, *rara avis in terris, nigroque simillima cygno*, was considered a mere flight of the poetic imagination. Nevertheless, not only does a black swan exist, but a second species is remarkable for having a black head and neck and a white body. The swans, all of which may be included in the single genus *Cygnus*, are readily defined as members of the present family characterised by their exceedingly long necks, their naked lores, the simple first toe, and the metatarsus reticulated and shorter than the third toe with the claw. The group as thus defined, indicates not only a genus, but likewise a distinct subfamily. All these birds are of large size, and have the flexible and slender neck as long as, or longer than the body; while the beak exceeds the head in length, and has its edges parallel, and the terminal nail small. The tail-feathers vary from twenty to twenty-four in number; and, with the exception of the black Australian swan, the plumage is entirely or mainly white in the adult state. The two sexes are nearly alike; and there is but a single moult. Swans, of which there are comparatively few species, are distributed over the greater part of the world except Africa south of the Sahara, North Australia, and the northern districts of South America. The gracefulness of their form, and especially the beautiful curving of the neck, is proverbial; and they are all birds of powerful flight, more aquatic in their habits than the geese, but also walking well on land. Frequenting lakes and other inland waters in summer, they often seek the sea in winter; but while some prefer open waters, others, like Bewick's swan, rather favour marshes and narrow rivers. Their food consists of the seeds, stems, and roots of flags and other water-plants, supplemented by insects and molluscs. All the white swans are migratory, and during their migrations fly both by night and day. Like the geese, they are more or less gregarious, especially during the winter; and they also resemble those birds in pairing apparently for life. Their large untidy nests are placed on the ground, often among tussocks of coarse grass, and contain from three to eight dull whitish eggs. As a rule, the young birds have feathered lores, and a greyish brown plumage. The call-note is loud and trumpet-like.

At least two species of swans are winter-visitants to the British Islands, while a third occurs in a domesticated state, although probably a few wild individuals also arrive. The first of these is the whooper or whistling swan (*C. musicus*), which belongs to a group of species common to the northern half of both the Old and New Worlds, and characterised by their comparatively short and rounded tails; while it is specifically distinguished by the lores and the basal portion of the beak to below the nostrils being yellow, the remainder of the nostrils being black. In length this species reaches 60 inches. The whooper is essentially an Arctic species, breeding chiefly within the Arctic Circle either on the islands in the deltas of the great rivers, or on the lakes of the Siberian tundras. Iceland and the northern parts of Scandinavia are also favourite nesting-haunts of this species, which appears to breed in pairs and not in small flocks. Mr. Hume is of opinion that during its winter migration this species does not, except in unusually severe winters, go as far south as some of its allies, although at times it reaches the Mediterranean Islands, Egypt, Algeria, and Palestine. Eastwards, it visits the Caspian, Persia, Turkestan, China, and Japan, but is unknown in India.

proper. The nesting-season commences in the latter half of May, the usual period of incubation being about six weeks; but the young birds are unable to fly before the end of August. In diet these swans are mainly vegetarians.

A considerably smaller bird than the last, this species (*C. bewicki*) **Bewick's Swan.** may be distinguished by the yellow of the bill not extending below the nostrils; the total length being about 50 inches. The general distribution is very similar to that of the whooper, although this swan is only an accidental visitor



WHISTLING SWAN ($\frac{1}{2}$ nat. size).

to Norway, and does not breed in Iceland. Indeed, it is only within the last twenty years that its nest and eggs were first obtained; and even now very little is known of its breeding-habits, since this swan is even a more northerly bird than the whooper. Its note is less loud and harsh than that of the latter, being indeed somewhat musical in sound. In winter this swan congregates in enormous flocks, which may be numbered by hundreds, or even thousands; and it is at all times exceedingly wary and difficult to approach. In both the whooper and Bewick's swan the windpipe is bent upon itself, and is received into a cavity in the front of the breast-bone, from which it again emerges to enter the chest; but the nature of the folding is different in the two species, and serves to distinguish between them.

American Swans. North America possesses two representatives of this group of swans, namely, the American swan (*C. columbianus*), and the trumpeter swan (*C. buccinator*), both of which have the windpipe folded. These two species have black beaks; but whereas in the former the number of tail-feathers is usually twenty, the beak is not longer than the head, and the naked skin of the lores generally shows a yellow spot; in the latter there are twenty-four tail-feathers, the beak is longer than the head, and there is no yellow on the lores. The trumpeter somewhat exceeds the whooper in size, whereas the other species is somewhat smaller. In defence of wounded companions the American swan is stated to display great affection, a number having been known to collect round a disabled bird and aid its escape by pushing it forward in the water and supporting its broken wing. In its southerly migration it collects in flocks of twenty or thirty, flying only when the wind is favourable, and then ascending to a great height in the air. The flock flies in the form of an elongated wedge; the rate of their progress being estimated at upwards of a hundred miles an hour.

Mute Swan. The mute swan of the Old World (*C. olor*) indicates a second group of the genus, characterised by the relatively long and wedge-shaped tail, the presence of a large tubercle at the base of the beak, and the absence of a fold of the windpipe entering the breast-bone. In addition to these features, the mute swan may be recognised by the coloration of the beak, in which the base, together with the lores and tubercle, is black, while the terminal portion is orange-red; the coloration being therefore just the reverse of that met with in the whooper. In size the mute swan agrees with the latter; the tubercle of the bill attaining its greatest development in old males. Best known in the British Islands as a domesticated bird, there is little doubt that during the winter there are some wild visitants. The range of the species includes Europe and some portions of Asia, the breeding-area embracing South Sweden, parts of Germany, Russia, Transylvania, Turkestan, etc., while during winter these birds enter Northern Africa, Egypt, and North-Western India. While swimming, the mute swan is the most graceful of all its kin, being the one in which alone the neck is bent in true "swanlike" form. Deriving its name from the absence of any cry in the domestic race, it appears that wild birds trumpet like the whooper. The nesting-time—during which the male bird displays extreme pugnacity—takes place in May; the nests being generally built in association, and the number of eggs in each varying from five to eight. The only swannery in England is the one at Abbotsbury, near Weymouth, belonging to the Earl of Ilchester, where in 1880 there were upwards of fourteen hundred birds. This swannery, which dates from very ancient times, is situated on the estuary known as the Fleet, of which the upper portion is brackish while the lower parts are completely salt. In the breeding-season the nests cover a large area near the shore; and while some of the young birds remain to increase the numbers in the swannery, others wander out into the Fleet and become nearly wild. The severe winter of 1880–81 reduced the number of swans to about eight hundred, an average which has been since maintained.

A considerable amount of discussion has taken place as to whether the so-called Polish swan (*C. immutabilis*), distinguished by the smaller size of the tubercle on the beak, the black edges to the gape, and the slaty legs, as well by the plumage

proper. The nesting-season commences in the latter half of May, the usual period of incubation being about six weeks; but the young birds are unable to fly before the end of August. In diet these swans are mainly vegetarians.

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of the cygnets being often white from birth, is entitled to rank as a distinct species. It is, however, very probable that the distinctive features of the bird itself may be due to immaturity; while the white plumage of the cygnets may be merely an effect of domestication.

Black-Necked Swan. The handsome black-necked swan (*C. nigricollis*) from Chili, Argentina, and other southern districts of South America, is easily distinguished from all the preceding by the black head and neck; the rest of the



BLACK SWAN.

plumage being white, and the lores and base of the beak red. It agrees with the mute swan in having the tail long and wedge-shaped; but differs in the scalloped margin of the web of the toes.

Black Swan. This Australian species (*C. atratus*) differs from all its congeners, not only in the predominant hue of the adult plumage being blackish, but also by the young having feathered lores, and likewise by the extreme shortness of the tail, and the crispness of the scapular and inner secondary feathers. The naked parts of the head and the skin at the base of the beak are red, and the

feathers of the pinion white, but otherwise the bird is black. Inferior in size to the whooper, this elegant bird is far less shy than the majority of its genus; and when flying overhead at night utters a decidedly musical call-note. In Victoria the "Old Bushman" writes that after the young birds can fly, black swans were common "on all the large swamps and lagoons; sometimes in good-sized flocks, but generally in small companies, which I took to be old birds and birds of the year. Early in summer they retire to their breeding-haunts, and we saw very little of them again till the swamps and water-holes filled. They appear to breed in August and September. The nest is a large heap of rushes, and the female lays five to seven dirty white eggs, not so large as those of the mute swan." It is added that the islands in Westernport Bay are favourite nesting-sites. Being a bird of heavy flight, the black swan always endeavours to save itself, if possible, by swimming rather than by taking wing.

Fossil Swans and Geese.

Remains of the whooper and Bewick's swan in the superficial deposits of the Thames Valley indicate that those birds were contemporaries of the mammoth; while, in the Miocene of Malta, Falconer's swan (*C. falconeri*) was of larger size than any existing form, from which it differed by its extremely short and goose-like toes. Bones of the existing species of European geese are found in the same deposits as those yielding the remains of modern swans; while an extinct species (*C. æningensis*), of the size of the bean goose, occurs in the Miocene rocks of Baden.

Comb Duck and Cotton Teal.

Before coming to the more typical ducks, there are three genera demanding a brief notice which, to a certain extent, connect the ducks with the geese, and thus render the classification of the family so difficult. The comb ducks, of which there is an Indian (*Sarcidiornis melanonotus*), an African (*S. africanus*), and a tropical American species (*S. carunculatus*), are large and somewhat goose-like birds with short and high beaks, and characterised by the presence of a blunt spur on the wing, a fleshy protuberance at the base of the beak of the male, and the glossy blackish plumage of the beak, the wings being brightly marked like those of ducks. Although the two sexes are very similar, the males are much larger than the females. The Indian species measures from 30 to 34 inches in length. In habits it approaches the tree-ducks, frequently perching on trees, and generally nesting in holes in their trunks.

The Indian cotton-teal (*Nettapus coromandelianus*) is a member of genus also having one African and two Australian representatives; and somewhat resembles a miniature of the comb duck, although lacking the comb and spur, and also differing by the more sombre coloration of the female. The beak, moreover, is still shorter and higher at the base; and the tail differs from that of all the true ducks in having but twelve feathers. The Indian species, which associates in large flocks, measures 13 or 14 inches in length.

Tree-Ducks or Whistling Teal.

There being no representatives of the group in Britain, the idea of ducks habitually perching in trees may seem to many persons somewhat unnatural, yet this is the normal habit of the tree-ducks, or, as they are generally called in India, whistling teal. Although approaching the more typical ducks in the form of the beak, which is somewhat depressed at the end, this genus (*Dendrocygna*) may be distinguished from them by the front of the metatarsus

being reticulate, in which respect they resemble the geese. The lores are feathered; the legs rather long, with the lower portion of the tibia bare; the wings are short and rounded; and the abbreviated tail is almost concealed by the coverts. The sexes are nearly alike; and although in some species there is a bright patch or speculum on the wing, in coloration these birds approach the Egyptian goose and ruddy sheldrake, to both of which they may be allied. In their voice, as well as in the plumage undergoing but one moult, and likewise in the vegetable nature of their food, these birds again approach the geese, and differ from the ducks. Tree-ducks are distributed throughout the tropical and subtropical regions of the world; and it is highly remarkable that one species (*D. viduata*) is common to South America and West Africa. The general colour of the plumage of these birds is some shade of brown or chestnut, with the back, wings, and tail variously marked with darker brown and slaty; but in one of the American species the abdomen is black, while in a second the under-parts are dirty white. The Indian *D. javanica* measures about 20 inches in length. The latter species frequents well-wooded, well-watered, and well-drained districts throughout India; being found during the breeding-season in pairs, but in the cold weather and spring associating in flocks, which, according to Mr. Hume, may number from twenty to two thousand head. Migratory in their habits, these birds, writes the last-named observer, are very tame and familiar, "frequenting village ponds, and living on the trees surrounding such, even on trees growing inside the enclosures of cottages. They are rather dull birds, slow on the wing and easily shot, and they have a habit of circling round and round the gunner when one of their number has been shot, that often proves fatal to the greater portion of the flock, when it unfortunately falls under the tender mercies of butchers. When absolutely required for food, a pair or so may be shot, but they are indifferent eating, and fly so poorly that they really afford no sport." Their deficiency in the matter of flight, is, however, counterbalanced by their expertness in swimming and diving, a wounded bird being most difficult to capture. When not on the wing, these birds are most commonly seen either feeding on the water, or resting on trees. Chiefly vegetarians, they subsist largely on rice, as well as various water-plants, but also consume insects and molluscs. They derive their name of whistling teal from their double hissing whistle-like note, which is always uttered when the birds are alarmed or about to fly, and is often repeated during flight, although but seldom heard when they are feeding or at rest. The nest may be situated either in a hollow tree or between the fork of a large branch, or on the ground, and if built by the birds themselves is unlined; a deserted crow's nest is, however, often taken advantage of. The number of eggs is usually from ten to twelve. Curiously enough, when the nest is in a tree, the young are carried down by the parent birds to the water. Mr. Hume has observed the ducklings carried in the claws of their parents, but it has been stated that they are sometimes borne on their backs.

The Sheldrakes. The handsome birds known as sheldrakes (*Tadorna*), which are near relations of the tree ducks, may be regarded as the first representatives of the subfamily *Anatinae*, in which are included all the more typical ducks. The members of this group are relatively short-necked birds of smaller size than the true geese, from which they differ in having the front of the

metatarsus covered with scutes, and the length of that segment shorter than the third toe; while they are further characterised by having only a small membrane attached to the first toe. The beak is variable; and the number of tail-feathers ranges from fourteen to eighteen. In the males, the lower end of the windpipe is dilated, as it is in the spur-winged and Egyptian goose, the comb ducks, etc. None of these birds are in the habit of diving for their food. The sheldrakes resemble the tree ducks in that the plumage of the two sexes is nearly alike; but in the ducks there is usually great differences between the two, the males having a very beautiful coloration, with a bright metallic patch or speculum, on the wing. The sheldrakes further agree with the tree ducks in having but a single annual moult; whereas, in many of the ducks, the males moult their contour-feathers once in the early summer and again in autumn. The subfamily comprises a very large number of species arranged under many genera, and having an almost world-wide distribution, although most widely spread during the winter of the Northern Hemisphere. The exigencies of space admit of a reference only to some of the more important genera. In addition to the similarity in the coloration of the sexes and their single moult, the sheldrakes are characterised by the presence of a conspicuous white patch on the front of the wing, by the relative length of the metatarsus (above which a portion of the tibia is bare), and also by the prevalence of chestnut, black, and white — often in strongly contrasting masses — in the plumage. The beak is about equal in length to the head, and higher than broad at the base (near which are situated the nostrils), with the nail bent down and hooked. In the long and powerful wings, the second quill is the longest. The sheldrakes form a group of six species, breeding in the temperate regions of Europe, Asia, Africa, and Australia, and visiting India and the adjacent countries in winter, but quite unknown in the New World.

Common The handsomest and, in Europe, the best known representatives
Sheldrake. of the genus is the common sheldrake, or burrow duck (*T. cornuta*), which is sufficiently characterised by the head and neck being dark glossy green, below which is a broad collar of white, followed by a band of rich chestnut extending across the back and breast; the remainder of the plumage being mainly black and white, with the speculum of the wing marked by green and chestnut on the secondaries. The beak is red, while the legs and toes are flesh-pink. The usual length is about 25 inches. This sheldrake is essentially an inhabitant of the temperate regions of the northern half of the Old World, being a resident throughout the year in the British Islands, and scarcely ever penetrating within either the Arctic Circle or the Tropics. From Britain its range extends to Japan, where it is a winter visitor; and the limits of its migration include Persia, North-Western India, and North Africa; while it breeds not only in Europe, but in Southern Siberia, Mongolia, Turkestan, etc. Essentially a coast-bird in Europe, in India the sheldrake is more commonly found on inland waters, although it haunts the shores of Sind. On the coasts of Europe these birds prefer sandy districts, especially those with numerous rabbit-burrows, in which they breed, and hence derive their name of burrow-duck. Yarrell writes that the nest is always in a burrow of some sort, and frequently in one describing part of a circle, so that it may be situated as much as ten or twelve feet from the entrance. It is composed of bents of grass,

lined with fine soft down. In the Frisian Islands the natives construct artificial burrows for these birds to nest in, and make a regular harvest of the eggs; the number laid by a single bird, if some are from time to time removed, reaching as many as thirty. The note of the sheldrake is a shrill whistle; and its food usually consists of seaweed and various small marine animals. Its conspicuous white and dark plumage renders the sheldrake easy of detection among the ducks; but, in India at least, it is extremely shy and difficult to approach.



COMMON SHELDRAKE ($\frac{1}{2}$ nat. size).

A very different looking bird to the last is the ruddy sheldrake, or Braminy duck (*T. casarca*), which, while but a rare visitor to the British Islands and North-Western Europe generally, breeds in Spain, the valley of the Danube, and southern Russia in great numbers, and thence extends through Persia, Turkestan, and South Siberia to Amurland and Japan; while in winter it visits India, Burma, and China in swarms. Although so largely migratory in Asia and non-migratory in Europe, the occurrence of this species during the winter in North Africa indicates that some individuals make a periodical move even in the western portion of its habitat.

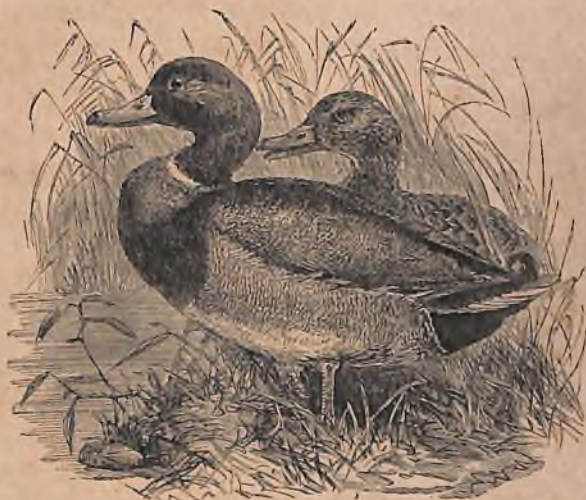
The greater part of the plumage of the Braminy is a full orange-brown, but in the summer the male has a black ring round the neck; while at all times the point of the wing and wing-coverts are pale buffy white, the primaries, rump, and tail-feathers blackish leaden grey, and the secondaries rather lighter, with a brilliant

bronzy green speculum formed by their outer webs, except at the tips. The beak and legs are leaden and blackish. In size, this bird corresponds closely with the ordinary sheldrake. Some of the favourite breeding-places of the Braminy are the great lakes of the Tibetan Highlands, such as the Pangkong and Tsomorari, on the former of which the writer has seen them in numbers. In such regions these birds build in clefts or cavities of rocks; but in other districts the nests are more commonly placed in burrows and other holes, while in Mongolia they have even been known to be situated in the fireplaces of deserted villages. Visiting the country during the winter in myriads, Braminys at that season are to be met with on every piece of water in India; and, as Mr. Hume observes, no object is more familiar in river scenery "than a pair of these ducks, standing or squatting, side by side on the banks, or on some chur [island]; no sounds are more perpetually heard as one floats lazily down with the stream, than their loud warning notes, repeated more earnestly as one draws nearer and nearer, and followed by the sharp patter of their wings as they rise on the approach of the boat. Very wary they are, and yet not at all afraid of men, so long as they keep just out of gunshot." Uneatable except when skinned, and then by no means a *bonne bouche*, the Braminy is most cordially detested by the Indian sportsman, as its harsh cry and noisy flight puts up all other water-fowl in the neighbourhood while still beyond shooting-range.

The beautiful
The True Ducks. wild duck or mallard

(*Anas boschas*) is the typical representative not only of the true ducks of the genus to which it belongs, but likewise of all the freshwater non-diving ducks of the present subfamily; the general characters of which have already been mentioned under the head of the sheldrakes. The

true ducks are characterised by having the broad and depressed beak about equal in length to the head, with its sides either parallel or partially dilated, and both mandibles provided with well-marked transverse lamellæ on their inner edges; the oval nostrils being situated in advance of its base. The legs are shorter than in the sheldrakes, and placed nearly under the centre of the body, with the metatarsus somewhat rounded in front. The wings are rather long and pointed; while the tail, which may be either pointed or wedge-shaped, is comparatively short. Of the true ducks there are numerous species, with a cosmopolitan distribution; and while in the wild duck the plumage of the two sexes is very distinct, this is not the case in some species, such as the Indian spot-bill duck (*A. pæcilorhyncha*).



WILD DUCK.

Mallard. Such a familiar species as the British wild-duck—the ancestral stock of most of our domesticated breeds—might seem to require little or no description, but the omission of such a notice would entail confusion later on. The mallard, then, is characterised by the male being more brightly coloured than the female, except during the breeding-season; and by the brilliancy of the wing-speculum in both sexes at all times. In winter the adult male has the four middle tail-feathers curled upwards; the head and neck are brilliant velvety green, and separated by a white collar from the rich chestnut of the breast; while the wing-speculum is a brilliant metallic violet, bounded in front by a black and then a white bar, and behind by two similar bands. The beak is yellowish green, and the legs and feet orange-red. In length the bird measures about 22 inches. On the other hand, the female at all times, and the male in the breeding-season, have the wings coloured as above, and the whole of the rest of the plumage variegated with dusky and ochre, the former appearing in the centre of the feathers and on the upper-parts, and the latter on the edges of the feathers and lower-parts. Such characters suffice shortly to distinguish this handsome species from its allies. As regards its distribution, the mallard may be said to inhabit the whole of the Northern Hemisphere, although its chief range is restricted to the zone lying between the Arctic Circle and the Tropic.

Dusky Duck. The dusky duck (*A. obscura*), of eastern North America, may be taken as an example of a second group of the genus in which the sexes are alike at all seasons, and there is no white at the base of the wing. In this bird the prevailing colour of the plumage is dusky, with the feathers bordered with dull ochre; the head and neck being deep dull buff streaked with dusky, and the wing-speculum usually deep violet.

Gadwall. This British duck (*A. strepera*) is a small more markedly distinct species, sometimes separated as a distinct genus, under the name of *Chaulelasmus*. Structurally it is distinguished from the preceding by the narrower and shorter beak, in which the edges are not quite parallel, the lamellæ are visible externally, and its upper border is not convex in front; while it is further distinguished by the dull coloration of the speculum, which is simple black and white—mainly the latter. The gadwall is a very widely spread species, occurring in Europe, Asia, Africa, and North America; and is represented in an island of the South Pacific by the somewhat smaller Coues' gadwall (*A. couesi*).

Habits. Limits of space preclude any detailed account of the habits of the various species of ducks of this genus, but the following excellent account, referring to the mallard, may be quoted from Macgillivray, who writes that "marshy places, the margins of lakes, pools and rivers, as well as brooks, rills, and ditches, are its principal places of resort at all seasons. It walks with ease, even runs with considerable speed, swims, and on occasion dives, although not in search of food. Seeds of grasses and other plants, fleshy and fibrous roots, worms, molluscs, insects, small reptiles, and fishes are the objects of its search. In shallow water it reaches the bottom with its bill, keeping the hind part of the body erect by a continued motion of the feet. On the water it sits rather lightly, with the tail considerably inclined upwards; when searching under the surface, it keeps the tail flat on the water; and when puddling at the bottom with its hind-part up, it

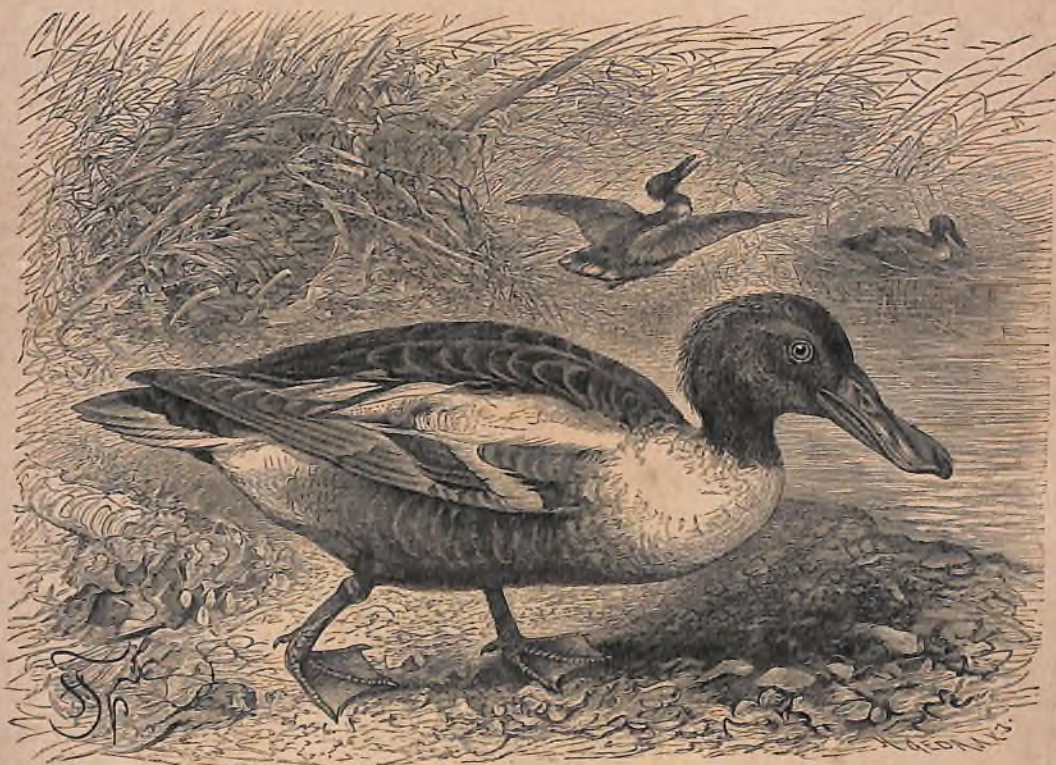


WILD DUCK.

directs the tail backward. The male emits a rather low and soft cry between a croak and a murmur, and the female a louder and clearer jabber. Both on being alarmed, and especially on flying off, quack; but the quack of the female is much the louder. When feeding, they are silent, but when satiated they often amuse themselves with various jabberings, swim about, approach each other, move their heads backward and forward, "duck" in the water, throwing it up over their backs, shoot along its surface, half-flying, half-running, and, in short, are quite playful when in good humour. On being surprised or alarmed, whether on shore or on water, they spring up at once with a bound, rise obliquely to a considerable height, and fly off with speed, their hard-quilled wings whistling against the air. When in full flight, their velocity is very great, being probably a hundred miles in the hour. Like other ducks, they impel themselves by quickly repeated flaps, without sailings or undulations." With regard to the foregoing statement as to the speed of the mallard's flight, it is probable that there is considerable exaggeration, since a recent writer records a case where a couple of wild ducks started off at full speed in front of a train which had disturbed them, and although the train was running at the rate of only thirty-seven miles per hour, the birds were overtaken. Like most of its kindred, the mallard usually builds its nest in a depression of the ground near the margin of water, although at times some distance from the latter. The nest is lined with dry grass, leaves, or down; the smooth eggs being of a dull greenish grey colour. The gadwall, however, lays creamy yellow eggs, varying in number from nine to thirteen. Instances are on record of wild ducks nesting in trees at considerable heights above the ground, from whence the young were doubtless carried down in the same manner as those of the tree-ducks. Essentially a winter migrant when breeding in high northern latitudes, the mallard appears at that season in immense numbers in certain districts of the British Islands as well as in the plains of India. These birds are, however, rarely seen in large flocks, usually associating in parties of from three to ten, and later on in pairs. In common with other water-fowl, hosts of these ducks are taken in decoys or shot from punts with swivel-guns.

The Shoveller- The enormous size and ungainly form of their flat beaks serves
Ducks. at once to differentiate the large ducks known as shovelers from all their allies. In these birds the beak is considerably longer than the head, compressed at the base, and very broad at the tip, where the upper mandible overhangs the lower, behind which the lamellæ are distinctly exposed. The wings are pointed, with the first and second quills the longest; and the short and graduated tail includes fourteen feathers. The legs are very short. As being the best known representative of the genus, our illustration depicts the common shoveller (*Spatula clypeata*), which in the British Isles is mainly a winter visitor, and is spread over the entire Northern Hemisphere. In the male the head and neck are dark metallic green, the breast and lower part of the neck white, the abdomen and sides chestnut, the wing-speculum green with a white border in front, the back and inner scapulars dusky brown, and the outer scapulars white; the beak being lead colour, and the legs and feet reddish orange, with black nails. The female lacks the brilliant coloration of her lord, having most of the feathers mottled with two shades of brown, the back and scapulars being nearly uniform

dusky, and the beak brown, with its lower mandible orange. In length, the male reaches about 20 inches. The genus is represented by a second species (*S. platalea*) in South America, by a third (*S. capensis*) in Africa, and by two others in Australia. Nesting in large numbers near or within the Arctic Circle, and more sparingly in lower latitudes, the common shoveller commences to arrive in the British Isles during September, where it sojourns till the following April or May. In the New World it breeds from Alaska to Texas, and winters as far south as Guatemala; while it spreads in numbers over the plains of India during the cold season. Writing of its habits in India, Mr. Hume remarks that the shoveller is very



COMMON SHOVELLER-DUCK.

tame, and in some districts may be met with "on every trumpery little village pond, half surrounded by huts, the resort of the washermen, and of the entire population for the purposes of ablution, and of the village herds, driven thither twice a day for water. Filthy is quite an inadequate expression for many of these reeking sinks of pollution, but foul or fair the shoveller is equally at home in them, and may be seen at all hours feeding along the edge, now just in and now just out of the water, making no epicurean selection, but feeding on pretty well every organic substance that comes to hand, nice or nasty." In Britain, on the other hand, it is a shy and wary bird, frequenting lakes, ponds, and sluggish rivers. The nest, usually situated on dry ground beneath a tussock of grass, is made of dry grass; the eggs, which are covered up with down plucked by the female from her own breast, varying in number from eight to fourteen, and being greenish buff in colour.

Pintailed Ducks. The elongation of the middle pair of tail-feathers in the male give to the almost cosmopolitan pintail duck (*Querquedula acuta*) its distinctive title, and at the same time afford one of the most striking characteristics of the genus of which this bird is the typical representative. In both sexes of the pintail the neck is unusually long and slender; while the beak is about equal in length to the head, with its edges nearly parallel, although expanding slightly towards the tip, and with the lamellæ but very little exposed. The wings are long and pointed, with the first and second quills the longest; and the tail is likewise sharply pointed in both sexes, the male bird not only having its two central feathers elongated and pointed, but also showing an equally marked lengthening of the lanceolate scapular feathers. The legs are rather short, and the webs are slightly excavated in front. The pintail resembles the mallard in the circumstance that during the summer the male assumes a plumage resembling that of the female. At other times the former sex has the head and upper neck dark brown; most of the upper-parts grey, forming by undulating lines of greyish and blackish; the front of the neck, breast, and considerable portion of the under-parts, white; the wing-speculum dark green; and the long tail-feathers black; the beak and feet being lead-colour or brownish. The female is nearly brown throughout, the feathers of the upper-parts being mottled with two shades, while those on the under surface are nearly uniform; the tail-feathers showing white markings on a brown ground. The length of the male pintail varies from 24 to 28 inches.

Found throughout the circumpolar regions, the pintail is a migratory species, ranging in winter as far south as Panama and Cuba in the New World, and in the Old World to the Mediterranean, Persia, Ceylon, China, Borneo, and Japan. Its main breeding-area in the Old World lies to the north of latitude 60°, but it descends below this limit in North Germany and Russia, and still more so in Siberia. A silent bird during the day, the pintail utters a low quacking sound at night. It generally frequents shallow waters, where it feeds upon both vegetable and animal food; and in winter commonly associates in flocks, which in India may include from twenty to two hundred, or occasionally thousands of head, and are at times composed exclusively of male birds. The flight of the pintail is rapid in the extreme; and this, together with its shy and wary habits, renders it one of the most difficult ducks to shoot, although the excellence of its flesh renders it of especial value to the sportsman. When once flushed, pintail almost invariably fly clean away, and cannot be driven backwards and forwards from one piece of water to another, like so many other ducks. From the closeness of its breast-plumage, it is especially necessary in the case of the pintail to allow the bird to pass before firing. In the Southern Hemisphere there are several allied ducks, such as the Chilean pintail (*D. spinicauda*) of lower South America, the South American Bahama duck (*D. bahamensis*), and the red-billed duck (*D. erythrorhyncha*) of South Africa, which are considered by many ornithologists as congeneric with the European species, although by others they are referred to the distinct genus *Poecilonetta*. They differ from the true pintail in the slight elongation of the middle tail-feathers of the male, and the uniformly dull and much spotted coloration of the two sexes.

Teal.

The group of beautiful little ducks known as teal, while presenting a great general resemblance to the pintails, are distinguished, in addition to their small size, by their much shorter necks, and the short and rounded tail of sixteen feathers, the scapulars of the male being also less pointed and elongated. The beak is about equal in length to the head, with its edges nearly parallel, and the lamellæ very slightly exposed. In the foot the first toe is very short, and the fourth much shorter than the third. The common teal (*Querquedula crecca*) is the best known representative of a group of the genus in which the nape of the neck in the male is ornamented with a small mane-like crest. In length this species measures only $14\frac{1}{2}$ inches; and in the ordinary plumage the male is characterised by the vermiculated markings of the back, the bright green band, bordered with buff, on the side of the head, the rest of the head chestnut, the wing-speculum black, green, and purple, tipped with white, and the breast white, spotted with black. The female has the upper plumage mainly of two shades of brown, and the wing-speculum mainly black, with but little green. This species is distributed over Europe and Asia generally, breeding in the British Islands, and visiting India and North Africa in the winter; while it occasionally occurs in Eastern North America. On the latter continent its place is taken by the American teal (*Q. carolinensis*), distinguished by the presence of a broad white crescent on each side of the breast. The garganey, or summer-teal (*Q. circia*), is a larger bird representing a second group of the genus, in which the head is crestless, the bill longer, and the wing-coverts bluish. In the male, of which the length is from 15 to 16 inches, the plumage of the back is not vermiculated; the upper part of the head is dark brown, beneath which is a white stripe running above the eye and thence down the side of the neck; the wing-coverts are pale bluish grey, the wing-speculum dull green bordered with white; the front of the neck and breast brown, and the middle of the abdomen white. The garganey is a migratory species widely distributed over Europe and Asia, occasionally visiting the British Islands in spring, and wintering in the Mediterranean countries, India, China, Japan, etc. The American blue-winged teal (*Q. discolor*) differs by the distinctly blue wing-coverts, the presence of a white crescent between the beak and the eye, and by the under tail-coverts being black, instead of white spotted with brown, in the male. The cinnamon teal (*Q. cyanoptera*) of Western America differs from the latter by the chestnut, instead of lead-coloured, head and neck of the male; and there are several other species, in some of which, such as the Asiatic clucking teal (*Q. formosa*), the scapulars are elongated.

Habits.

The common teal breeds either among reeds and sedge on the margin of lakes and swamps, or on boggy moors; the nest being a large structure composed of water-plants, lined with feathers or down, and the number of eggs in a clutch varying from eight to ten in Britain, and from ten to fifteen in Lapland. When unmolested, teal feed both by night and day, but when much shot at they become mainly nocturnal feeders. In India, where they arrive by thousands in the cold season, teal frequent large sheets of water in the daytime, and resort to rice-fields and shallow marshes in the evening. Nearly as swift on the wing as pintail, teal, writes Mr. Hume, "turn and twist in the air with a rapidity second only to the cotton-teal, and they have a habit after being flushed

of dropping suddenly again. They swim easily, but not very rapidly, and they cannot dive to much purpose, so that a wounded bird, unless there are weeds near, under which it can lie with only the bill above water, has, as a rule, but a poor chance of escape. On the land, if the ground be fairly smooth, they walk with tolerable ease; but it is rare to see them, as one often sees the wigeon, well out on the dry sward, walking for pleasure." Their chief food is of a vegetable nature, but they also consume water-insects and molluscs. The common teal is usually seen in India in moderate-sized parties, but occasionally in large flocks, although never in the countless thousands in which the garganey sometimes congregates in that country. In March, however, they associate in pairs, and then afford very pretty shooting when lying on the water beneath the steep banks of the larger rivers. The teal is the easiest of all ducks to net and snare; immense numbers being captured during the cold weather in India, and kept alive through the summer in specially constructed "tealeries."

Wigeon.

The last genus of the subfamily represented in the British Isles is that which includes the common wigeon (*Mareca penelope*), the North American wigeon (*M. americana*), and the Chilian wigeon (*M. sibilatrix*) of South America. These birds have a bill considerably shorter than the head, and very like that of the gadwall, but with the lamellæ scarcely exposed, and slightly concave above. The rather long and pointed wings have the first and second quills the longest; the tail is short and pointed; and the wing-speculum is largely black, while there is a white patch on the lesser wing-coverts. In the legs, a small portion of the tibia is bare, and the first toe has a small membranous lobe. The male wigeon, which measures from 18 to 20 inches in length, may be recognised by its chestnut head and neck, minutely spotted with green (except on the forehead and top, where it is whitish), by the black and white vermiculation of the back and flanks, the white on the wing-coverts, and by the wing-speculum being formed by one green band bordered by two equally wide ones of black. The female is a more soberly coloured bird, lacking the bright head-coloration of the male, and with a greyish brown speculum. In the late summer the plumage of the male, although always the brighter, approximates to that of his partner. The slightly larger American wigeon, has the head and neck of the male whitish, slightly speckled with black, and with a metallic green patch on the side of the head, which may extend some distance down the neck; while the female has a black wing-speculum. In the Chilian wigeon the speculum is velvety black in both sexes. The common wigeon is a migratory species having a distribution very similar to that of the teal, breeding occasionally in the northern parts of the British Islands, as well as in France, Germany, and the Danube Valley, but more generally in the belt lying between the Arctic Circle and the 60th parallel. At all times gregarious, these birds are even social in the breeding-season; and whilst in the British Islands principally frequenting estuaries and the neighbourhood of the coast, in India they are spread over all the inland waters. Their habit of walking on land near the margin of water has been already mentioned under the head of the teal; and it may be added that they differ from those birds in the facility with which they dive when wounded. They breed in well-watered districts where the ground is partly swampy and partly covered with low scrub; the nest being

placed near the water beneath tussocks of grass, or at some distance off under the shelter of a bush. May or June is the usual nesting-time; and the number of eggs in a clutch is usually from six to ten, although occasionally more. In its partiality for grazing the wigeon resembles the geese.

Summer-Duck
and Mandarin-
Duck.

The brilliantly coloured and elegantly marked plumage and the long silky pendent crest of the males, serve at once to distinguish the summer or wood-duck (*Æx sponsa*) of North America and the mandarin-duck (*Æx galerita*) of China from all the other members of the family. These birds are further characterised by the beak being much shorter than the head, with its base elevated, and produced upwards and backwards in an angle nearly to each eye, while its tip is depressed and covered with an unusually large nail. The inner secondaries differ from those of the genera just described, by being broad and rounded; and the tail-feathers are not pointed. The two species agree in the general plan of their gorgeous coloration, but are distinguished by a difference in the arrangement of the feathering at the base of the beak; and also by the circumstance, that whereas in the mandarin-duck the tail feathers are short and exceeded in length by the under tail-coverts, in the American species the long and very broad tail-feathers extend far beyond the coverts. The description of the coloration of those beautiful birds would occupy too much space.

The summer-duck derives its name from being found in most parts of the United States at that season, while it takes its second title from its habit of frequenting woods, among the trees of which it flies with the facility of a pigeon. The beauty of its plumage, its graceful carriage when swimming, and the gentleness of its disposition, make it a universal favourite in America, where it is frequently induced to nest in gardens. Going about in pairs or small parties, the summer-duck generally lays its eggs in hollow trees, but may take possession of the deserted nests of other birds. In diet it is a somewhat miscellaneous feeder; its food in autumn being largely composed of acorns. The range of this bird extends from the fur-countries throughout temperate North America. The splendidly coloured mandarin-duck has one of the scapular feathers expanded into a large fan, of which the colour is mostly chestnut-brown, but with a broad purple band on the outer hind border. In South America the place of the summer-duck is taken by the much larger Muscovy duck (*Cairina moschata*), distinguished by the great difference in the size of the two sexes, and the presence of brownish fleshy wattles on the forehead and lores; the secondaries being greatly lengthened, and the greater wing-coverts short. The Muscovy, or musky, duck has long been domesticated in Europe, and interbreeds with the common duck and other species.

Pochards and
Scaup Ducks.

The pochards and their near allies the scaup-ducks, which may be included in the single genus *Fuligula*, although divided by some ornithologists into three generic groups, are the first representatives of a subfamily distinguished structurally from the preceding one by having a distinct pendent lobe or membrane attached to the first toe; while in habits they differ by their practice of diving in search of food, and their extreme expertness on the water. As a rule, the sexes are different in coloration; and the males undergo a partial second moult in summer. Of some forty species of diving-ducks, as the whole group may be collectively designated, the majority are confined to the Northern Hemisphere.

and South America, although there are three Australian species, and another in Africa.

The pochards and their congeners are characterised by the beak being not longer than the head, and having its base somewhat elevated, and its broad tip depressed; while the tail-feathers are short, moderately stiff, rounded at the tips, and more than half concealed by the coverts. The wings are rather short and pointed, and the metatarsus is characterised by its lateral compression. The red-crested pochard (*F. rufina*) differs from the other members of the genus in the head of the male being rufous and furnished with a full, soft, rounded, and bushy crest; the beak being vermilion, the front of the neck and breast rich dark brown, and the wing-speculum white. The female is devoid of a crest, and has the head and neck yellowish white speckled with black, and no white speculum. This species inhabits Southern and Eastern Europe (occasionally ranging northwards to the British Islands), Northern Africa, and India. On the other hand, the widely distributed scaup-duck (*F. marila*), of Europe, Asia, and the whole of North America, may be taken as the representative of a second group (the genus *Fulix* of some) in which the adult males have no crest, but the whole of the head and neck of a uniform black colour; the beak being about equal in length to the second toe, with its nail differing from that of the red-crested pochard by being small and narrow, in place of large and broad. In the male the head, neck, and breast are purplish black, the back and scapulars white with black vermiculations, and the wing-speculum and under-parts white. A third group (*Æthya* of some) is represented by the common pochard (*F. ferina*) of Europe and Northern Asia, and the red-headed (*F. americana*) and canvas-backed duck (*F. vallisneria*) of North America, as well as other forms. In all these the beak is rather longer than the inner toe, and the head and neck of the adult males are red. Finally, we have a fourth group (*Nyroca*) represented by the white-eyed pochard (*F. nyroca*) of Europe and Asia, and the Australian white-eye (*F. australis*), which take their name from the white ring formed by the iris of the eye. In the adult male of the European species the head, neck, and upper breast are chestnut-brown, the wing-speculum white, and the beak leaden-blue; while in the female the head and neck are pale chestnut.

During its sojourn in the British Islands from October to March or April, the common pochard is generally met with on the coast, although in other districts, and especially India, it is an inland bird at the same season. A bad walker, this duck is essentially a diver and swimmer, associating in India in immense flocks on open sheets of water of medium depth. These birds feed chiefly by night, but in undisturbed districts they may be seen diving at all hours of the day in search of the stems and roots of water-plants, which constitute their chief food. The same habits characterise the American canvas-back, which is met with in countless numbers on the Chesapeake, where it dives for vallisneria grass, locally known as celery. Both these ducks are most excellent table-birds; and while in India the pochard is taken by hundreds in nets placed in the water, the canvas-back is usually shot in America, one device being to attract the birds within range by going out at night in a boat furnished with a powerful lamp and reflector in the bows. Such pochards as remain to breed in the British Isles usually nest in May and the first half of June; the nest being constructed of rushes, grass, or flags,

sometimes placed among the rank vegetation near the margin of the water, but at other times being a floating structure. The greenish grey eggs vary from eight to twelve or even fourteen in number. Writing of the red-crested pochard, Mr. Hume observes that he has "watched flocks of them, scores of times, diving for an hour at a time, with a pertinacity and energy unsurpassed by any other wild-fowl. Examine closely their favourite haunts, and you will find these to be almost invariably just those waters in which they must dive for their food." Such haunts being deep broads where the beds of water-weed are several feet below the surface.

Golden-Eye and Buffel-Head. The pretty ducks bearing these names, together with Barrow's golden-eye (*Clangula islandica*) of North America, constitute a genus characterised by the beak being much shorter than the head, and high and broad at the base, but depressed at the tip, where it is covered by a rather small and bent-down nail. The nostrils are situated near the middle of the beak, in which the lamellæ are concealed by the overlapping of the upper mandible. The wings are pointed and rather short, with the first quill the longest; and the tail of sixteen feathers is rounded and of medium length. In the male the coloration is pied black and white, while it is brown and white in the female. The golden-eye (*C. glaucion*) takes its name from the golden-yellow hue of the iris, and the male may be recognised by the metallic green of the head and upper neck, the white patch at the base of the beak below the eye, and by the scapular region being striped with white. This species, which measures from 16 to 19 inches in length, inhabits Northern Europe and Asia, migrating south in winter; and is represented by a variety in North America. It always builds in holes in trees at a considerable height above the ground. Of the American species, Barrow's golden-eye may be distinguished by the white patch behind the beak extending to a point above the level of the eye; while in the smaller buffel-headed duck (*C. albeola*), which has occasionally straggled across the Atlantic, the white patch on the head of the male is placed behind the eye and extends right across the occiput.

Harlequin-Duck. The well-known harlequin duck (*Cosmonetta histriónica*), of the northern latitudes of both hemispheres, belongs to an allied genus, distinguished by the larger size of the nail on the beak, the presence of only fourteen feathers in the tail, and by the near equality in the length of the first and second quills of the wing. The male is characterised by the general leaden hue of its plumage, relieved by white markings on the head and white collars on the lower neck and breast, as well as by the purple wing-speculum; while the female is greyish brown, with white patches on the head. In summer an inland species associating in pairs, in winter the harlequin duck collects in flocks to frequent sheltered bays and inlets on rocky coasts. It is an occasional straggler to Britain, but is unknown on the Continent.

The Long-Tailed Duck. Easily recognised by the great elongation of the two middle tail-feathers of the male, the long-tailed duck (*Harelda glacialis*) occupies in respect of this feature a position among the diving series analogous to that held by the pintail in the non-diving group. In both sexes the beak is very short and tapering, with a large decurved nail at the tip, and sub-basal nostrils. The wings are rather short and pointed; the scapular feathers of the male are lengthened; and the tail, which has fourteen feathers, is short and graduated in

the female. In the male bird, of which the length is from 22 to 26 inches, the prevailing colour of the head and neck in the ordinary dress is white, with an oval brown patch on the sides of the latter; the breast, middle of the back, rump, and middle tail-feathers are black; the scapulars are striped with white; and the remaining tail-feathers and under-parts pure white. The female is a more sombre-coloured bird, with the sides of the head white and those of the neck brown.

As its Latin name implies, the long-tailed duck is an essentially Arctic species, ranging to the most northerly known lands of both hemispheres, and not generally migrating very far south in winter, although it has been known to reach Northern Italy. Not uncommon as a winter visitor to Britain, it regularly frequents at that season the Caspian, Northern China, Japan, and the northern United States. Found in numbers on the Kara Sea, and breeding in Novaia Zemlia, Northern Russia, and all through North Siberia, this duck is mainly marine in its habits, feeding on molluscs, crustaceans, and small fishes, in search of which it dives with remarkable expertness. During the breeding-season it resorts, however, to fresh-waters, on the margins of which its nests are constructed among low bushes. The note of the male is loud, but almost indescribable in words; and when flying the members of this sex are said to present an exceedingly graceful appearance, moving with very rapid strokes of the wings, with the long tail-feathers floating behind.

Well known on account of the beautifully soft down collected from their nests, the eiders, *Somateria*, are best characterised by the elongated scapulars and emerald or pale green markings on the heads of the males; these two characters serving to distinguish them from other diving-ducks. Both sexes may be recognised by the beak being shorter than the head, and swollen and elevated at the base, with small and lateral nostrils, but more especially by the feathers of the forehead extending downwards nearly to the nostrils between its divided upper portion. Generally, the prevailing colours of the plumage of the males are black and white. The eiders are now represented by six well-defined species, confined to the northern regions of the Old World; three of which occur in the British Islands, although two are more occasional visitors. The common or true eider (*S. mollissima*), which is mainly confined to the Eastern Hemisphere, and is the only resident British species, may be recognised by the upper part of the back and scapulars of the male being white in the breeding plumage, while the top of the head and under-parts are black; the female being pale rufous brown, with darker markings. Young males are at first like the females; but in the first year, as shown in the upper figures of our illustration on next page, the wing-coverts and secondaries become white, and in the third year the full plumage is assumed. In summer, with the second moult, old males become almost black. In the king-eider (*S. spectabilis*), which is circumpolar, although but a rare visitor to Britain, the male in breeding-plumage has the upper part of the back white, but the elongated scapulars black, and also a black chevron on the throat with its apex on the chin. On the other hand, in the handsome Steller's eider (*S. stelleri*), which is a still more exclusively Arctic bird, the adult male in nuptial plumage has the whole back black, the long scapulars white on their inner, and bluish black on their outer webs, and a bluish black collar on the neck.

Habits. All the eiders are exclusively dwellers on rocky coasts, where they subsist mainly on molluscs and crustaceans; and while they are birds of slow and heavy, although powerful flight, and are at the same time clumsy walkers on land, in the sea, which is their true home, they are most expert divers and swimmers. Iceland and the Farn Islands are well-known breeding-resorts of the common eider; and the following account of a colony on a small



EIDER-DUCKS AND NEST ($\frac{3}{4}$ nat. size).

island near the former locality is taken from Mr. C. W. Sheppard. On landing, that observer writes, "the ducks and their nests were everywhere. Great brown ducks sat upon their nests in masses, and at every step started from under our feet. It was with difficulty we avoided treading on some of the nests. On the coast of the opposite shore was a wall built of large stones, just above the high-water level, about 3 feet in height, and of considerable thickness. At the bottom, on both sides of it, alternate stones had been left out, so as to form a series of

square apartments for the ducks to nest in. Almost every compartment was occupied, and as we walked along the shore a long line of ducks flew out, one after the other. The surface of the water also was perfectly white with drakes, who welcomed their brown wives with loud and clamorous cooing. The house itself was a marvel. The earthen walls that surrounded it, and the window-embrasures were occupied by ducks. On the ground the house was fringed with ducks. On the turf slopes of its roof we could see ducks, and a duck sat on the door-scraper. The grassy banks had been cut into square patches, about 18 inches having been removed, and each hollow had been filled with ducks. A windmill was infested, and so were all the outhouses, mounds, rocks, and crevices. The ducks were everywhere. Many were so tame that we could stroke them on their nests; and the good lady told us that there was scarcely a duck on the island that would not allow her to take its eggs without flight or fear." In all cases the eiders build on the ground, and their not very numerous eggs are of some shade of green. In Labrador, where the numbers of these valuable birds have been greatly reduced by "egggers," Mr. A. S. Packard, writing of his experiences many years ago, observes that in the middle of June "all the eiders were busy in making their nests and in laying their eggs. The old or completed nests contained a great mass of down, and were twelve to fifteen inches in outside diameter, the downy moss in which the eggs sank being five or six inches high, the newer nests were without down; and there were about five eggs to a nest. Most of the nests which we saw were built on low land near pools, and not far from the sea-water, in a dense thicket of dwarf spruce-trees." The species referred to in this account is the American eider (*S. dresseri*), which differs from the common kind by the greater convexity of the beak, and the greater development of the elongated scapulars. The nest is formed of seaweed, lined with down from the body of the female bird; the lining being gradually added during the month occupied by incubation, till at length it reaches such an amount as to completely conceal the eggs. The product of down yielded by a single nest is about one-sixth of a pound; the local value of the commodity varying from twelve to fifteen shillings per pound. Although such thoroughly gregarious birds at all seasons, it is somewhat remarkable that the males of none of the eiders take any share in the work of incubation.

The pied Labrador duck (*S. labradoria*) is a species which may be included among the eiders, although frequently referred to a distinct genus (*Camptolæmus*). A handsome bird, formerly abundant on the coast of Labrador and the mouth of the St. Lawrence, it appears to have become extinct since 1852.

The black marine ducks known as scoters, derive their scientific title (*Ædemia*) from their swollen or basally tuberculate beaks, which are deep, large, and strong, with the tip much depressed, and entirely covered by the large, flat nail; the oval and lateral nostrils being placed near the middle of the beak. The wings are pointed and rather short, and the graduated tail is likewise short and pointed. Placed relatively far back on the body, the legs are noticeable for the shortness of the metatarsus; while the large feet are characterised by the second toe being fully as long as the third. In the males the colour is black, with or without white on the head or wing; while in the females

it is dusky greyish brown. The scoters, of which there are five species, although confined to the Northern Hemisphere, are far less exclusively Arctic birds than the eiders. The common scoter (*Æ. nigra*), which inhabits a large portion of Europe and Northern Asia, is characterised by the entire plumage of the male being black. In Japan and North America it is replaced by the American scoter (*Æ. americana*), in which the whole of the protuberance at the base of the beak is orange-yellow, instead of mainly blackish blue. The velvet scoter (*Æ. fusca*), which is also a winter visitor to the British Islands, although far less common than the preceding, differs in that the male has a small white patch behind the eye, and a white speculum on the wing. Widely spread along the more northern coasts of Europe and Asia, this scoter is represented by a variety in North America. As another very well-marked member of the genus, mention may be made of the North American surf-scoter (*Æ. perspicillata*), of which stragglers occasionally reach Britain. The male may be recognised in its breeding-plumage by the presence of one broad patch of white on the forehead and another on the nape of the neck. All the scoters are regular migrants, and marine and gregarious in their habits; the common species assembling in such countless numbers on the British coasts in winter, as on some occasions to cause the water to appear literally black. Scoters generally arrive from their summer-quarters in September and October, and return in the following April or May. During the breeding-season the flocks of adults break up into pairs; although this is not the case with the immature birds, which do not breed during their first spring, but remain congregated throughout the summer. Moreover, in the case of both the common and the surf-scoter, flocks of these immature birds frequent the British Islands during summer, instead of going northwards. All the scoters are late breeders; the nidification of the common species not beginning in Iceland till the middle of June, while in Arctic Russia it is deferred for a fortnight or so later. Islands in the rivers and lakes of the Arctic tundras, where the ground is covered with dwarf birch and willow, form the favourite breeding-grounds of the scoters; and the eggs, which are usually from five to nine in number, are deposited in a mere hole in the ground; those of the common species being greyish buff in colour, with a dull exterior. Although rather awkward walkers, all the scoters fly with rapidity, and are fully equal to their allies in swimming and diving. Their food in winter consists of various small aquatic invertebrates, and in summer of water-plants; their flesh being almost uneatable. Remains of extinct scoters, which have been referred to the genus *Fuligula*, used in a wide sense, occur in the Lower Miocene strata of France, which have also yielded others belonging to typical ducks and described as *Anas*.

The Stiff-Tailed
Ducks. The genus *Erismatura* comprises species known as stiff-tailed ducks, all of which are lacustrine rather than marine in their habits, and many of which are characteristic of the Southern Hemisphere. While agreeing with the preceding genera in their broad and depressed beaks, these ducks are distinguished by the feathers of the tail being narrow and very rigid, with the inferior surface grooved. Moreover, the tail-coverts are so short as scarcely to overlap the base of the tail, which is rather long and graduated, and may contain as many as twenty-four feathers. All are said to be expert divers, and in flight and habits some

resemble more a grebe than a duck. Southern Europe, North Africa, and parts of Asia are the home of the white-faced stiff-tailed duck (*E. leucocephala*), distinguished by the breadth and size of the nail at the end of the beak. In other species, such as *E. rubida*, of North, and the ferruginous stiff-tailed duck (*E. ferruginea*) of South America, as well as in the Australian *E. australis*, the nail is very small and narrow. The great musk-duck (*Biziura lobata*) of Australia constitutes a separate genus, characterised by the marked superiority in the size of the male over the female, and the presence of a large lobe of skin depending from the chin of the former sex. Here also may be mentioned the steamer-duck (*Tachyeres cinereus*) of the Falkland Islands and Patagonia.



FERRUGINOUS STIFF-TAILED DUCK.

The Mergansers.

Under the general designation of mergansers may be included a group of diving and fish-eating birds, which differ from the other members of the family in the extreme narrowness of their beaks, although resembling the diving-ducks in the structure of their feet. The beak, which may be either longer or shorter than the head, is, in addition to its narrowness, straight and slender, furnished on its edges with saw-like lamellæ, and terminates in a conspicuous hooked nail; the longitudinally elliptical nostrils being lateral and placed near the middle of its length. The wings are of moderate length, with the first and second quills the longest; and the relatively short legs are placed somewhat backwardly on the body. Of the five species of mergansers, four are inhabitants of the northern portions of both hemispheres, migrating southwards in winter; while the fifth (*Mergus australis*) is from the Aucklands. All the four northern species are met with in the British Islands, although two are but casual visitants, and only one is a regular breeder.

The goosander (*M. merganser*), which is a species occasionally breeding in Britain, belongs to a group in which the beak is longer than the head, and has long recurved serrations; the metatarsus being rather long, and a depressed and pointed crest present in both sexes. A handsomely coloured bird, the adult male goosander in its breeding-plumage is characterised by its vermilion beak and the shining greenish black head and upper neck, as well as by the lower neck and under-parts being whitish, with a rosy tinge on the breast. The upper part of the back and scapulars are black, as are the primaries; the lower back, tail-coverts, and tail-feathers are ashy grey; and the point of the wing and wing-coverts are white. In the female the head and upper neck are pale chestnut, and the upper parts and wings, except the white secondaries, mainly grey. In length the male varies from 25 to 28 inches. The goosander ranges over the northern portions of

it is dusky greyish brown. The scoters, of which there are five species, although confined to the Northern Hemisphere, are far less exclusively Arctic birds than the eiders. The common scoter (*Æ. nigra*), which inhabits a large portion of Europe and Northern Asia, is characterised by the entire plumage of the male being black. In Japan and North America it is replaced by the American scoter (*Æ. americana*), in which the whole of the protuberance at the base of the beak is orange-yellow, instead of mainly blackish blue. The velvet scoter (*Æ. fusca*), which is also a winter visitor to the British Islands, although far less common than the preceding, differs in that the male has a small white patch behind the eye, and a white speculum on the wing. Widely spread along the more northern coasts of Europe and Asia, this scoter is represented by a variety in North America. As another very well-marked member of the genus, mention may be made of the North American surf-scoter (*Æ. perspicillata*), of which stragglers occasionally reach Britain. The male may be recognised in its breeding-plumage by the presence of one broad patch of white on the forehead and another on the nape of the neck. All the scoters are regular migrants, and marine and gregarious in their habits; the common species assembling in such countless numbers on the British coasts in winter, as on some occasions to cause the water to appear literally black. Scoters generally arrive from their summer-quarters in September and October, and return in the following April or May. During the breeding-season the flocks of adults break up into pairs; although this is not the case with the immature birds, which do not breed during their first spring, but remain congregated throughout the summer. Moreover, in the case of both the common and the surf-scoter, flocks of these immature birds frequent the British Islands during summer, instead of going northwards. All the scoters are late breeders; the nidification of the common species not beginning in Iceland till the middle of June, while in Arctic Russia it is deferred for a fortnight or so later. Islands in the rivers and lakes of the Arctic tundras, where the ground is covered with dwarf birch and willow, form the favourite breeding-grounds of the scoters; and the eggs, which are usually from five to nine in number, are deposited in a mere hole in the ground; those of the common species being greyish buff in colour, with a dull exterior. Although rather awkward walkers, all the scoters fly with rapidity, and are fully equal to their allies in swimming and diving. Their food in winter consists of various small aquatic invertebrates, and in summer of water-plants; their flesh being almost uneatable. Remains of extinct scoters, which have been referred to the genus *Fuligula*, used in a wide sense, occur in the Lower Miocene strata of France, which have also yielded others belonging to typical ducks and described as *Anas*.

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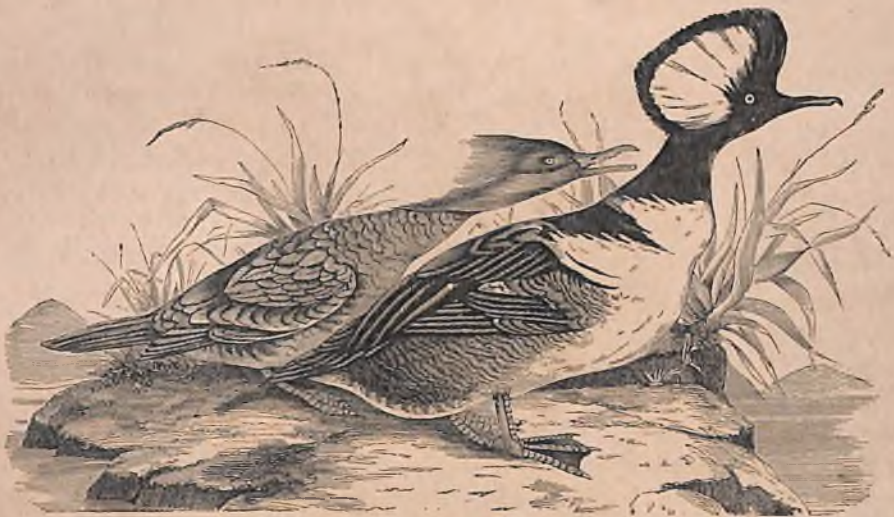
the Old World, migrating in winter to the northern shores of the Mediterranean, India, and Japan, and being replaced in North America by a variety. Nearly allied is the red-breasted merganser (*M. serrator*), which has a circumpolar distribution, and breeds regularly in Scotland and Ireland. It is a rather smaller bird than the goosander, the male having the head and upper neck greenish black, the middle of the neck (except a dark streak behind) white, the lower neck and upper breast buff streaked with black, the white feathers on the sides of the breast



THE GOOSANDER ($\frac{1}{2}$ nat. size).

bordered with black, and those on the flanks vermiculated with blackish grey. Very different from either of the above is the hooded merganser (*M. cucullatus*), distinguished by the black beak being shorter than the head, with smaller serrations, by the shorter metatarsus and longer wing, and more especially by the full semicircular, erect and compressed crest of hair-like feathers. In the male the head and upper neck are black, with the exception of the hinder part of the crest, which is white edged with black; and the white breast is marked on each side by two black crescentic bands. Mainly North American, where it ranges from Alaska to Mexico, this merganser is a casual visitor to Europe. Still more different is the

beautiful smew (*M. albellus*), in which the bill is much shorter and deeper, with small and inconspicuous serrations, and the crest much smaller than in the preceding species; while the tail has frequently sixteen, in place of the usual eighteen feathers. The male smew, which varies from 17 to 18 inches in length, has a greenish black patch on the occiput, extending in a point on each side of the head, and another between the eye and the beak, but the rest of the head, neck, and under-parts mostly white; the plumage of the upper-parts being pied with black, brown, grey, and white. Females have the head and back of the neck mainly reddish brown, with an inconspicuous crest. The smew is an inhabitant of the more Arctic regions of the Old World in the breeding-season, rarely visiting the British Islands in



HOODED MERGANSER.

winter, but to the eastward migrating as far south as the north of Africa, Northern India, and Japan.

Habits. Although in Europe the mergansers very generally frequent the coast, those species which visit India are more commonly observed on inland waters. All are strong, albeit somewhat heavy fliers, and most expert swimmers and divers; but on the land their movements are awkward and ungainly. Their food consists entirely of fish, molluscs, and crustaceans, most of which are procured by diving; and in consequence of this diet their flesh is unpalatable in the extreme. When fishing in flocks, as is often the habit of the goosander, the whole party may frequently be seen to dive simultaneously; although not uncommonly a few remain above water as if to act as sentinels. While the red-breasted merganser nests on the ground among bushes, heather, or long grass, the goosander nearly always, if not invariably, selects a hollow tree, or, failing that, a cleft in a rock, as a breeding-place, sometimes taking advantage of the nest of a crow or other bird. The creamy-white eggs of the latter species are from eight to twelve in number; and the young, as soon as hatched, are carried down one by one from the nest to the water in the beak of their parent. When floating at ease the goosander sits as high in the water as a duck, but when swimming settles down

as deep as a cormorant, while when pursued nothing more than the head and neck appears. On the larger Indian rivers, writes Mr. Hume, "they will float down with the stream for a couple of miles, and if not hungry, they rise and fly back again; but more commonly they fish their way back, diving incessantly the whole way, and, despite their activity, taking a long time to make their way back from where they started from. When gorged, they often sit on some rock in the middle of the water, sitting very upright and cormorant-like, often half opening their wings to the sun. In the interior, where you find them in smaller streams, they are rarely in parties of more than three or four—most generally at that time in pairs—and then they are either flying up-stream or floating down, twisting round and round in the rapids, or fishing vigorously in some deep pool near the foot of a waterfall or rapid." Although generally silent, mergansers utter at times, especially when on the wing, a harsh, unmusical kurr. Three beautifully coloured birds from the mountains of Chili, Peru, and Ecuador, constitute the allied genus *Merganetta*.

THE SCREAMERS.

Order PALAMEDEÆ. Family PALAMEDEIDÆ.

If we examine the skeleton of any ordinary bird, such as the one represented on p. 292 of the preceding volume, it will be noticed that some of the anterior ribs are provided with backwardly-directed projections, known as uncinate processes. If, however, we observe that of one of the peculiar South American birds designated screamers, we shall not fail to be struck with the absence of these processes, and as they are present in all other birds and many reptiles, it will be evident that the screamers are a very specialised group, although in some other ways they are generalised. Although these strange birds exhibit certain resemblances in their internal anatomy to the storks and cranes, it is now generally considered that their nearest affinities are with the ducks and flamingoes. Agreeing with those two groups in the features mentioned at the commencement of the chapter, the screamers are readily distinguished from both by their short hen-like beaks, and medium-sized legs, of which the toes are not completely webbed, but furnished with long claws, the claw of the first toe being specially elongated. Internally, in addition to the absence of uncinate processes, they are characterised by the presence of distinct basipterygoid processes on the rostrum of the skull, by the number of vertebræ in the neck being more than eighteen (which is not the case in the two allied orders), and likewise by the absence of any bare spinal tract in the plumage of the upper-parts; while the angle of the lower jaw, although recurved, is not much produced backwards. Another peculiarity is to be found in the circumstance that the skin when touched is yielding and crackling, owing to the presence of a layer of air-cells, which communicates to it a bubbly appearance. In colour and texture their eggs resemble those of the geese.

The screamers are birds of the size of a swan, but of totally different appearance, having a hen-like beak, with a waxy growth at the base, medium-sized neck, very inflated crop, a pair of powerful spurs on the front of each wing, and the long-toed legs bare to a considerable distance above the ankle-joint. Although the

second and third toes are free, the third and fourth are connected at the base by a web. The long and powerful wings have the third quill the longest; the rounded tail has twelve feathers; and the contour feathers are soft and on the neck narrow. Both sexes are alike in plumage. The screamers are divided into two genera, of which the first is represented by the horned screamer (*Palamedea cornuta*) of Guiana and Amazonia, characterised by the presence of a slender horn-like process, 5 or 6 inches arising from the middle of the head, and curving upwards



HORNED SCREAMER ($\frac{1}{2}$ nat. size).

and forwards. Of the two spurs on the wing, the foremost is by far the longer and more powerful. In colour, the soft feathers on the top of the head are whitish grey, with blackish tips; those of the cheeks, throat, upper neck, wings, and tail are dark brown; the inner secondaries and greater wing-coverts having a greenish metallic sheen, and the smaller wing-coverts yellowish roots; while the feathers of the lower neck and upper breast are silver-grey, broadly banded with black, and those of the abdomen pure white. The iris is orange, the beak blackish brown

with a whitish tip, the horn whitish grey, and the foot ashy grey. The second genus, *Chama*, has no horn on the head, and is represented by the crested screamer, or chajá (*C. chavaria*) of Argentina, and the Derbian screamer (*C. derbiana*) of Colombia. In the former the general colour of the plumage is slaty blue, with a black ring round the neck, while the naked skin round the eyes and the legs are red. According to Mr. W. H. Hudson, to whom we are indebted for a good account of the Argentine species, these birds only utter their powerful scream of alarm occasionally; while during the night, or when soaring high in the air, they give vent to somewhat melodious notes, audible when the birds are too high up to be visible. "At certain times," writes the author just mentioned, "in districts favourable to them, the chajás often assemble in immense flocks, thousands of individuals being sometimes seen congregated together; and in these gatherings the birds often all sing in concert. They invariably—though without rising—sing at intervals throughout the night, 'counting the hours,' as the Gauchos say, the first song being about nine o'clock, the second at midnight, and the third just before dawn, but the hours vary in different districts." Although living for a considerable part of the year in large flocks, the screamers pair for life, and during the breeding-season are only to be seen in couples. The chajá (pronounced chahá), or Argentine species, breeds among the rushes of lagoons, and during a visit to Argentina in 1893, I had, while staying at the *estancia* of Las Bandurrias, near Colina, on the Great Southern Railway of Buenos Aires, the opportunity of observing the habits of a pair which were nesting in a small *laguna* a couple of miles or so from the house. The *laguna* in question contained large growths of reeds and flags, forming masses intersected by open channels, and at the time of my visit (the latter part of October) growing to a considerable height above the water. Like other similar spots in this part of Argentina, it was tenanted by large flocks of ducks and coots, while black-necked swans, small parties of the lovely red South-American flamingo, and a few storks were generally also to be seen. On my first visit to the *laguna*, for the purpose of duck-shooting, I was puzzled by seeing a pair of large grey birds, with short beaks, and looking somewhat like huge grey geese, swimming about unconcernedly among the other denizens of the lagoon, since I had not the least idea such was the habit of the chajá. On wading into the water, and approaching the birds, I was, however, soon convinced, both from their appearance and voice, that they were really chajás. They allowed me to approach within easy gun-shot, when they rose heavily and flapped slowly to the bank, where they alighted. That they had a nest among the reeds in the middle of the *laguna* I felt assured, but the depth of water prevented my wading to the spot. I had, however, reason to believe that the young were already hatched and swimming about among the reeds, so that, had I succeeded in reaching the nest, my labour would have been in vain. As soon as I reached the shore, the chajás once more returned to the water, and recommenced swimming about among the ducks. During several subsequent visits to the same spot, I nearly always saw the birds swimming far out in the water; and, indeed, I think it was only once or twice that I observed them on land. It is therefore evident that during the nesting-season this pair of chajás should be described as thoroughly aquatic in their habits.



A FLIGHT OF PIGEONS.

CHAPTER XVI.

THE PIGEONS AND SAND-GROUSE.

Order COLUMBÆ.

THE pigeons form such a well-marked group that there is but little difficulty in recognising any of their numerous representatives at a glance. In all, the moderately large head is set on a graceful neck, and the body is rather compact and stoutly built. Swollen at the extremity, the beak has its basal portion covered with a soft skin, in which open the nostrils. The legs are coated with hexagonal scales, and are usually more or less thickly feathered on the upper-part, although sometimes naked; the feet have four toes, the first of which is placed on the same level as the others. With the exception of the ground-doves, in which the wings are short and rounded, most of the living species have long, powerful quill-feathers, but the dodo and solitaire were incapable of flight. As regards osteological characters the pigeons have a cleft (schizognathous) palate, in which respect they and the sand-grouse differ from all the preceding groups; the upper bone of the wing or humerus is provided with a triangular deltoid crest, very similar to that of the sand-grouse, to which is attached the great pectoral muscle; thus rendering these birds capable of protracted and powerful flight. The majority of the pigeons are indeed excellent flyers, capable of traversing enormous distances in an incredibly short time; as an

example of which we may mention the performances of the carrier-pigeons. All pigeons are provided with a large crop, which becomes glandular during the breeding-season, and then secretes a milky fluid to moisten the half-digested food on which the young are nourished. The amount of food which a pigeon can consume in a day



UPPER PORTION OF THE RIGHT HUMERUS OF (a) SAND-GROUSE,
(b) FOWL, AND (c) PIGEON.

(From Garrod, *Proc. Zool. Soc.*, 1874.)

is almost incredible, it being probable that one of these birds is capable of eating a quantity more than equal its own weight. Like the sand-grouse, pigeons drink by thrusting the bill into the water and retaining it there till they have quenched their thirst. All pigeons pair for life, and both sexes take part in the building of the nest, incubation, and rearing of the young. When hatched, the

latter are naked and helpless, and thus need care from both parents. The bill of the young is larger and more fleshy than that of the adult, and during the operation of feeding, the old bird thrusts its beak inside that of its offspring, and injects the semi-liquid nutriment. The nest is a simple structure composed of twigs, and generally placed in a tree; the eggs never more than two in number, being invariably pure white.

THE GREEN, PAINTED, AND FRUIT-PIGEONS.

Family *TRERONIDÆ*.

This family contains a large number of arboreal species inhabiting Africa, South-Eastern Asia, and the islands of the Eastern Archipelago generally, distinguished by their rather short legs, which are feathered for more than half their length, and are usually shorter than the middle toe and claw; the soles of the feet being very broad, and the skin of each toe expanded on the sides. Of these birds three subfamilies may be distinguished, the first containing the green pigeons, which have the bill rather thick. The plumage, with a few exceptions, in which it is chocolate-brown, is mostly green, and most species have a yellow band across the wings. In the first three genera the base of the bill is soft, and the sheath of the upper mandible does not reach the feathers of the forehead.

Wedge-Tailed Green Pigeons. The wedge-tailed green pigeons (*Sphenocercus*) include seven different species, with wedge-shaped tails, and the middle feathers more or less pointed, from South-Eastern Asia; the best known being the Himalayan and Burmese forms (*S. apicicauda* and *S. sphenurus*). The former is distinguished by having the under surface of the tail black, with a broad grey band across the extremity, and the middle pair of tail-feathers long and pointed; while in the latter the under surface of the tail is uniform grey, and the middle pair of feathers are less pointed and much shorter. The habits of this and the other green pigeons are

very similar. The males are not difficult to identify, but the females often resemble one another very closely. Writing of *S. sphenurus*, Mr. Oates says that it is found in the thick forest country of Burma, frequenting trees which bear fruit, and going about in flocks. It is a summer visitor to the Himalaya, and breeds from April to July, constructing a nest of twigs on the outer branches of trees. In October it collects in small flocks of six or eight, and quits the country. It is rather shy, and its note is a soft, cooing whistle; its food consisting entirely of small fruits, which are swallowed whole.



ABYSSINIAN WALIA-PIGEON.

Other Genera. The African genus *Vinago* has the tail-feathers almost even, the outer pair being little shorter than the middle, and the feathers on the legs conspicuously yellow, while the forehead in some species is more or less naked. The Abyssinian walia (*V. walia*) is met with in the subtropical belt, and rarely seen on the highlands, being first observed at an elevation of about two thousand feet, and not extending above six thousand. Its call is a liquid whistle, very similar to that of the Indian green pigeon in tone, but with the concluding portion a little harsher and more prolonged. It feeds on fruits, especially figs, and, like its allies, is delicious eating. A third genus (*Crocopus*) inhabiting the Indo-Chinese countries resembles *Vinago* in having the feathers on the legs yellow, but is distinguished by the first three flight-feathers being pointed. The

nest is roughly made of sticks, and is usually situated rather high up in a mango-tree.

The next genus (*Osmotreron*) contains seventeen species, inhabiting South-Eastern Asia and the Malay Archipelago, and distinguished by having the feathers on the legs of a greenish or whitish colour. Of its members we may mention the grey-fronted green pigeon (*O. malabarica*), which, like its allies, closely resembles the thick-billed species in its habits and mode of life. In the male the upper part of the head is grey shading into olive-green on the back of the neck, the upper part of the back maroon, and the rest of the upper-parts and middle tail-feathers olive-green; the lateral tail-feathers grey, with a black band across the middle; the quills and wing-coverts black, the latter edged with yellow; and the under-parts olive-yellow. The female has the upper part of the back olive-coloured.

In the three remaining genera the sheath of the upper mandible reaches the feathers of the forehead. The typical genus, *Treron*, includes only two species inhabiting South-Eastern Asia. Both these birds have the third flight-feather deeply scooped about the middle of the inner web; the thick-billed green pigeon (*T. nipalensis*) being distinguished by having the grey colour of the cap darker, and not extending over the upper part of the cheeks. The latter inhabits the South-Eastern Himalaya, extending to the Malay Peninsula; and is very common in Tenasserim, where it occurs in moderately large flocks, feeding on small fruits. They feed in the morning and evening, and are noisy and quarrelsome. Their flight is rapid, and they frequent dense forest, thin tree-jungle, and even gardens, breeding in February and March, the nests being flimsy little platforms of straw placed about ten feet above the ground. In the Philippine *Phabotreron* the five species are peculiar in having the general colour of their plumage chocolate-brown; *P. amethystina* being a handsome bird with the hind-neck of a beautiful amethyst colour, and the upper-parts with bronze reflections.

Painted Pigeons. The second group of the family are the painted pigeons, which include a number of small, brilliantly-coloured species, with their plumage generally variegated with patches of different colours, many of them being birds of surpassing beauty. They may be distinguished from the last group of green pigeons by the more slender bill, which is not very distensible at the base; and in this respect, as well as in their smaller size, they differ from the true fruit-pigeons described below. Of the five genera, by far the largest and most important is *Ptilopus*, which contains no less than seventy species, inhabiting a wide range from the Malay Peninsula to Australia and Polynesia. The numerous species have been arranged under twelve subgeneric groups, the first eight of which are distinguished by having the first flight-feather abruptly attenuated at the extremity, the only exception being one species. The subgenus, *Leucotreron*, is characterised by having no defined cap on the upper part of the head and by the tail being rather long. As an example, we may mention *P. occipitalis* of the Philippine Islands, in which the upper part of the head is grey, the cheeks and back of the head purple-red, the back of the neck and the rest of the upper-parts bronze-green, with a grey band at the tip of the tail; while the under surface of the body is mostly whitish and grey, with a wide purplish band on the lower part of the breast. In the second group, which contains the typical species of painted pigeons, the tail is moderately long,

the feathers on the breast are forked at the extremity, and there is a well-marked cap on the top of the head. Among these the Eastern Australian painted pigeon (*P. swainsoni*) has the crown rose-lilac, surrounded by a narrow ring of yellow; the upper-parts are mostly greenish yellow, the inner quills being tipped with deep blue; the breast is dull green, each of the forked feathers shading into silvery grey at the tip; and there is a lilac band between the breast and the orange abdomen. The third group (*Lamprotreron*) is distinguished by a broad blue-black band separating the breast from the abdomen. Only two species belong to this group, viz. *P. superbus* and *P. temmincki*, the former being very common in New Guinea and Australia. The other groups of this section of the genus, in which the first primary is attenuated at the extremity, include eleven species, which, unlike those previously mentioned, have the tail rather short, and are all inhabitants of New Guinea or the islands immediately to the east and west. The remaining subgenera differ from those already mentioned in not having the first flight-feathers narrowed, while none have the head, neck, and breast uniform rose-carmine. They include twenty-nine species, many of which are exceedingly beautiful, but none more so than *P. eugeniae* from the Solomon Islands. In both sexes of the latter the head is pure white, and the rest of the upper-parts bronze-green, with a small grey patch on the shoulder and spots on the wing-coverts of the same colour; the throat and chest are dark purple-red, surrounded by a dull purple band; and the breast is greyish green, shading into whitish on the abdomen.

Wart-Pigeons,
etc.

Of the four other genera of the subfamily we may mention *Chrysaenas*, which is distinguished by having the inner webs of the quills yellow or orange-yellow, and contains three species from the Fiji Islands, one being the splendid *C. victor*, the male of which has the general plumage bright orange, with the head and throat olive-yellow, and the bill and feet green. The female has the entire plumage rich green, the head and throat being yellowish green, and the bill and feet black.

Another genus includes the wart-pigeons (*Alectraenas*) of Madagascar, in which the plumage is mostly deep blue, and the feathers of the neck are deeply forked at the extremity. Two of the species have the tail blue; in one of these the crown of the head is red, while in the other it is grey; in the third and fourth species the tail is red, the former having the head of a light grey colour, while in the latter it is deep slate-blue. Finally, the one species of *Drepanoptila*, from New Caledonia and the Isle of Pines, is peculiar in having the outer flight-feathers divided at the tip and the legs entirely feathered.

Fruit-Pigeons.

The third subfamily includes the true fruit-pigeons (*Carpophaginae*), the giants of the family, none of them being smaller than a rock-dove, and many larger. They have the bill rather long and distensible at the base, thus enabling them to swallow large fruits whole. Their plumage is not much variegated, and in six out of the seven genera there are fourteen tail-feathers, the seventh (*Hemiphaga*) having only twelve. The genus *Globicera* contains seven species, differing from the rest by the swollen fleshy knob at the base of the upper mandible. Passing over a peculiar form (*Serresius*) from the Marquesas, in which the basal half of the bill is covered with a saddle-shaped production of the skin of the forehead, we come to the typical genus *Carpophaga*,

nest is roughly made of sticks, and is usually situated rather high up in a mango-tree.

The next genus (*Osmotreron*) contains seventeen species, inhabiting South-Eastern Asia and the Malay Archipelago, and distinguished by having the feathers on the legs of a greenish or whitish colour. Of its members we may mention the grey-fronted green pigeon (*O. malabarica*), which, like its allies, closely resembles the thick-billed species in its habits and mode of life. In the male the upper part of the head is grey shading into olive-green on the back of the neck, the upper part of the back maroon, and the rest of the upper-parts and middle tail-feathers olive-green; the lateral tail-feathers grey, with a black band across the middle; the quills and wing-coverts black, the latter edged with yellow; and the under-parts olive-yellow. The female has the upper part of the back olive-coloured.

In the three remaining genera the sheath of the upper mandible reaches the feathers of the forehead. The typical genus, *Treron*, includes only two species inhabiting South-Eastern Asia. Both these birds have the third flight-feather deeply scooped about the middle of the inner web; the thick-billed green pigeon (*T. nipalensis*) being distinguished by having the grey colour of the cap darker, and not extending over the upper part of the cheeks. The latter inhabits the South-Eastern Himalaya, extending to the Malay Peninsula; and is very common in Tenasserim, where it occurs in moderately large flocks, feeding on small fruits. They feed in the morning and evening, and are noisy and quarrelsome. Their flight is rapid, and they frequent dense forest, thin tree-jungle, and even gardens, breeding in February and March, the nests being flimsy little platforms of straw placed about ten feet above the ground. In the Philippine *Phabotreron* the five species are peculiar in having the general colour of their plumage chocolate-brown; *P. amethystina* being a handsome bird with the hind-neck of a beautiful amethyst colour, and the upper-parts with bronze reflections.

Painted Pigeons. The second group of the family are the painted pigeons, which include a number of small, brilliantly-coloured species, with their plumage generally variegated with patches of different colours, many of them being birds of surpassing beauty. They may be distinguished from the last group of green pigeons by the more slender bill, which is not very distensible at the base; and in this respect, as well as in their smaller size, they differ from the true fruit-pigeons described below. Of the five genera, by far the largest and most important is *Ptilopus*, which contains no less than seventy species, inhabiting a wide range from the Malay Peninsula to Australia and Polynesia. The numerous species have been arranged under twelve subgeneric groups, the first eight of which are distinguished by having the first flight-feather abruptly attenuated at the extremity, the only exception being one species. The subgenus, *Leucotreron*, is characterised by having no defined cap on the upper part of the head and by the tail being rather long. As an example, we may mention *P. occipitalis* of the Philippine Islands, in which the upper part of the head is grey, the cheeks and back of the head purple-red, the back of the neck and the rest of the upper-parts bronze-green, with a grey band at the tip of the tail; while the under surface of the body is mostly whitish and grey, with a wide purplish band on the lower part of the breast. In the second group, which contains the typical species of painted pigeons, the tail is moderately long,

the feathers on the breast are forked at the extremity, and there is a well-marked cap on the top of the head. Among these the Eastern Australian painted pigeon (*P. swainsoni*) has the crown rose-lilac, surrounded by a narrow ring of yellow; the upper-parts are mostly greenish yellow, the inner quills being tipped with deep blue; the breast is dull green, each of the forked feathers shading into silvery grey at the tip; and there is a lilac band between the breast and the orange abdomen. The third group (*Lamprotreron*) is distinguished by a broad blue-black band separating the breast from the abdomen. Only two species belong to this group, viz. *P. superbus* and *P. temminckii*, the former being very common in New Guinea and Australia. The other groups of this section of the genus, in which the first primary is attenuated at the extremity, include eleven species, which, unlike those previously mentioned, have the tail rather short, and are all inhabitants of New Guinea or the islands immediately to the east and west. The remaining subgenera differ from those already mentioned in not having the first flight-feathers narrowed, while none have the head, neck, and breast uniform rose-carmine. They include twenty-nine species, many of which are exceedingly beautiful, but none more so than *P. eugeniae* from the Solomon Islands. In both sexes of the latter the head is pure white, and the rest of the upper-parts bronze-green, with a small grey patch on the shoulder and spots on the wing-coverts of the same colour; the throat and chest are dark purple-red, surrounded by a dull purple band; and the breast is greyish green, shading into whitish on the abdomen.

Wart-Pigeons, Of the four other genera of the subfamily we may mention *Chrysaenas*, which is distinguished by having the inner webs of the quills yellow or orange-yellow, and contains three species from the Fiji Islands, one being the splendid *C. victor*, the male of which has the general plumage bright orange, with the head and throat olive-yellow, and the bill and feet green. The female has the entire plumage rich green, the head and throat being yellowish green, and the bill and feet black.

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which may be divided into six subgenera, founded on the general colour of the plumage and the shape of the flight-feathers. It will be sufficient to mention one or two species in which the general colour is mostly metallic on the upper-parts, the tail uniform in colour, and the flight-feathers normal in shape. In the nutmeg-pigeon (*C. aenea*), common in the Indo-Burmese countries, Ceylon, and the Andamans, the head, neck, and under-parts of the body are grey, the upper-parts bronze-green,



MADAGASCAR WART-PIGEONS ($\frac{2}{3}$ nat. size).

and the under tail-coverts deep chestnut. This bird keeps to the larger forest trees, and lives on fruit, especially the wild nutmeg, which it swallows whole, although only the mace is digested, the nutmeg being disgorged. Another closely allied species, the Nicobar nutmeg-pigeon (*C. insularis*), of the islands from whence it derives its name, differs in having the under tail-coverts mixed with dark green. In the Nicobars it occurs singly, in pairs, or in small parties; and its deep low coo may be heard all day resounding through the forest. It breeds in February and March, and its nest has been found in a cocoanut-palm about twenty feet from the

ground, and contained one large white egg. The members of the genus *Myristivora* may be distinguished from those previously mentioned by their white and black plumage. The white nutmeg-pigeon (*M. bicolor*) is a handsome species found in the Philippine Islands, the Malay Archipelago, and the Andaman and Nicobar Islands. Both sexes have the entire plumage of a pale creamy white, except the flight-feathers, the tip of the tail, and some spots on the under tail-coverts, which



NUTMEG-PIGEON.

are black. This bird is not so generally distributed throughout the Nicobars as the nutmeg-pigeon, and, though occasionally found some distance in the forest, keeps in general to the mangrove-swamps; but on islands such as Treis and Track, where there is little or no mangrove, it occurs everywhere. *Lopholæmus antarcticus*, found in Eastern Australia, is easily recognised by being the only crested species of fruit-pigeon, and is the sole representative of its genus. The last genus, *Hemiphaga*, contains three species belonging to New Zealand and adjacent islands, and differs from the six genera already mentioned in having only twelve tail-feathers.

WOOD, LONG-TAILED, AND PASSENGER-PIGEONS.

Family COLUMBIDÆ.

This family may be distinguished from the green pigeons and their allies by having the soles of the feet normal, that is, not very broad, and only the hind-toe with the skin prominently expanded on the sides. It is split up into three groups,

the first being the *Columbinae*, in which the tail is never longer than the wings; this group containing the wood-pigeon, stock-dove, and rock-dove, from the last-named of which the domestic breeds of pigeon are derived. Of the first genus, *Gymnophaps*, only one species (*G. albertsi*) peculiar to New Guinea is known, which is distinguished from the allied genera by having the legs feathered for two-thirds of their length, and a naked carmine space in front of and round the eyes.

Rock-Dove and We next come to the large and universally distributed genus,
Allies. *Columba*, containing about sixty species. All these birds resemble the two following genera in never having the legs feathered for more than half



ROCK-DOVE ($\frac{1}{2}$ nat. size).

their length, while they differ in having the first flight-feather of the wing longer than the sixth. Space only permits of mentioning a few more important members, among which must be included the rock-dove or blue rock (*C. livia*), widely spread over Europe, and extending as far as India in the east, where it meets the nearly allied but grey-rumped species (*C. intermedia*); southwards it ranges to the north and west coasts of Africa, where another closely related form (*C. gymnocyclus*) is found, differing only in having the plumage dark bluish or blackish slate-colour, and perhaps descended from domestic pigeons. In the original wild stock of the blue rock, the plumage is grey, the rump white, and the neck, and upper breast metallic green and purple, while there are two narrower black bars across the wing and a broader one across the end of the tail. It is found in a wild state where caves and deep fissures exist, and is common along the northern coasts of

Scotland and Ireland, wherever suitable caves occur. The nest is placed on a ledge or in a crevice of the rock in a cavern where little light penetrates.

Another British species is the stock-dove (*C. anas*), often confused with the rock-dove, which it resembles in size and general colour, although distinguished by having the rump grey instead of white. This pigeon is especially common in the southern and eastern counties of England, and large flocks may be seen feeding in the fields, frequently in company with wood-



WOOD-PIGEON AND STOCK-DOVE ($\frac{1}{2}$ nat. size).

pigeons. The places chosen by this bird for a nesting-site are varied. It frequently breeds on open ledges in the face of a steep cliff (never in caves), and in rabbit-burrows where the soil is light and sandy, or under the shelter of dense furze. Numbers of nests are placed in trees, a favourite situation being among the dense bunches of twigs surrounding the stems of old elms.

The third and largest British species is the wood-pigeon (*C. palumbus*), recognised by the broad white patch on each side of the lower part of the neck as well by its variously tinted breast and the white

band along the edge of the wing. Its range extends across Europe as far east as Northern Persia, and it is also found in North-West Africa, the Azores, and Madeira. The destruction of the larger birds of prey, as well as the extent of land devoted to plantations and green crops, probably accounts for the vast increase in numbers of this pigeon. That the countless swarms of these voracious birds in parts of the country do an immense amount of damage, cannot be denied, but that much of their food often consists of worthless seeds is a fact that may be easily ascertained by examining the contents of their crops. Booth remarks that "shortly before harvest wood-pigeons may often be seen flying in small parties to the fields of wheat and barley; after wheeling round for a time, the birds will disappear from view into the standing corn. An examination of the state of the ground on which they were lost sight of would doubtless cause astonishment to those who imagined that the birds were in pursuit of grain; on reaching the spot it would be discovered that for a considerable space the crop was exceedingly scanty, completely choked, in fact, by a mass of weed rank and strong, whose seeds, well-nigh ripe, had proved the sole attraction. Immense flights of these birds arrive on the north-east coast in October and November from the Continent, and about that time of year large flocks, which have recently arrived exhausted by their long journey, may be observed fluttering along the coast and about the fir plantations. In the London parks it has now become one of the commonest birds, and is steadily increasing in numbers, many pairs breeding each year."

Other Species. Some remarkable statements have been made concerning the habits of the band-tailed pigeon (*C. fasciata*), which somewhat resembles the common wood-pigeon in having a narrow white band or half-collar on the nape, and is found in the Western States of North as well as in Central America. In Oregon it sometimes breeds on the ground, and the normal number of two eggs are laid; but in Arizona, where it appears to nest in nearly every month of the year but a single egg is laid. Mr. O. C. Poling has ascertained that this bird is often in the habit of carrying off its eggs when frightened from its nest. He remarks that "in regard to their carrying the egg about, I have, in addition to the cases noted, shot two other females having the egg imbedded in the feathers of the belly, and further held by the legs while flying; but in such cases they seem simply to alight on the limb of a spruce, and incubate there without any nest. This accounts for the shooting of pigeons having a broken egg smeared over the feathers, as I have done, when no nest was to be seen." Some of the species of *Columba* found in the islands of the Pacific are more brilliant in colouring, and among these may be mentioned *C. albigularis* of New Guinea, in which the plumage is blackish slate-colour, with the edges of the feathers metallic purple changing into green, and the cheeks and throat white. The third genus, *Nesoenas*, with one species (*N. meyeri*) from Mauritius, is distinguished by having the first flight-feather equal to the sixth. The plumage is pale pink, darker on the mantle, and shading into brown on the back and wings, while the tail is uniform cinnamon-colour. The last genus, *Turturana*, contains five of the smallest species of this group, not exceeding the common dove in size, with the hind-neck brilliantly ornamented with metallic colours. They inhabit Africa, and differ from other *Columbinae* in having the sexes often very dissimilar in plumage.

Long-Tailed
Pigeons.

The second subfamily, *Macropygiinae*, or long-tailed pigeons, of South-Eastern Asia and the islands of the Pacific, may be distinguished by having the tail longer than the wings, in which respect they resemble the migratory pigeon, the type of the third section of this family, while they differ from it in having the feathers of the tail broad and round at the tip. Four genera, including thirty species, are recognised, although little has been recorded of their habits. Of the first genus, *Turacena*, the two species have the bill fairly strong, and the tail moderately rounded, the outer feathers being much more than half the length of the middle pair. The Celebean species (*T. menadensis*) has the plumage slate-black, with the face and throat white, while in the one from Timor (*T. modesta*) it is uniform slate-colour; both being ornamented with shades of metallic green, lilac, and blue.

Cuckoo-Pigeons.

The great majority of the long-tailed pigeons belong to the genus *Macropygia*, commonly known as cuckoo-pigeons. All have the tail much graduated and wedge-shaped, the outer feathers being less than half the length of the middle pair, and the general colour of their plumage is rufous, chestnut, or cinnamon. In the Indian cuckoo-pigeon (*M. tusalia*) the male has the plumage of the forehead, chin, and throat vinaceous buff, the top of the head and rest of the upper-parts shining metallic green with purple and bronze reflections, the latter being also irregularly barred with black and purple chestnut; the under-parts are vinous grey shading into buff on the abdomen, and glossed on the chest with golden-green and bronze; the quills are brown, and the middle pair of tail-feathers barred with black and vinous chestnut, while the outer pairs are mostly grey. The female is not so brightly coloured, and has most of the under-parts barred with brownish black. This bird is of a shy disposition, keeping to thick forest, and associating in small flocks which feed chiefly on trees and seldom descend to the ground. In Nipal the two white or sometimes creamy eggs are laid in May and June, and the nest, which is the usual loose platform of sticks, is placed on some horizontal branch, at no great height from the ground.

Allied Genera.

In the other two genera the bill is strong and thick, and the tail wedge-shaped, as in *Macropygia*. The first of these, *Reinwardtanas*, distinguished by having no crest, contains three species, ranging from Celebes to the Duke of York Island. In Reinwardt's long-tailed pigeon (*R. reinwardti*) both sexes have the head, neck, and mantle pale lavender, the back, wings, and middle tail-feathers chestnut; and the front of the neck and breast white shading into lavender on the abdomen. The last genus, *Coryphaenas*, contains one crested species (*C. crassirostris*) from the Solomon Group. The whole plumage of this bird is slate-colour, darker on the upper surface, and the head is dusky brown, the feathers on the back of the head being lengthened into a greyish brown crest.

Passenger-
Pigeon.

The last group of the subfamily, like the other long-tailed pigeons, has the tail longer than the wings, but it is also narrower, and the feathers are pointed at the extremity. Only one species, the passenger-pigeon (*Ectopistes migratorius*); of North America is known. In the male the head and upper-parts of the body are bluish grey, spotted with black on the wings; the quills brownish black with grey edges, the chin whitish grey, and the breast cinnamon-rufous shading into pale vinous on the rest of the under-parts, and

white on the under tail-coverts. The back and sides of the neck glitter with golden and violet metallic colours. In the female the upper-parts of the breast are brownish, shading into white on the abdomen and rest of the under-parts.

There can be little doubt that the vast numbers of this pigeon have greatly diminished during recent years, and though at present by no means on the verge of extinction, it seems certain that unless laws be made for its protection its extermination is only a matter of time. Mr. Brewster writes that in Michigan "we found that large flocks of pigeons had passed there late in April, while there were reports of similar flights from almost every country in the southern part of



PASSENGER-PIGEON.

the State. Although most of the birds had passed on before our arrival, the professional pigeon-netters, confident that they would finally breed somewhere in the southern peninsula, were busily engaged getting their nets and other apparatus in order for an extensive campaign against the birds. Our principal informant said that the last nesting of any importance in Michigan was in 1881, a few miles west of the Grand Traverse. It was only of moderate size, perhaps eight miles long. Subsequently, in 1886, Mr. Stevens found about fifty dozen pairs nesting in a swamp near Lake City. He does not doubt that similar small colonies occur every year, besides scattered pairs. In fact he sees a few pigeons about Cadillac every summer, and in the early autumn young birds, barely able to fly, are often

met with singly or in small parties in the woods. Such stragglers attract little attention, and no one attempts to net them, although many are shot. The largest nesting he ever visited was in 1876 or 1877. It began near Petosky, and extended north-east past Crooked Lake for twenty-eight miles, averaging three or four miles wide. The birds arrived in two separate bodies, one directly from the south by land, the other following the east coast of Wisconsin, and crossing at Manitowish Island. He saw the latter body come in from the lake at about three o'clock in the afternoon. It was a compact mass of pigeons, at least five miles long by one mile wide. The birds began building when the snow was twelve inches deep in the woods, although the fields were bare at the time. So rapidly did the colony extend its boundaries, that it soon passed literally over and around the place where he was netting, although, when he began, this point was several miles from the nearest nest. Nestings usually start in deciduous woods, but during their progress the pigeons do not skip any kind of trees they encounter. The Petosky nesting extended eight miles through hardwood timber, then crossed a river bottom wooded with arborvitæ, and thence stretched through white pine woods about twenty miles. For the entire distance of twenty-eight miles every tree of any size had more or less nests, and many trees were filled with them. None were lower than about fifteen feet above the ground. Pigeons are very noisy when building. They make a sound resembling the croaking of wood-frogs. Their combined clamour can be heard four or five miles away when the atmospheric conditions are favourable. Two eggs are usually laid, but many nests contain only one. Both birds incubate, the female between 2 o'clock P.M. and 9 or 10 o'clock the next morning; the males from 9 or 10 o'clock A.M. to 2 o'clock P.M. The males feed twice each day, namely, from daylight to about 8 o'clock A.M., and again late in the afternoon. The females feed only during the forenoon."

THE GROUND-PIGEONS.

Family *PERISTERIDÆ*.

In contradistinction to the preceding groups, which may be collectively spoken of as tree-pigeons, we now come to a family whose members live much on the ground. This family of ground-pigeons, which includes almost all the remaining species, is distinguished from the tree-pigeons by having the legs equal to or longer than the middle toe. Seven subfamilies are recognised, in the first six of which the feathers of the neck are never hackled.

Mourning-Doves. The group of mourning-doves (*Zenaidinæ*), distinguished by having a blackish, more or less metallic, spot below the ear-coverts, includes thirteen rather small American species, placed in four genera; the first (*Zenaidura*) resembling the two following ones in having the scapulars and upper wing-coverts spotted with black. It further agrees with the next genus (*Zenaida*) in the tail being composed of fourteen feathers, and the bill nearly straight, but differs in having the tail longer and generally wedge-shaped. All the three species are North and Central American, the best known being the mourning-dove (*Z. carolinensis*) of the United States, Central America, and the West

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Indies. In the male of this species the crown and upper-parts of the body are bluish, mostly washed with light olive-brown; the rest of the head and under-parts being cinnamon-buff, tinged with purple on the breast. The female is smaller, and has the under-parts brown like the back, but paler. Captain Bendire states that this bird is frequently found breeding in gardens and shrubberies near dwelling-houses, feeding in the barnyard among domestic fowls. Never occurring in large flocks like the passenger-pigeon, it is usually found in small parties of from six to a dozen or more, and in autumn, previous to its migration, may be met with in flocks of fifty or sixty. It is fond of alighting in roads, where it may often be seen searching for suitable food or gravel, or taking a dust-bath, of which it is very fond. In the more arid districts of the West, such as South Arizona, where water is scarce, this dove, like the sand-grouse, visits regular watering-places in the morning and evening, to which it may be seen coming in small parties from all directions. The nesting-sites chosen are variable, and in some localities, such as the Carolinas, these doves nest chiefly on the ground, while they are said occasionally to lay their eggs in other birds' nests. The old birds are attentive to their young, even long after they have left the nest, and the female has been observed covering fully-fledged young. As many as four eggs have been found in one nest, but whether these were all laid by one bird is uncertain. The seven species of the genus *Zenaida*, inhabiting the West Indies and Central and South America, differ in having the tail only moderately long and rounded. The *Zenaida* dove (*Z. amabilis*) of the West Indies has the upper-parts brown, with some black spots on the wings, the chin white, the cheeks and throat rufescent, two steel-blue spots above and below the ear-coverts, and the top of the head, breast, and under-parts vinous. The quills are black, edged with white, and there is a conspicuous white band at the end of the secondaries. Rather solitary in its habits, it is never met with in flocks, nor does it breed in communities. Its food consists of small seeds, the principal part of its time being spent on the ground; and when flushed it flies off in a straight line much like a quail. The nesting-habits vary much in different localities. In the Bahamas they have been found nesting in the fork of a fallen tree about three feet from the ground, while other nests were in holes in rocks. Among the islands at Indian Key, the nest is placed in a small hole scooped in the sand, and is composed of dry leaves and twigs, with a matted inner lining of blades of dry grass, the whole structure being more compact than that of other pigeons. Writing of another South American species (*Z. auriculata*), distinguished by having no white tips to the secondary flight-feathers, Mr. Hudson says, that it "is the commonest species of the pigeon-tribe in the Argentine country, and is known to every one as the 'Torcasá,' probably a corruption of Tortola, or turtle-dove. In autumn they often congregate in very large flocks, and are sometimes observed migrating, flock succeeding flock, all travelling in a northerly direction, and continuing to pass for several consecutive days. But these autumnal migrations are not witnessed every year, nor have I seen any return-migration in spring; while the usual autumn and winter movements are very irregular, and apparently depend altogether on the supply of food. When the giant thistle has covered the plains in summer, incredible numbers of torcasas appear later in the season, and usually spend the winter on the plains,

congregating every evening in countless myriads wherever there are trees enough to form a suitable roosting-place. On bright warm days in August, the sweet and sorrowful sob-like song of this dove, composed of five notes, is heard from every grove—a pleasing, soft, murmuring sound, which causes one to experience, by anticipation the languid summer feeling in his veins.”

Galapagos Pigeon. A peculiar genus, *Nesopelia*, is represented by a single species, the Galapagos pigeon (*N. galapagoensis*), restricted to the islands from which it takes its name. This bird has the bill long and bent downwards, and the tail rather short, rounded, and composed of twelve feathers.

White-Winged Doves. Of the white-winged doves (*Melopelia*) two species are known, one from the south-western United States, Central America, and the West Indies, and the other from Peru and Chili. They are distinguished from the mourning-doves by the absence of black spots on the wings, while there is a white patch on the upper wing-coverts. The northern species (*M. leucoptera*) has a note bearing a close resemblance to the first efforts of a young cock attempting to crow, and this call is frequently uttered and in various keys. In Arizona, towards the end of summer, this bird, which is by no means shy, collects in small parties.

Turtle-Doves. The turtle-doves (*Turturinae*), of which a species is figured in the cut on p. 378, form the second subfamily of the ground-pigeons, and include twenty-eight Old World species belonging to one genus (*Turtur*), which may be divided into five subgenera. They differ from the mourning-doves in having no black spot below the ear-coverts, and the neck ornamented with a more or less distinct dark collar, or with dark scale-like patches on the sides. In the first three subgenera (*Turtur*, *Homopelia*, and *Streptopelia*) the feathers of the neck are normal, in the fourth (*Spilopelia*) those of the hind-neck, and in the fifth (*Stigmatopelia*) those of the fore-neck, are forked at the extremity. The first two may also be recognised by having two scale-like patches of dark feathers on the sides of the neck, while *Streptopelia* has a complete black collar on the hind-neck. The five typical species of *Turtur* have the wing-coverts mottled, with the centres of the feathers darker than the edges. Of these, the turtle-dove (*T. communis*) is widely distributed over Europe, extending as far east as Yarkand, and ranging southward in winter to Africa, where it reaches at least as far south as Shoa. The crown and hind-neck are bluish grey, with a black patch of white-margined feathers on each side of the neck, the back is pale brown, the inner wing-coverts cinnamon-brown with dark middles, and the outer grey washed below with ashy, the chin nearly white, and the throat and breast vinous shading into white on the belly; the quills and the two middle tail-feathers being brown, while the outer pairs are greyish black broadly tipped with white. The male is rather larger than the female, and has the plumage brighter and purer in colour. The turtle-dove, which is a summer visitor to the British Isles, where it is one of the latest migrants, not arriving till the end of April or the beginning of May and departing in September, may be distinguished from the three pigeons found in those islands by its smaller size. Shortly after its arrival it commences to build its nest, which is loosely constructed of slender twigs and placed in a thick bush, tree, or dense hedge at no great height from the ground. Two small creamy white eggs are laid, and both parents take part in the incubation, which lasts about a fortnight, two

broods being sometimes reared in the season. The turtle-dove is chiefly met with in woods, and is partial to thick coverts and fir plantations, whence its low prolonged coo may be constantly heard, though the bird itself is rarely to be seen, preferring the seclusion afforded by the thick foliage to the outer branches of the trees. Its flight is always extremely rapid, and when amongst trees it can turn and twist with extraordinary ease and swiftness. It sometimes flies great distances in search of food and water, and may be often seen in cultivated fields searching



DOMESTIC TURTLE-DOVE, AND AFRICAN GROUND-DOVE ($\frac{1}{3}$ nat. size).

for grain and seeds, although seldom in such large flocks as other pigeons. In Britain it is a shy bird, at the slightest sign of danger quickly seeking shelter in the nearest covert. All the five members of the second subgenus (*Homopelia*), which have the upper wing-coverts uniform in colour, inhabit Madagascar and the adjacent islands. The third subgenus (*Streptopelia*), distinguished by having a black collar round the hind-neck, includes thirteen species; but it is uncertain from which of these the domestic turtle-dove (*T. risorius*) has been derived. As an example of this group may be mentioned the Tranquebar dove (*T. tranquebaricus*).

from Peninsular India, in which the plumage is vinous red; the lower back, rump, and flanks grey; the head, under wing-coverts, lower abdomen, and under tail-coverts similarly coloured but paler; the outer wing-coverts darker, the chin whitish, the vinous red upper-parts separated from the grey of the head by a black collar on the hind-neck; and the quills blackish with pale edges. A nearly allied form (*T. humilis*) from the Indo-Chinese countries, is distinguished by having the under wing-coverts much darker and of a grey colour. In Tenasserim it is found in larger or smaller flocks, very wild and difficult to approach, and keeping to the thin tree and bamboo-jungle. These flocks were met with in the vicinity of cultivated land, feeding on the ground, and when disturbed rose together and settled on the same tree, sometimes a leafless one, sometimes one with plenty of foliage.

The three species of turtle-dove constituting the fourth group (*Spilopelia*) are distinguished by having the feathers of the hind-neck forked at the extremity, and black ornamented with two white spots at the tip. The Burmo-Malayan species (*T. tigrinus*), recognised by the dark brown shaft-line on the wing-coverts, is the common dove of Tenasserim, and is met with in gardens, fields, and grassy land; in fact, wherever the country is open, but not in the forest or on the higher hills. It is sometimes seen singly, or in pairs, at other times in small flocks or in hundreds. The last group (*Stigmatopelia*) includes two species which may be recognised by having the feathers of the fore-neck forked at the extremity, and black with two rufous spots at the end. They have a wide range, the Senegal turtle-dove (*T. senegalensis*) being found all over Africa, while the brown turtle-dove (*T. cam-bayensis*) ranges from Asia Minor to Central India. The former is characterised by the plumage of the upper-parts being more or less reddish, and the rump bluish grey. The subfamily *Geopeliinae* contains three genera, with a few small species from both the Old and New Worlds, and is characterised by the short rounded wings, a rather long tail of fourteen feathers, and no metallic tint on the sides of the neck or elsewhere. The Old World forms belong to the typical *Geopelia*, ranging from Burma to Australia, and have the first quill-feather pointed at the extremity. The American genus, *Scardafella*, includes two doves about the size of sparrows, with the first flight-feathers normal, and the tail of twelve feathers; the Inca dove (*S. inca*) from the South-Western, North, and Central America being a well-known example. But a single species (*Gymnopelia erythrothorax*) is included in the last genus, distinguished by the large naked patch surrounding the eye.

American Genera. The six American genera of the subfamily *Peristerinae* are characterised by their small size and the general uniform coloration of the plumage; the wings being, as a rule, ornamented with metallic spots, and rather short and rounded, while the primaries are not much longer than the secondaries. In five genera the tail is rather longer than half the length of the wing; while the two last may be distinguished by having the first primary pointed at its extremity. The picui dove (*Columbula picui*), the only representative of the first genus, is peculiar in having a steel-blue band across the wing, and by the middle and outer pairs of tail-feathers being shorter than the intermediate ones. Found only in South America, it is the smallest dove of Argentina where it is a resident, frequenting the neighbourhood of houses; and its song, consisting of a succession of long, rather loud and somewhat monotonous notes, may often be heard in

summer or even on warm days in winter. Six small species, ranging from the Southern United States to South America, represent the second genus (*Chamaepelia*), which has a tail shorter than the length of the wing and rounded at the extremity, the middle feathers being longer than the outer ones. The remaining genera may be passed over without notice.

The South African cinnamon-dove (*Haplopelia larvata*) may be taken as a well-known representative of another subfamily of ground-doves (*Geotrygoninae*), which contains more than seventy species of somewhat partridge-like birds with no well-defined metallic spots or bands, although a violet patch may be present near the bend of the wing. The metatarsus is stout and longer than the third toe, and in the short and rounded wings the primaries exceed the secondaries in length. Of the nine recognised genera, the one above mentioned, which has six African species, is characterised by the primary feathers being broad and not tapering to a point, while in the remaining eight they are narrow and more or less pointed. The cinnamon-dove is distinguished from its allies by having the forehead white, the top of the head, hind-neck, chest, and upper-breast metallic coppery purple, the back and wings olive-brown, and the abdomen and under tail-coverts pale cinnamon. The Zamoen Duif, as the colonists call this bird, is common in the dense bush along the coast of Natal, where its brown colouring renders it difficult to detect as it sits motionless among the dense creepers. It never appears in the open, and is generally to be seen on the ground beneath the trees, silently and busily searching for food. Of the remaining genera with narrow primaries, two have the outermost pointed at the extremity; and of these, *Leptoptila* is distinguished by having the tail equal to more than half the length of the wing. The species range from Texas through Mexico and Central America to Peru and Argentina, and may be divided into a long-tailed and a short-tailed group. Two handsome species form the genus *Osculatea*, in which the length of the tail is less than half that of the wing. In the six following genera, the first primary is not pointed at the tip; the first five agreeing with one another in having the front of the metatarsus covered with transverse scales; while, in the three genera to be next mentioned, the tail is composed of less than twenty feathers. The Central and South American genus, *Geotrygon*, is also characterised by its rather short tail of twelve feathers. Another genus, *Phlogoenas*, differs from the above in having fourteen feathers in the tail. More than twenty species are known, some of which

Blood-Breasted Dove. are remarkably handsome birds, but none more so than the blood-breasted dove (*P. luzonica*), from the Philippines, represented in the woodcut on p. 381. The forehead and crown are pale grey; the top of the head, upper-parts, and sides of the breast dark grey, the feathers being edged with metallic purple and green; the cheeks, throat, and breast white shading into buff below; and there is a large patch of blood-red on the middle of the breast. The quills are reddish brown, there are six alternate bands of grey and chestnut across each wing and a black band near the tip of the outer tail-feathers. The two remaining genera, with the tail composed of less than twenty feathers, are distinguished by the longer tail.

Wonga-Wonga Dove.

The Australian wonga-wonga (*Leucosarcia pycata*) is the only representative of a genus, distinguished from the seventh (*Eutrygon*)

by the metatarsus being very little longer than the middle toe. This dove, remarkable for its size, inhabits the brush-country of Eastern Australia, where it spends the greater part of its time on the ground, feeding on seeds and fallen fruits. The noise made by its wings when rising is said to resemble that of a pheasant, and its flight is never long sustained. In the two species of *Eutrygon* from New Guinea, the metatarsus is twice as long as the third toe; while the genus *Otidiphaps*, including



BLOOD-BREASTED DOVES ($\frac{1}{2}$ nat. size).

three large black species, with chestnut back and wings, from New Guinea and Fergusson Island, is peculiar in having twenty feathers in the tail.

Blue-Bearded Cuban Dove. The last genus, characterised by having the front of the legs covered by six-sided scales, contains only the blue-bearded Cuban dove (*Starnoenas cyanocephala*), figured on p 382. The general colour of this bird is olive-brown above, and dull rusty beneath; the top of the head being blue margined with black, and a broad white stripe running below the eye, while the feathers of the throat and breast are black, tipped with blue and narrowly margined with white.

As a well-known representative of the fourth subfamily (Phabinae) of this assemblage, may be mentioned the Cape dove (*Æna capensis*), which is the sole member of its genus. The subfamily includes a dozen genera, and about double that number of species, all of which are confined to the Old World; their essential characters being their relatively large size, and the presence of blue or green spots or patches on the wings. In the first four genera there are two dark bands across the rump. The Cape dove, which may be recognised by its long wedge-shaped tail, with the middle feathers more than twice as long as the outer pair, ranges all over Tropical and Southern Africa, as well as Madagascar and Arabia. It occurs in pairs, and is chiefly found on the ground;



BLUE-BEARDED CUBAN DOVES ($\frac{1}{2}$ nat. size).

when disturbed, seeking shelter in low trees and bushes, but rarely in larger trees. The nest is placed in a low bush, and the two white eggs have a rosy tint, caused by the thinness and semi-transparency of the shell. The next three genera have the tail moderately long and more or less rounded; and while *Tympanistria* has the first primary pointed, in *Chalcopelia* and *Chalcophaps* this feather is normal in shape. The white-breasted wood-dove, the only representative of the genus *Tympanistria*, inhabits the whole of South Africa as well as Madagascar, the Comoro Islands, and Fernando Po.

African Ground-Dove. The African ground-dove (*Chalopelia afra*), the solitary representative of its genus, in addition to the characters given, may be recognised by the boldly marked patches of metallic steel-blue or golden-green adorning the wings. Inhabiting the whole of Africa south of about 17° north

latitude, it is met with in Abyssinia among bushes, and thick underwood, and in the jungles along the banks of water-courses. It is figured on p. 378.

Bronze-Winged Doves. The six bronze-winged doves (*Chalcoptera*), distinguished by having the upper wing-coverts metallic golden-green, are mostly inhabitants of the Indo-Malayan and Australian regions; the Indian species (*C. indica*), ranging from India to Western New Guinea, having the top of the head and hind-neck dark grey, the white forehead and eyebrow-stripes of the male less distinct in the female, and the middle of the back and shoulder-feathers golden-green like the wing-coverts. This dove is not uncommon in the well-wooded portions of Tenasserim, where it is found singly or in pairs in thick forest or very shady gardens. Omitting mention of several genera, we come to two Australian species, in which the beak is feeble, and the tail has sixteen feathers.

Australian Ground-Doves. The common bronze-winged dove (*Phaps chalcoptera*) is generally distributed all over Australia, and differs from its ally, *P. elegans*, in having the throat white instead of chestnut, and the breast vinous; while in the latter this part is grey. It is a plump, heavy bird, weighing fully a pound when in good condition. Its amazing powers of flight enable it to cross a great expanse of country in an incredibly short space of time, and just before sunset it may be seen singly, or in pairs, coming swiftly over the plains, or down the gullies to its drinking-places. It feeds almost entirely on the ground, picking up various leguminous seeds; and numbers of old and young are killed in the stubble-fields after the breeding-season, which lasts from August to December.

Harlequin-Dove. Another genus (*Histriophaps*), characterised by the feeble bill and the tail of fourteen feathers, is represented by one peculiarly coloured species, the harlequin-dove (*H. histrionica*), of North-Western Australia. The forehead, a stripe round the ear-coverts, and the gorget are snow-white; the remainder of the head, throat, and ear-coverts being jet black, while the upper-parts of the body and middle tail-feathers are cinnamon-brown, with a patch of metallic purple on the innermost secondaries; the under-parts being bluish grey, and the outer tail-feathers blackish, shading into grey at the base, and tipped with white. This species breeds in February, depositing two eggs under any low bush in the middle of the open plains. Towards the beginning of April it collects in large flocks, and lives on the seeds of the rice-grass, which the natives collect for food. During the short period harvest lasts the flavour of this dove is delicious, but at other times it is indifferent. It flies to water at sunset, when, like the bronze-wing, it only wets the bill; and it seems astonishing that so small a quantity of water should suffice to quench its thirst in the burning deserts it inhabits.

Pencilled Dove. If we omit the white-quilled rock-dove, (*Petrophassa albipennis*), having the general plumage almost uniform dark brown, and the bases of the primaries white, and inhabiting the sterile districts of North-Western Australia, we come to two species forming the genus *Geophaps*, which, in addition to the characters already mentioned, has the bill rather stout. The pencilled bronze-winged dove (*G. scripta*) has the top of the head, upper-parts, and chest light brown; the tips of the upper wing-coverts being paler, and the inner ones ornamented with patches of metallic greenish purple, the cheeks, ear-coverts, and throat white bordered by a black band in front of the eye, a second black band

being on the cheek, while a third passes above the eye, the rest of the under-parts being grey, shading into fawn colour, the quills brown edged with pale rufous, and the tail reddish brown, with the outer feathers tipped with black. This bird inhabits the plains, being most abundant in the neighbourhood of water, and is sometimes observed in pairs, but more frequently in small flocks of from four to six. When approached, instead of taking flight, it runs off rapidly in an opposite direction, and crouching down, either on the bare plains or among the scanty herbage, remains till all but trodden on. When it rises, its flight is rapid, and accompanied by a loud whirring noise of the wings. No nest is made, the two eggs being deposited on the bare ground, and the young are able to run when no larger than quails.



CRESTED AND COMMON BRONZE-WINGED DOVES ($\frac{1}{2}$ nat. size).

Plumed
Bronze-Wing. The last two genera of the bronze-winged doves are distinguished by having the head crested, while they differ from one another in the shape of the tail-feathers, which are short and nearly even in *Lophophaps*, and in *Ocyphaps* long, the middle pair being longer than the outer. Of the former, three Australian species are known, all with the general colour cinnamon, the innermost secondaries with metallic bronze-purple spots, the cheeks and throat white, the throat having a black band down the middle, commencing on the chin and joining the gorget, which is similarly coloured, the breast having a grey band across it. Writing of the plumed bronze-winged dove (*L. plumifera*), of North-Western Australia, Sturt says it was generally seen perched on some rock, basking with pleasure in the heat of the sun, and was exceedingly wild, taking flight at the slightest noise.



GOLDEN PHEASANTS.

Crested Bronze-Wing. The crested bronze-winged dove (*Ocyphaps lophotes*), represented on the left side of the figure on p. 384, is the only representative of the last genus, and is a native of the interior of North and East Australia. Its crest is black, the head and under-parts grey, the sides of the neck and breast pinkish salmon-colour, the back and rump olive-grey, and the upper tail-coverts greyish brown, edged with white. The smaller wing-coverts are greyish buff, banded with black, the greater coverts and secondaries edged with white, and mostly ornamented with metallic green and purple. The primaries are greyish black, the middle tail-feathers brown, and the outer pairs brownish black, glossed on their outer webs with green, blue, and



NICOBAR PIGEONS ($\frac{1}{2}$ nat. size).

purple. Gould says this dove "frequently assembles in very large flocks; and when it visits the lagoons or river-sides for water, during the dry seasons, generally selects a single tree, or even a particular branch, on which to congregate before descending simultaneously to drink. Its flight is more rapid than that of any member of the group to which it belongs; and impetus being acquired by a few quick flaps of the wings, it goes skimming off apparently without any further movement of the pinions. Upon alighting on a branch, it elevates its tail and throws back its head, so as to bring them nearly together, at the same time erecting its crest, and showing itself off to advantage."

Nicobar Pigeon. The beautiful Nicobar pigeon (*Caloenas nicobarica*) has a wide range, inhabiting not only the islands from which it takes its name, but extending through the Mergui and Malay Archipelagos to the Solomon Islands. Together with a smaller species of an indigo-blue colour from the Pelew Islands.

the Nicobar pigeon represents not only its genus, but likewise a special subfamily (*Caloenadinae*), distinguished from the preceding groups by the elongated and narrow feathers of the neck, which resemble the hackles of a game-cock. The general colour of the plumage is metallic green with copper-coloured reflections, the under-parts are less brightly coloured, the head, neck, and upper breast being nearly black, while the quills are also much the same colour, and the short tail and its coverts are pure white. The bill and the knob at the base are black, and the legs and feet dark purple. In one of the Nicobar Islands, Davison says that the birds swarm by thousands, and in the early morning may be seen flying from the island in flocks out to sea, doubtless to other islands of the group to feed. When well up in the air, the flight is swift and powerful, and somewhat like that of sand-grouse. Having wandered some distance away from the rest of his party, and reached a part of the jungle where the birds had not been disturbed, he was surrounded by a flock of at least thirty old and young pigeons. Their gait was pigeon-like, and while digging among the dead leaves in search of food with their bills they were very silent, their only note being a hoarse croak. He

always met with them on the ground, and, when disturbed, they invariably perched on the thicker branches along which they were often seen to walk. The Nicobar pigeon builds a nest of sticks, in which the single egg is laid.



ALBERT'S CROWNED PIGEON. (From D'Albertis' *New Guinea*.)

CROWNED PIGEONS.

Family *GOURIDÆ*.

The members of this family are the largest existing representatives of the order, and are characterised by the erect fan-shaped crest which adorns the head as well as by their large size, while they are further distinguished by having the metatarsus covered all over with small six-sided scales. Exclus-

ively Australasian in their distribution, all the six known species inhabiting the Papuan Islands have the general colour bluish slate; but the Victorian crowned pigeon (*Goura victoria*) differs from its allies in having the tips of the crest-feathers spatulate or club-shaped. Very little has been recorded concerning the habits of these splendid birds, but they appear to spend much of their time on the ground in search of food, and being remarkably stupid may be easily approached within gunshot. The species here figured (*G. albertisi*) was discovered by the explorer from whom it takes its name.

THE TOOTH-BILLED PIGEON.

Family DIDUNCULIDÆ.

Occupying an entirely isolated position among the existing members of the order, the tooth-billed pigeon (*Didunculus strigirostris*) is perhaps the most

TOOTH-BILLED PIGEON ($\frac{1}{3}$ nat. size).

interesting representative of the whole group, on account of its kinship to the dodo. An inhabitant of the Samoan Islands, this pigeon possesses a remarkably heavy powerful bill and short strong legs. The head, mantle, and chest are metallic blackish green, while the rest of the upper-parts are chestnut, and the under-parts brownish black. The bill is orange and the legs and feet reddish ochre. The following account of its habits is taken from one given by Mr.

Whitmee, from which it appears that the bird now feeds mainly on trees, whereas it formerly procured its food on the ground:—"I did not attribute much importance to that fact, says the observer, because the bird being wary, I thought its destruction by wild cats to be chiefly in the night when roosting, or when on the nest during the process of incubation, while rats would also destroy the eggs or young in the nest. Hence, I did not see how a change in the place of feeding could alone account for the increase of the bird. I therefore made particular inquiries from natives as to its roosting; and from the information thus procured I believe the *Didunculi* almost invariably now roost upon the high branches of trees instead of upon low stumps as formerly." The nest is so rarely found, that few opportunities occur of learning where it is built; but it appears that it is generally situated in the fork of a tree, and that the eggs are white; although formerly the bird nested on the ground. Verging some years ago on extinction, from the assumption of arboreal habits, the Samoan tooth-billed pigeon is now increasing rapidly in numbers.

DODO AND SOLITAIRE.

Family *DIDIDÆ*.

Dodo. The dodo and its nearly the solitaire are recently exterminated members of the order, characterised by their very large size and massive build, accompanied by a total incapacity for flight. This group was entirely confined to the islands of Mauritius, Reunion, and Rodriguez. A native



THE DODO.

of Mauritius, and the sole representative of its genus, the dodo (*Didus ineptus*), in size was somewhat larger than a swan, with rudimental wings, and a tail composed of short curly feathers. The beak was very large and hooked, the body remarkably heavy, and the legs and feet short and stout. Large, clumsy, and defenceless, the dodo was a bird marked out for early destruction; and soon after its discovery it fell a prey to sailors, and the animals introduced by them into its island-home. A few scattered relics of stuffed

specimens, together with bones dug up from the peat of Mauritius, are all that are left of this bird; but fortunately a good idea of its appearance is given in several contemporary pictures. It was discovered by Admiral Van Neck in 1598, and was still abundant in 1601, and it was known to be living eighty years later, although by 1691 it appears to have been exterminated. An allied bird inhabited Reunion, but its affinities will probably remain unknown.

Solitaire.

The gigantic flightless pigeon of Rodriguez, known as the solitaire (*Pezophaps solitaria*), survived till a later date than the dodo, having probably lingered on in the more remote parts of the island till 1761. It was much longer in the leg than the dodo, and had a proportionately longer neck, and the males, which were far superior in size to the females, had a peculiar ball-like excrescence on the wings. Leguat, who visited Rodriguez in 1691, found the solitaires abundant, and has given us a good account of their habits, and a truthful, if somewhat pre-Raphaelite portrait; while of late years numerous bones of the solitaire have been brought to Europe, so that we have now a fair idea of its organisation and affinities.

THE SAND-GROUSE.

Family *PTEROCLIDÆ*.

The sand-grouse form a small group intermediate in their affinities between the pigeons and game-birds; resembling the former in the most important particulars of their skeleton, while their digestive organs are very similar to those of the latter.¹ Among their other columbine characters may be specially noted the great triangular deltoid crest of the humerus or upper bone of the wing, the peculiar shape of which is so characteristic of the pigeon tribe; this deltoid crest being the projecting process on the right side of the upper-part of the specimens figured on p. 391. To this process is attached the great pectoral muscle which renders these birds capable of sustained and powerful flight. In the game-birds this process (as shown in the same cut) is very differently formed, the edge being rounded and curved inwards instead of nearly flat and triangular. In the sand-grouse the body is rather stout and compact, the neck short and the head small. The bill is short and shaped like that of the game-birds, although not so strong; there is never any naked space round the eyes; the wings are long and pointed, and the legs and toes are remarkably short, rendering it impossible for these birds to perch on trees. The general tone of the plumage is suggestive of the sandy arid regions these birds frequent, being a subtle mixture of subdued colours, beautiful in their arrangement and pattern, but well suited to afford protection by their perfect harmony with the surroundings. The majority of this group inhabit Africa and South-Western and Central Asia, but Pallas's sand-grouse ranges in summer to the north of Lake Baikal, and westwards to Pekin, and the black-bellied sand-grouse extends to the Canary Islands and South-West Europe, while Madagascar contains a species (*Pteroclorus personata*) peculiar to that island, and the Pyrenean pin-tailed sand-grouse (*P. pyrenaicus*), a western form of the Asiatic species (*P. alchata*), is met with in South-Western Europe and North Africa. The flight of these birds is swift and powerful, and on the wing they resemble the plover tribe. All are more or less migratory, and some travel immense distances. They are in the habit of repairing in the morning and evening to certain favourite drinking-places where numbers congregate. When

¹ In placing them here the Editor follows the late Professor Garrod, but the writer of this chapter prefers to regard them as representing a distinct order.

drinking, these birds thrust their bill into the water, and retain it there till their thirst is quenched, after the manner of pigeons. The young are covered with a close and beautifully patterned down, and are able to run as soon as hatched. The only nest is a hole scratched in the sand; and the eggs, generally three in number and oval in shape, are double-spotted with brown and pale violet on a ground-colour which is generally cream or buff, but more rarely pale red, the pale violet spots being more deeply imbedded in the shell than the others. The eggs are like those of the rails, and unlike those of the game-birds, which are always single-spotted.

Pallas's Sand-Grouse. In this genus the first toe is absent, while the short front toes are densely covered with feathers, and the central pair of tail-feathers are produced into long thread-like points. In Pallas's sand-grouse (*Syrrhaptes paradoxus*), the first quill of each wing is greatly lengthened and attenuated at the extremity, but in the other species (*S. tibetanus*), which is a native of Tibet, these feathers are much less developed. Pallas's sand-grouse has the general colour of the upper-parts pale buff barred with black, the breast being pale grey shading into dirty white, and the under-parts black. The male is distinguished by having the throat and a patch of feathers on each side of the neck rust-coloured, the rest of the head and neck uniform greyish, and a band of white feathers barred with black across the chest. In the female, on the other hand, the patches of feathers on the neck and throat are pale yellow, and the throat is bounded below by a narrow black band; the top of the head, back, and sides of the breast being spotted with black, and the band across the chest absent. The interest attaching to this bird lies in the incursions which it has from time to time made into Europe, more often in comparatively small numbers, but in the years 1863 and 1888 in enormous flocks, many of which arrived on the eastern coasts of Great Britain, and spread inland to nearly every county, some individuals even reaching the Scilly Islands and Ireland, and others the Shetlands and Faroes. The reason of these migrations is without any satisfactory explanation, especially as the flocks arrive in spring. It seems hardly probable that they could have been driven back by stress of weather while attempting to reach their breeding-haunts, since they are able to endure severe cold, and have arrived in South Siberia in the end of March.

Black-Bellied Sand-Grouse. This species (*Pterocles arenarius*) represents a genus distinguished by the naked feet, the presence of the first toe, and by the central pair of tail-feathers not being elongated. Common during the cold season in the north-western parts of India, this bird does not breed within the limits of the empire. It prefers the great sandy plains where water is easily accessible, but in places, where the rivers are too distant for it to resort to, it frequents such few tanks as are to be found. In the early morning ploughed land is a very favourite haunt, and there large numbers may be seen squatting close together and basking in the morning rays of the sun. Like the rest of their kind, these birds are in the habit of taking a midday siesta when the sun is hot, but when the weather is cold and cloudy they are moving about all day. They scratch about among the loose loam like so many hens till they have made a comfortable depression that fits them, and there they repose, sunning first one side and then the other, and apparently thoroughly enjoying the scorching heat. During their siesta they are never closely packed, but scattered over the ground singly or in twos and threes.

Other Species.

Before leaving this genus mention must be made of the little painted sand-grouse (*P. fasciatus*) of India, which is one of the most beautiful of all the group, and distinguished by its small size and black-and-white markings on the head. In habits it differs from the large sand-grouse, and resembles the nearly allied close-barred sand-grouse (*P. lichtensteini*), while as regards its plumage it so closely approximates to the small African species (*P. quadricinctus*) that it can only be distinguished by the different arrangement of the black and white bars adorning the smaller feathers of the wing. This species, which is seldom



A FLOCK OF PIN-TAILED SAND-GROUSE.

if ever difficult of approach, and can run faster than the other kinds, is usually met with in small packs or in pairs, and frequents the neighbourhood of low, bush-clad, or sparingly-wooded hills. Mr. Thompson says it is nocturnal, and that even in the darkest night the birds arrive at the edge of the plain at dusk and remain feeding and going to water during the dark hours before the moon gets up, and he has frequently noted parties of six or seven flitting about noiselessly over an opening in the forest long after sunset.

Pin-Tailed Sand-Grouse.

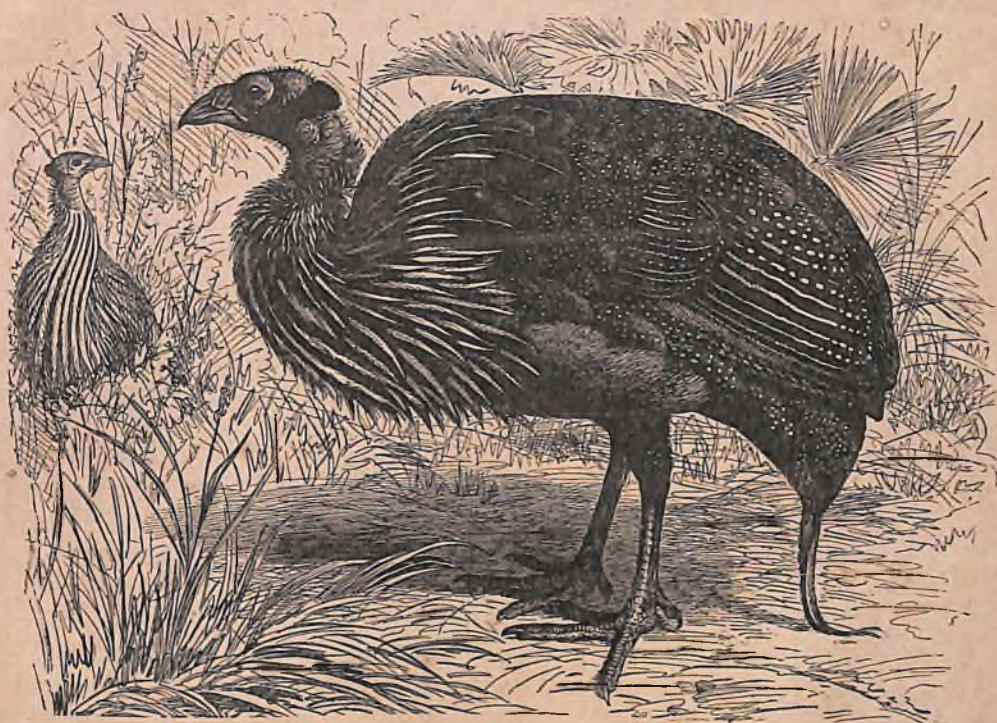
The pin-tailed sand-grouse (*Pteroclorus alchata*) belongs to a genus differing from the last by the elongation of the middle tail-feathers, in this respect resembling *Syrrhaptes*. This species ranges from Asia

Minor to India, while an allied western form (*P. pyrenaicus*) is met with in North Africa and South-Western Europe. Although the two are very similar, the western bird has the wide chestnut band across the breast much darker, and the marginal lines round the smaller feathers of the wing pale yellow instead of white. In both, the under-parts are pure white, and the males have the throat black and the upper-parts dull olive blotched with yellow; while in the females the throat is white and the upper-parts are barred with black. The eastern form is a cold-weather visitant to the north-west of India, where some of the sand-grouse habitually associate in such countless numbers, Mr. Hume stating that he has seen flocks of at least ten thousand, while similar observations have been made in Mesopotamia and on the shores of the Persian Gulf.

Common Sand-Grouse. A third member of the pin-tailed group is the common sand-grouse (*P. exustus*), which has the general colour of the plumage yellowish buff, shading into dark brown on the under-parts in the male, while in the female the breast and upper-parts of the back are spotted with brownish black, and the rest of the upper surface barred with the same colour. This bird has a very wide range, inhabiting the whole of India in localities where the rainfall is moderate, the soil fairly dry, and the country open and tolerably level, and extending westwards across Asia and Northern Africa to Senegal.

W. R. OGILVIE GRANT.





VULTURE-LIKE GUINEA-POWL ON THE GROUND ($\frac{1}{4}$ nat. size).

CHAPTER XVII.

THE GAME-BIRDS AND RAILS,—Orders GALLINÆ AND FULICARÆ.

THE general appearance of the game-birds is so well-marked that the most inexperienced can hardly fail to recognise them. The body in all is compact and stout, and the neck rather long, supporting a fairly large rounded head, with a moderately long, stout bill, the upper mandible being arched and overhanging the lower. Though the legs vary in length, they are always strong and adapted for rapid locomotion, the first toe being present, and the feet, with their powerful, slightly-curved claws, specially suited for scratching up the ground. The wings are concave, fitting close to the body, and the flight, though noisy and somewhat laboured, is often extremely rapid. The tail varies greatly in shape and size, being enormously lengthened and developed in some species of pheasant, while in others, as the painted quail, it is rudimentary and hidden by the upper tail-coverts. Among the more striking skeletal characters it may be mentioned in the first place that the palate is of the cleft (schizognathous) type, while, secondly, the breast-bone has two deep notches on each side of the posterior margin, and its superior process perforated to receive the bases of the metacoracoids. The feathers of the body are provided with after-shafts, and the young are born covered with

down, or well-feathered in the case of the megapodes, and able to run soon after they are hatched. The nesting-habits vary, the grouse, partridges, and pheasants habitually laying their eggs on the ground with little or no nest, while the curassows generally build in trees, and the megapodes place their eggs among sand and vegetable remains, where they are hatched by the warmth of the decaying matter and the heat of the sun. In the true game-birds the eggs, if spotted at all, are only marked with surface-spots, which are easily scratched off, and never possess the deep, underlying marks characteristic of the eggs of the sand-grouse and rails.

GROUSE AND PTARMIGAN.

Family *TETRAONIDÆ*.

The grouse form a group of about thirty species, in which the feathering of the legs and feet varies in the different genera; the ptarmigan and its allies

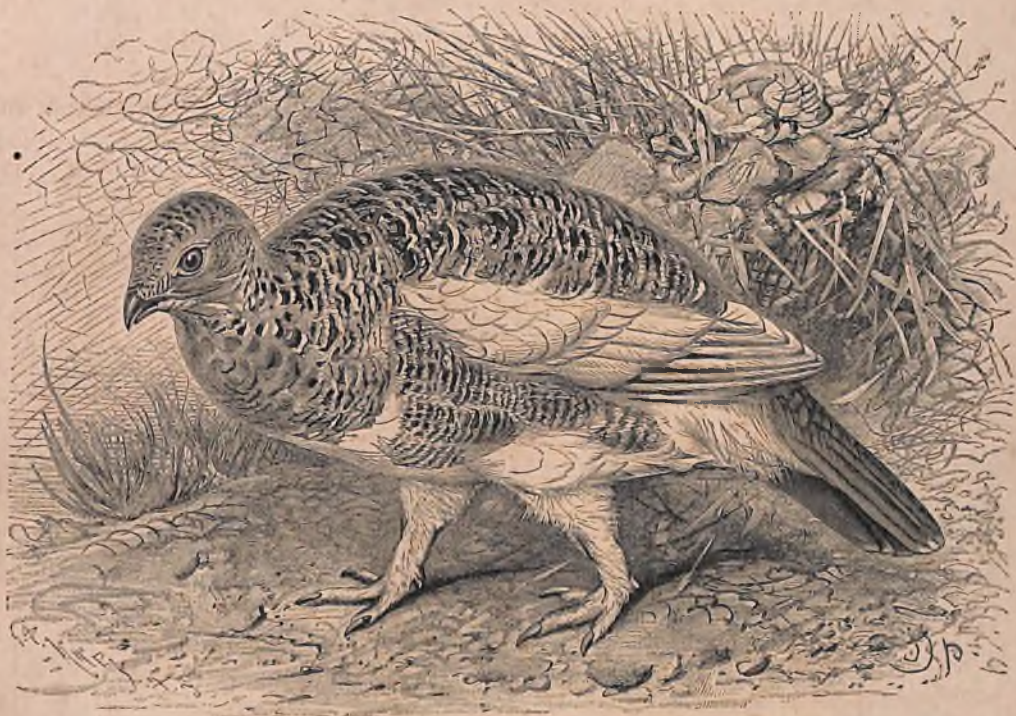


PTARMIGAN IN WINTER DRESS ($\frac{1}{3}$ nat. size).

having the legs and feet entirely covered with feathers, while in others, such as the blackcock, the toes are naked, and only the legs feathered; and in the hazel-hen group not only the feet but the greater part of the metatarsi are naked. Those with naked feet may be distinguished from the pheasant-group by the horny

processes fringing the sides of the toes and producing a comb-like appearance; these being absent in the pheasants, while none of the grouse have spurs on the legs.

True Grouse and Ptarmigan. Perhaps no members of this group of birds are more interesting than the ptarmigan and its allies, on account of the seasonal changes of plumage they undergo in order that they may assimilate themselves to the colour of their surroundings, and be thus protected from their numerous enemies. In the ptarmigan (*Lagopus mutus*) three changes of plumage, summer, autumn, and winter, take place; during winter both sexes of the common species becoming pure white, with the exception of the outer tail-feathers, which are black; the male being distinguished by the presence of a small black patch in



PTARMIGAN IN SUMMER DRESS.

front of the eye. It must, however, be remarked that absolutely pure white plumage on the back is not often met with in Scotch examples, except in unusually severe winters: there being generally a few of the greyish autumn feathers left in the plumage of the upper-parts which are neither replaced by white ones nor turn white. On the other hand, in such examples as inhabit colder climates, like the north of Scandinavia, the male at least rarely dons the full summer and autumn plumages, a number of white winter feathers being retained throughout the summer, and in some instances only the head, mantle, and chest change colour, the rest of the plumage remaining white. It would thus seem that in those countries where the summer is of short duration, sufficient time is not allowed for the full summer and autumn changes to be effected before winter sets in once more; and no doubt this parti-coloured plumage affords even better protection in such

localities than if a complete change to a darker plumage took place. In summer the male ptarmigan has the general colour of the head, upper-parts, sides, and flanks dark brown or blackish brown, finely mottled and barred with grey and rusty; while the chest and upper-breast are blackish, sometimes slightly mottled with buff; the rest of the under-parts and the middle tail-feathers remaining white. The female has the general plumage above, as well as the middle tail-feathers, black mixed with rufous buff, most of the feathers being edged with white or buff, and the under-parts rufous buff barred with black. This plumage so closely approaches in colour the general surroundings of the nesting-places, that the bird when sitting on its eggs is almost invisible. As the autumn advances, the darker coloured feathers in both male and female are replaced by a grey plumage finely mottled with black, and sometimes buff, and as the season continues the more or less complete white winter plumage already mentioned is once more assumed. It is noteworthy that a considerable amount of the changes in colour is due not to moulting but partly to a rearrangement of the pigment in the feathers themselves. In all the group, except red grouse, the primary feathers (which, like those of the tail, are only cast at the autumn moult) remain white throughout the year. All ptarmigan are essentially high-ground birds; the red grouse being an exception, occurring sometimes on low-ground bogs close to the sea. Unlike the black grouse, the common ptarmigan and the rest of its allies pair with one female only, remaining with her throughout the breeding-season.

During the nesting-season the ptarmigan is tame, and may be approached within a few yards. On the barren hilltops and watersheds, where it finds a home among the scattered boulders, dwarf Alpine plants, deer-grass, and mosses, the wanderer is often startled by the hoarse croaking cry of the male, as he rises suddenly from the ground where he was squatting invisible almost at the feet, and settles on some neighbouring rock. On being again approached, he makes a second short flight to some commanding position, where with outstretched neck he watches the movements of the intruder. Soon after, one may nearly walk on the female sitting on her eggs, or in charge of a number of beautiful chicks patterned with yellow and brown down. The young scatter in every direction, running with considerable speed, and helping themselves along with their still tiny, undeveloped wings, while the anxious mother covers their retreat by going through a performance intended, by attracting attention, to cover their retreat and convey the idea that at least one of her wings has been broken. In a few seconds, however, she appears to recover, and skulks off among the rocks, and when one looks to see what has become of the young, they, too, have vanished. The ptarmigan inhabits most of the higher mountain ranges of Europe, and possibly extends into Central Asia, where its place is taken by the nearly allied rock-grouse (*L. rupestris*), differing in the more rufous plumage of the male in summer, though in some localities, such as Newfoundland, a greyer phase, closely approaching the European bird is met with. The rock-grouse inhabits Northern Asia, extending eastwards to Japan and through Arctic America to Iceland.

Red Grouse. In Spitzbergen a somewhat different species (*L. hyperboreus*) occurs, with more white on the basal part of the tail-feathers, the outer web of the outermost pair having only the terminal third black. This is

shown in the accompanying cut. The most curious bird of the group is, however, the red grouse (*L. scoticus*), peculiar to the British Islands, in which the changes of plumage appear unique; this species differing from all the others in having no white winter plumage, and the flight-feathers being always brownish black. Subject to enormous variation in plumage, the extreme diverseness may be enumerated as the black, red, and white spotted phases. The first form has the entire plumage black, and is by far the rarest; the second, in which the general colour is rufous chestnut, is chiefly met with in the west coast of Scotland, the outer Hebrides and Ireland; while the white-spotted variety, in which all the feathers of the breast and under-parts, and sometimes also those of the head and back, are widely tipped with white, is apparently dependent on latitude and altitude.

Willow-Grouse.

The nearest ally of the red grouse is the circumpolar ripa or willow-grouse (*L. albus*), which has three distinct seasonal plumages, those of summer and autumn (shown in the accompanying cut), closely resembling those of the red grouse, while the winter dress is white, and the bird can then only be distinguished by its large size and thick bill. That the red grouse is only an insular form of the willow-grouse there can be little doubt, and it has in all probability gradually ceased to assume a white winter dress, which in a milder climate was no longer essential for its protection. Under these circumstances it might be inferred that in the red grouse there would be only two changes of plumage, namely, in summer and autumn, but this, for some at present unknown cause, is only the case with the female. In early spring the latter begins to assume the summer dress of black mottled and barred with buff or rufous buff, which harmonises so well with the surroundings of her nest that she is comparatively safe from detection. In the end of June she casts



SPITZBERGEN PTARMIGAN.

the whole of her plumage, and by the beginning of September the change to the dark buff-spotted autumn dress is complete, though in some examples, probably birds of the year, a few feathers of the back may still be seen in quill as late as December. The male, on the other hand, makes no spring change, not a single feather being renewed between January and the end of June; but after the breeding-season the entire plumage is replaced by the autumn feathers, which are black, marked, barred, and often edged round the margin with buff. Thus, while at the end of August the cock bears a considerable resemblance to the female in



WILLOW-GROUSE IN SUMMER DRESS ($\frac{1}{3}$ nat. size).

May, though the buff markings are never so coarse, no sooner is the autumn plumage donned than the dark chestnut winter feathers, with their mottled black bars, begin to appear, the whole change being completed by December. Some of the autumn feathers are, however, often retained on the back, and may be distinguished from the winter plumage at a glance. The male breeds in this plumage, and very shabby and worn he is by the end of the nesting-season. It will thus be seen that the male and female have two changes in the season, but while those of the latter are, as might be expected, made in spring and autumn, the male changes in autumn and winter. The Rocky Mountain ptarmigan (*L. leucurus*) is the smallest representative of the genus, and is recognised by its pure white tail.

Black-Game. The next group of grouse we have to notice are the black-game, which have the legs covered with feathers, but the feet naked, and the sides of the toes furnished with horny comb-like appendages. Only two species are known, the black grouse (*Lyrurus tetrix*) of Europe and Asia, and the Caucasian black grouse (*L. mlokosiewiczii*). The two sexes are commonly known as black-cock and grey hen; and the males are distinguished by their general black plumage, the peculiar shape of their tail, the outer feathers of which are elongate and curved outwards at the extremity. In the blackcock the under tail-coverts are white, while in the bird from the Caucasus these parts are black, like the rest of the



WILLOW-GROUSE IN WINTER DRESS.

plumage. The two species also differ in their changes of plumage; in the former, the young male assuming the black feathers of the adult more or less completely by the first winter, while in the young male of the Caucasian bird a female-like plumage is retained throughout the first winter and spring. During the autumn moult, when the males are rarely met with, the black plumage of the head and neck is replaced by brownish buff and black feathers, barred like those of the female. No doubt this temporary change is protective, enabling the blackcock to escape observation, when, owing to the heavy moult in their wings and tail they are rendered almost incapable of flight. Black-game are polygamous, one male pairing with a number of females, each of which undertakes the entire responsi-

bility of rearing her young. During the pairing-season the males are in the habit of resorting to some spot where in the morning and evening they fight for the possession of the females; each challenging the other in turn, and going through a series of skirmishes till the older and stronger birds have driven off the rest and won the females. Black-game are chiefly found in the neighbourhood of pine and birch forests bordering moorland, where bilberry, cranberry, heath, and



BLACK-GAME AT HOME.

bracken flourish, though they may sometimes be seen on the open moor. Although their flight is straight, and their regular wing-beats somewhat laboured, they can travel at a great rate. Black-game perch on trees, much of their food consisting of buds and flowers, while in autumn they may be seen on the stubbles in search of grain. The blackcock by no means confines his attentions during the pairing-season to the hens of his own species, the hybrids produced by a cross between this species and the capercaillie being not uncommon. Sometimes, too, he

interbreeds with the red grouse, and more rarely with the willow-grouse, hazel-hen, and pheasant, while crosses with domestic fowls have been known to occur.

Capercaillie. The largest members of the tribe are the capercaillie or wood-grouse, inhabiting the pine-forests of Northern and Central Europe and Asia. Three different species and one well-marked local race are known, all of which may be recognised by their very large size, as well as by their rounded tail composed of eighteen feathers. The capercaillie (*Tetrao urogallus*) ranges through Northern and Central Europe to Turkestan and the Altai, but in the Urals is represented by a paler form, with the whole of the breast and under-parts white in the male. In typical examples of the common species the breast and under-parts are black, with some of the feathers in the middle of the breast tipped with white, but numerous examples are to be met with in the London market in every intermediate stage of plumage, and are believed to be imported from some of the southern states of Russia, though the exact locality is uncertain. In North-East



BLACK-GAME IN THE SNOW.

Siberia a different species (*T. parvirostris*) occurs, while the third form (*T. kamschaticus*) is confined to Kamschatka. These eastern birds are distinguished from the common species by their smaller bill, and by the scapulars being widely tipped with white; the females being also much darker on the under-parts. From one another they may be distinguished by the white tips of the scapulars in the smaller Kamschatkan species being wide and forming a continuous white band, while in the Siberian bird they constitute an interrupted line of white spots. Formerly indigenous in Scotland and Ireland, the capercaillie was exterminated towards the end of the last century, but was reintroduced in 1837 into Scotland, and is now fairly plentiful in the counties of Perth, Stirling, and Forfar. The capercaillie is polygamous; and its nesting-habits and eggs are very similar to those of black-game, the latter being buff spotted with reddish brown. As many as twelve eggs are sometimes laid, but the capercaillie hen is a bad mother, and seldom succeeds in rearing more than one or two of her somewhat delicate young. The male is a remarkably wary bird, much harder to obtain than the female, and it is astonishing, considering his large size and weight, how quietly

he can slip out of the far side of a pine-tree without being observed. The greater part of his time is spent among the branches of these trees, the needles forming a considerable portion of his food, and giving the flesh a strong flavour of turpentine.

This group contains only two representatives, namely, the **American Grouse.** Canadian grouse or spruce-partridge (*Canachites canadensis*) of



HYBRID BETWEEN BLACKCOCK AND CAPERCAILLIE (1 nat. size).

Canada and the Northern States to the east of the Rocky Mountains, and its near ally, Franklin's grouse (*C. franklini*), inhabiting the coast-ranges to the west of the same chain. Both are about the size of a partridge, and have sixteen tail-feathers; the cocks pair with only one female, probably often retaining the same mate for more than one season. The male Canadian grouse has the upper-parts mostly grey shading into sandy or rufous white on the wings, and barred

and mottled with black; while the throat, chest, and middle of the breast are black, the sides and under-parts being tipped with white, and the tail black tipped with chestnut. The female has the general plumage barred and mottled with black and rufous yellow. In both the male and female of Franklin's grouse this chestnut band across the end of the tail is absent, and the upper tail-coverts are tipped with white instead of grey.

Other Genera.

The sharp-winged grouse (*Falcipennis*) of North-Eastern Siberia and Kamschatka may be recognised by having the outer flight-feathers narrowed towards the extremity and sickle-shaped. The dusky grouse (*Dendragapus obscurus*) and its two allies, of the pine-forests to the east and west of the Rocky Mountains, have the tail with twenty feathers, and the males are provided with an inflatable air-sac on each side of the neck. The home of the dusky grouse is the southern Rocky Mountains, from New Mexico to Idaho, its place further west being taken by the sooty grouse (*D. fuliginosus*), ranging along the Pacific Coast from California to Sitka; while, on the east side of the Rockies, Richardson's grouse (*D. richardsoni*) is found from Central Montana northwards. Much larger than the Canadian grouse, the males of this species have the upper-parts smoky black, mottled with grey, and the under-parts grey; while in the females the plumage of the upper-parts and breast is barred and mottled with buff. In both the dusky and sooty grouse the tail is somewhat rounded in shape, with a terminal grey band wider (more than an inch wide) in the former. In Richardson's grouse the grey band is absent and the tail square.

Prairie-Hens.

The males of the three species of prairie-hen are characterised by an elongate tuft of feathers, and an inflatable air-sac on each side of the neck, but in the females these tufts are less conspicuous and the air-sacs absent. The common prairie-hen of the Mississippi Valley (*Tympanuchus americanus*), shown in the woodcut on p. 404, has the plumage brown above, barred and marked with buff and black, the longer feathers of the neck-tufts being black, and the under-parts pale brown, barred and fringed with white. During the pairing-season these birds assemble in numbers in the morning on some high dry knoll, when the males go through strange antics to captivate the females. Inflating their orange air-sacs and erecting their long neck-tufts, they utter their strange, booming love-note, which may be heard at a great distance in the still morning air. The females are remarkably prolific, laying eleven to fourteen eggs on an average, while as many as twenty or more are not unfrequently found. The females alone undertake the incubation and care of their young, the males separating from them as soon as all the eggs are laid.

Sage-Grouse.

The largest American representative of the family is the sage-grouse (*Centrocercus urophasianus*), inhabiting the dry sage-brush plains of the western United States. Distinguished from the allied forms by its long pheasant-like tail of twenty feathers, with the middle pair elongate and pointed, the male has an inflatable air-sac on each side of the neck, and attains a weight of 8 lbs., the female being smaller. The chief food of this bird, especially during the winter months, is the sage-brush, though during summer it is varied with grasses, berries, insects, and sometimes grain. The stomach of this species

is soft, and unlike that of other game-birds, which are all provided with a muscular gizzard. Captain Bendire gives the following account of the sage-cock's courtship:— "Early one morning, in the first week of March 1877, I had the long-wished-for opportunity to observe the actions of a single cock, while paying court to several females near him, and I presume he did his very best. His large, pale yellow air-sacs were fully inflated, and not only expanded forward but apparently upward as well, rising at least an inch above his head, which, consequently, was scarcely noticeable, giving the bird an exceedingly peculiar appearance. He looked decidedly top-heavy, and ready to topple over at the slightest provocation. The



PRAIRIE-HENS.

few long, spiny feathers along the edges of the air-sacs stood straight out, and the greyish white of the upper-parts showed in strong contrast with the black of the breast. His tail was spread out fan-like, at right angles from the body, and was moved from side to side with a slow, quivering movement. The wings were trailing on the ground. While in this position he moved around with short, stately, and hesitating steps, slowly and gingerly, evidently highly satisfied with his performance, uttering, at the same time, low, grunting, guttural sounds, somewhat similar to the purring of a cat when pleased, only louder."

Sharp-Tailed
Grouse.

Another North American type is the sharp-tailed grouse, of which two forms are known, namely, the large dark northern race (*Pediocetes phasianellus*), inhabiting the interior of British North America, and

a smaller more rufous and buff southern form (*P. columbianus*). Both are characterised by their wedge-shaped tails of eighteen feathers, in which the middle pair is larger than the rest, the males not being provided with air-sacs.

Ruffed Grouse. We now come to two genera forming a somewhat different group of grouse, the various members having the lower parts of the legs as well as the toes devoid of feathers. The ruffed grouse (*Bonasa umbellus*)



RUFFED GROUSE.

of North America extends over a wide range and is subject to climatic variations. This bird is recognised by the frilled ruffles of black feathers on each side of the neck, though in some specimens they vary to dull chestnut. The general colour above is rufous or grey, but every intermediate stage of plumage may be met with. Captain Bendire writes that "the mating-season occasionally commences early in February, but usually about the beginning of March, when the familiar drumming of the male may be frequently heard, though the bird is not often seen. This drumming of the ruffed grouse has been often described, and many different theories have been advanced as to how the sound is produced. It is generally

conceded that the sound is produced by the outspread wings of the bird being brought suddenly downward against the air, without striking anything."

Hazel-Hens. The hazel-hens form the last group of the family, and differ from the ruffed grouse in having the plumage of the sexes different, and lacking the conspicuous ruffles on the sides of the neck, while the tail is composed of sixteen instead of eighteen feathers. Besides the common species (*Tetrastes bonasia*) of Northern and Central Europe from Scandinavia to Kamschatka and Spain to North China, a peculiar form (*T. griseiventris*), with the breast and under-parts sandy grey narrowly barred with black, comes from Perm in East Russia, while a third (*T. severtzowi*), with the outer tail-feathers black barred with white, is found in North-East Tibet. The common species, like its North American ally, has two extreme phases of plumage, a rufous and a grey, and every intermediate variety of colour can be found.

PARTRIDGES, PHEASANTS, TURKEYS, AND GUINEA-FOWLS.

Family PHASIANIDÆ.

The great bulk of the typical game-birds are included in this family, which contains fifty-nine genera, with forty-seven peculiar to the Old World, and all the remainder American. In all, the legs and feet are naked, the latter never being fringed with horny comb-like appendages as in the grouse, while many have the legs armed with one or more pairs of spurs. The family may be divided into three subfamilies—the first (*Perdicinæ*) including the partridges, francolins, and quails, and their allies; the second (*Phasianinæ*) the true pheasants; and the third (*Odontophorinæ*) the American partridges and quails, in which the cutting-edge of the upper mandible is notched. The division between the two first groups is, however, artificial, for the partridges merge into the pheasants, the bamboo-partridges (*Bambusicola*), the African and Indian spur-fowls (*Ptilopachys* and *Galloperdix*) being the principal intermediate forms. The shape of the wing is almost the only character of any importance for distinguishing these groups: all the pheasants, except the typical genus, having the first primary quill shorter than the tenth, whereas in the partridge the former is equal to or longer than the latter. Unfortunately, the exception among the former is the genus *Phasianus*, which has the first primary longer than the tenth; while, on the other hand, in some of the partridges the tenth is somewhat the longer. It is only by using the supplementary character of the length of the tail, coupled with the shape of the wing, that it can be decided to which of these divisions some of the species should be referred. Thus the first group of partridges may be briefly characterised as having the first primary quill longer than or equal to (rarely shorter than) the tenth, and the length of the tail less, usually much less, than that of the wing.

Snow-Partridges and Snow-Cocks. The snow-partridge (*Lerwa nivicola*), inhabiting the higher Himalayan ranges and extending eastwards into Western China, which is somewhat peculiar in having the upper half of the legs feathered, has the plumage of the upper-parts in both sexes black, narrowly barred with white and rufous, while the general colour of the breast and under-parts is deep chestnut, and



CHINESE PHEASANTS IN COVERT ($\frac{1}{4}$ nat. size).

the coral-red legs are armed in the male with stout spurs; the tail having fourteen feathers. Closely allied to but distinguished by their larger size, differently shaped wing, and tail of eighteen feathers, are the two rare species of pheasant-grouse (*Tetraophasis*) from the highlands of Central and Eastern Tibet, and from them we pass to the snow-cocks which are the giants among the tribe, and only found at great elevations in the mountains of Asia. The Himalayan snow-cock (*Tetrogallus himalayensis*), one of the largest of the six species, and not much inferior to the capercaillie in size, ranges through the Western Himalaya to the Hindu-Kush, and northwards through the Altai. In the male the feathers of the upper-parts are mostly grey, finely mottled and margined with buff, while there is a large chestnut patch on each side of the nape, and a band of the same colour surrounds the throat, which, together with the chin and eyebrow stripes, is white. The breast is white barred with black, and the rest of the under-parts mostly grey, the sides and flanks being margined with chestnut and buff. The female scarcely differs in plumage, but may be distinguished by her smaller size and the absence of the blunt spurs of the male. These birds are confined to the snowy ranges above the limits of forest, but are driven by the snows of winter to perform one or in some places two annual migrations to the middle regions. In summer they are only seen near the limits of vegetation, but from June till August, however much the sportsman may wander on the highest accessible places of the Gangetic Hills, only a few are met with, the majority, no doubt, retiring across the snowy range into Chinese Tibet to breed. At the beginning of September they are first seen near the top of the higher grassy ridges, and after the first general severe fall of snow come down in numbers on some of the bare exposed hills in the forest regions, where they remain till the end of March. Gregarious, and often congregating in packs, sometimes to the number of twenty or thirty, snow-cocks never enter the forests or jungle, avoiding spots where the grass is long. When feeding, they walk up hill, picking up tender blades of grass and young shoots of plants, occasionally stopping to scratch up bulbous roots, of which they are fond.

Red-Legged Partridges. Easily recognised by their transversely barred sides and flanks, which contrast strongly with the rest of the plumage of the breast and under-parts, the red-legged partridges are represented by half a dozen species. In these birds the tail is composed of fourteen feathers, and the sexes are similar, except that the male is provided with a pair of blunt spurs. In the mountains of Southern Europe, ranging from the Pyrenees to the Balkans, the so-called Greek partridge is found; but in the Grecian Islands and Cyprus its place is taken by the nearly allied chukar (*Caccabis chukar*), distinguished by having the lores or space in front of the eye white instead of black. Its range is extensive, extending across Asia to China, and reaching from the sea-level to an elevation of sixteen thousand feet; while the bird apparently flourishes as well in desert-country as in cultivated hills. Their surroundings largely affect the chukar both in size and colour; the paler-coloured birds from the Persian Gulf differing widely from the dark forms found in Cyprus and the Himalaya. The common red-legged or French partridge (*C. rufa*), shown in the woodcut on next page, is a native of South-West Europe, and was introduced into England towards the end of the last century. It is a handsome bird, the upper-parts being olive-brown shading into chestnut on the

top of the head and mantle; the eyebrow stripe, chin, and throat being white, and the throat bounded by a black band. The feathers of the neck and chest are broadly edged with black, while those of the sides and flanks are grey barred alternately with white, black, and chestnut; the bill, legs, and feet being bright coral-red. Unlike the common partridge, the red-legged species sometimes perches on trees, walls, and palings, and when pursued always prefers to escape by running. During the pairing-season the males are pugnacious, fighting not only among themselves, but with the common species. The eggs vary from ten to eighteen, and are deposited in a hollow in the ground among rough grass or in growing crops.



FRENCH PARTRIDGES ($\frac{1}{2}$ nat. size).

Bonham's Partridge. The pretty little Bonham's partridge (*Ammoperdix bonhami*), known in India as the sisi, and Hey's partridge (*A. heyi*), found on both shores of the Red Sea, form a small well-marked group nearly allied to the last, but with the plumage of the two sexes different, the males having the feathers of the sides and flanks margined with black instead of being cross-banded, while the legs are never armed with spurs. The sisi has a wider range, being found from North-West India to the Euphrates Valley, and extending southwards to Aden. The male may be recognised by its grey head and neck, with a white black-edged band passing across the forehead and along the sides of the head to the ear-coverts, the general colour of the rest of the plumage being vinous buff. In the male of Hey's partridge the head and neck are vinous fawn-colour, and the upper-parts much paler. The females of both are almost indistinguishable, having the head and

neck isabelline, faintly marked and barred with rufous buff, and the dark marking on the upper-parts coarser. Bare broken ground is the favourite home of the siskin, and they may be met with in suitable localities from sea-level up to about seven thousand feet. Unlike most partridges, they care little for concealment, and when they wish to hide, the colour of their plumage harmonises so perfectly with the sand and stones, that it is only necessary for them to keep still to avoid detection.

We now come to a large group of spur-legged partridges known as francolins, which include more than forty species, the great majority of which are natives of Africa. One species, the common francolin (*Francolinus vulgaris*), is, however, found in Cyprus, and ranges across South-West Asia to Northern India, while the painted francolin (*F. pictus*) is peculiar to Western and Central India, and the Chinese francolin (*F. chinensis*) inhabits the Indo-Chinese countries. In all, except two, the males are provided with at least one, and in certain cases two pairs of sharp spurs, and in some of the African forms the females are almost as well armed. The common and painted francolins are exceptions to the rule, the male of the former having but one pair of blunt wart-like spurs, while in the latter even these are absent. The common francolin or black partridge once extended over a wider range and inhabited many of the countries bordering the Mediterranean, until recently a few pairs still remaining in Sicily. The male has the sides of the head, chin, throat, and under-parts deep black, the sides and flanks being more or less spotted with white according to age; there is a white band below the eye, and a wide chestnut ring surrounds the neck, while the top of the head and wings are dark brown edged with buff, and the lower back and rump black narrowly barred with white. The female has the chestnut collar confined to the nape, and the general colour of the upper-parts browner, while the sides of the head are buff shading into white on the throat, and the under-parts white mixed with buff and barred with black. This bird, in common with all the francolins, loves valleys where high grass and jungle are interspersed with cultivated ground. Although the males and females of this and several other species differ considerably in plumage, in the great majority of cases they are very much alike; an instance of this occurring in two closely allied African species. Thus, while the male of the Natal francolin (*F. natalensis*) has the under-parts white with V-shaped black marks on the feathers, and is similar to the female, in the allied Hildebrand's francolin (*F. hildebrandi*) from Kilima Njaro, and the Johnston's francolin (*F. johnstoni*) from the Shire Highlands, although the males are very similar to the Natal bird, and only differ in the shape of the black marking on the under-parts, the females are different, their general colour below being bright rust-colour. One of the largest species is Jackson's francolin (*F. jacksoni*) from Masailand, which is only rivalled in size by Erckell's francolin (*F. erckelli*) from Abyssinia. An allied genus includes the bare-throated francolins (*Pternistes*) of Africa, of which nine large species are known, these being easily recognised by their bare throats covered with red or orange skin. In habits they closely resemble the true francolins.

The next genus is that of the true partridges, which are natives of Europe and Asia, where they are represented by four species belonging to two distinct types. The common partridge (*Perdix cinerea*), and the bearded partridge (*P. daurica*), with a black horse-shoe mark on the breast, have

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eighteen tail-feathers, and the under-parts of the body devoid of black crossbars; while to the second group belong Hodgson's partridge (*P. hodgsoni*) from South Tibet, and the smaller more northern form (*P. sifanica*) from Kansu, both of which have only sixteen tail-feathers, and the under-parts barred with black. The common partridge ranges over Europe and Western and Central Asia, as far, at least, as the Barabinska Steppes and the Altai. Until recently the chestnut horse-shoe mark on the breast was considered as distinctive of the male, the female having this



A COVEY OF GREY PARTRIDGES.

reduced to a few chestnut spots, or absent. It is true, indeed, that in old birds the differences in this patch are generally characteristic of the male and female, but in the majority of immature females the horse-shoe is well developed, and nearly or quite as large as in the adult male. Immature birds of both sexes may be recognised by having the first flight-feather pointed at the extremity, and the legs yellowish brown; while in adults this feather is rounded at the tip, and the legs are slate-colour. In the south-eastern counties of England young females rarely have a well-marked horse-shoe, and in some instances all trace of chestnut is absent. On the other hand, in most examples from other parts, this patch is greatly developed,

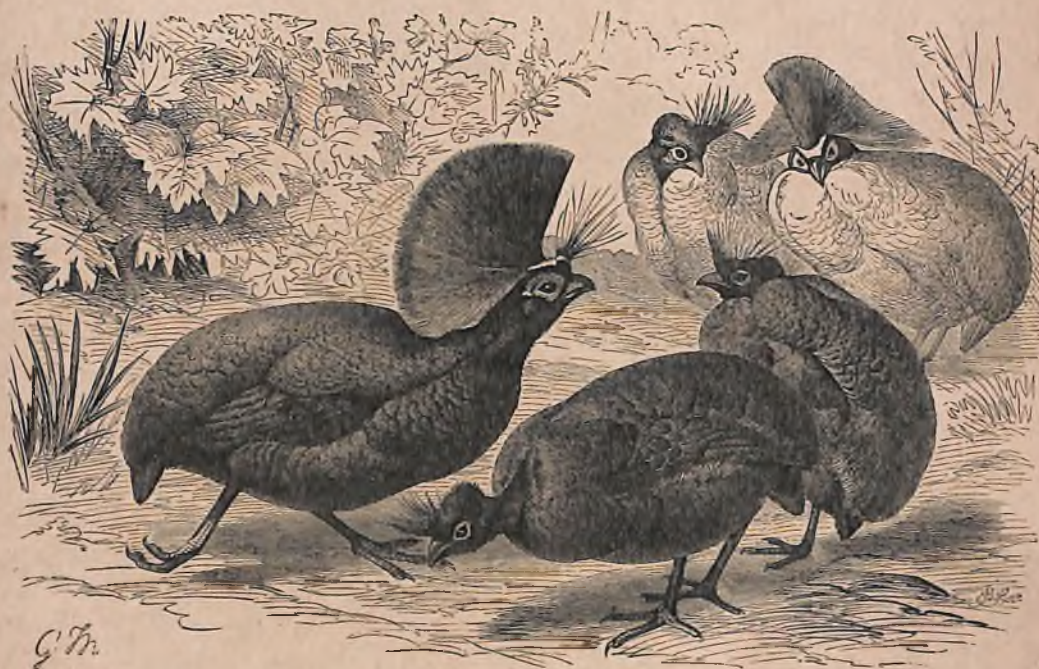
and occasionally is nearly as large as in adult males. The only character for distinguishing the sexes is in the lesser and median wing-coverts; in the male, each of these feathers being brownish buff, thickly vermiculated with black, with a chestnut blotch on either web, and a well-defined pale buff shaft-stripe down the middle, while in the female the ground-colour is mostly black with wide-set transverse buff bars, in addition to the buff shaft-stripe common to both sexes.

Allied Genera. Passing over the Madagascar partridge (*Margaroperdix madagascariensis*), distinguished by having only twelve tail-feathers, we come to the pigmy Indian partridges, forming two genera with five species, all no larger than the quail, but with handsome plumage. In all, the plumage of the sexes is different, and the tail feebly developed, being less than half the length of the wing; in the first genus containing twelve feathers, and in the latter ten. The jungle bush-quail (*Pedicularia asiatica*), and the rock bush-quail (*P. argunda*), are the representatives of the first genus. In the males the breast and under-parts are white barred with black, but while in the former the chin and throat are bright chestnut, in the latter they are dull brick-red. The females have the under-parts vinaceous buff, but in the jungle bush-quail the chin and throat are bright chestnut as in the males, while in the other the middle of the chin and throat are whitish. The distribution of these species is complementary to each other, that is to say, though both are found over the greater part of India, the localities they affect are widely different, the jungle-quail being met with on hilly ground covered with moderately thick forest and jungle, while the rock-quail prefers half-barren sandy or rocky plains, studded with low scattered bushes. Mr. Hume describes the former as "little, bustling, ground-birds, always keeping, according to my experience, in packs or families; never coming out into the open; always feeding in grass, jungle, or stubble long enough to hide their tiny selves." The painted bush-quails (*Microperdix*), are chiefly found in rocky ground interspersed with bushes, fern, and high grass, and are met with in coveys, and prized by the natives on account of their pugnacious habits.

Tree-Partridges. These partridges form a group characterised by the short tail, its length being less than half that of the wing, and also by their peculiarly long and rather straight nails, that of the first toe being well developed. There are nearly twenty species, ranging from the Himalaya, through the Indo-Chinese countries to Sumatra, Java, Borneo, Formosa, and Hainan. Unlike the preceding genera, which are all ground-birds, though individuals may occasionally perch, these partridges are not unfrequently in the habit of sitting in trees. The colour in most of the species is a mixture of olive-brown, black, and rufous, but in the species (*Arboricola ardens*) from Hainan the chest is ornamented with a patch of fiery red. All these birds frequent hill-forest, the common tree-partridge (*A. torqueolus*) ranging to an elevation of fourteen thousand feet, and being seldom flushed except with dogs; but when they rise their flight is strong and swift. The eggs differ from those of other partridges in being pure white. The plumage in all but one is practically identical in both sexes, but in the tree-partridge of the outer ranges of the Himalaya it differs considerably. In both male and female the general colour of the upper-parts is olive-brown barred with black, and the sides and flanks are grey, widely edged with chestnut, and spotted with white; but the

male has the top of the head bright chestnut, the eye stripes, sides of the face, chin, and throat black, more or less margined with white, and there is a broad white band across the front of the crop. In the female the top of the head is brown marked with black, and the sides of the head are rufous spotted with black, the white band being absent.

The members of the three genera now to be considered are peculiar in having the nail of the first toe rudimentary. In the ferruginous wood-partridges (*Caloperdix*) the legs of the male are provided with one or more pairs of spurs. The general colour of the head, neck, and under-parts is bright rust-red, the upper-back black and white, the lower-parts black with rusty



RED-CRESTED WOOD-PARTRIDGES ($\frac{1}{2}$ nat. size).

red markings, and the wings olive-brown, spotted with black. The three species respectively inhabit the Malay Peninsula, Sumatra, and Java and Borneo. The red-crested wood-partridge (*Rollulus roulroul*), figured in the woodcut, is an inhabitant of Tenasserim and the Malay Peninsula and Islands. In both sexes there is a tuft of long hair-like bristles on the middle of the forehead, and the claw on the first toe is rudimentary. The male has also a long, fan-shaped maroon crest of hairy feathers, and the rest of the head and neck black with a white band between the eyes, the wings being maroon glossed with purplish blue, the remainder of the upper-parts rich green with steely blue reflections, the under-parts black glossed with blue, and the base of the bill, naked skin round the eye, as well as the legs and feet, scarlet. In the female the head is blackish grey, the wings chestnut, and the rest of the plumage bright grass-green, shading into greyish green on the under-parts. This green colour is an unusual tint among game-birds, found else-

where only in the males of the blood-pheasants. These birds ramble about the hillsides, at an elevation of about three thousand to four thousand feet, in bevvies or parties of six or eight to a dozen; and are exceedingly swift of foot, never leaving the jungle, and rarely taking wing. Their note is a soft mellow whistle, chiefly heard in the morning, or when they have been separated. Their nearest ally is the black wood-partridge (*Melanoperdix niger*), ranging over much the same area, but not found in Java. The male has the whole plumage glossy black, while that of the female is mostly chestnut, the scapulars barred with black, and the upper-parts, sides, flanks, and under tail-coverts mottled with the same colour.



COMMON QUAIL ($\frac{1}{2}$ nat. size).

The most advanced form of the partridge type of wing is found in the quails, as well as in the snow-partridges; all of which have the first flight-feather but little shorter than the second, and equal to the third, while the tenth is much the shortest. Accordingly, when the wing is expanded the vertical angle of an imaginary triangle is formed by the second quill, instead of by the fifth or sixth. The common or migratory quail (*Coturnix communis*), ranges over an enormous area, being found over Europe, Africa, and Asia, north of the Himalaya. In Eastern Asia a distinct species, the Japanese quail (*C. japonica*), is found, but during the breeding-season many of the common quail invade these countries, with the result that the two interbreed. The male of the common quail may be recognised by its white throat with a black anchor-shaped mark down the

middle, while in the Japanese species the throat is uniformly dull brick-red. The females may be distinguished by the former having the white feathers covering the throat short and rounded, while in the latter they are elongate and pointed, forming quite a beard. In South Africa a race of the common quail (*C. capensis*) occurs, in typical examples of which the males have the sides of the head, as well as the chin and throat, bright rufous-chestnut, and the black anchor-shaped mark characteristic of the migratory species well developed. The common quail interbreeds freely with these birds, and the results are seen in many of the males, having the chin and throat partially chestnut. Another Australian quail (*Synæcus australis*) has no anchor-shaped mark on the throat, and the under-parts marked with V-shaped black bars; an allied species with the under-parts dull rufous inhabiting Timor and Flores. The last genus includes the smallest and most beautifully marked birds of the group; the tail being very short, hidden by the upper tail-coverts, and with only eight feathers. The common painted quail (*Excalfatoria chinensis*) inhabits the Indo-Chinese countries, especially the lower hills where the ground is swampy and grass-covered. The male has the upper-parts brown, barred and marked with black, and ornamented with whitish shaft-stripes; the forehead, sides of the head and neck, and wing-coverts are washed with slaty blue, the chest and flanks slaty blue, and the rest of the under-parts rich chestnut. In very old birds the chestnut takes the place of the slate, till very little of the latter remains on the under-parts.

Bamboo Partridges. We have now to turn our attention to that group of the family with a monal type of wing, that is to say with the first flight-feather shorter than the tenth. As already noted, the true pheasants are the only exception in this respect, but although the shape of their wings is partridge-like, their long tails at once serve to distinguish them. Little need be said of the African rufous-breasted partridge (*Ptilopachys*), ranging from Senegambia and the Gold Coast to Abyssinia, and inhabiting broken ground and stony hillsides. The plumage of both sexes is similar, and the male is never armed with spurs; though these appendages are sometimes developed even in the females of the bamboo-partridges. Here the sexes of the three species have the plumage alike; and in general appearance they recall the male of the common partridge, this being especially the case with the Chinese species (*Bambusicola thoracicus*), in which the sides of the head, throat, and forepart of the neck are chestnut, while the eyebrow-stripe and crop are grey. The nearly allied Formosan *B. sonorivox*, may be recognised by having the sides of the head dark grey; while Fytch's partridge (*B. fytchi*) from India, Burma, and China has the eye-stripe buff. The note of this species is loud, harsh, somewhat fowl-like, and different from the low whistle of the tree-partridges. Found in heavy forest jungle, this partridge generally goes in pairs, and is difficult to flush, unless hard pressed.

Spur-Fowl. The Indian spur-fowl are more pheasant-like, having a rather long tail, and the plumage of the sexes different. The legs in both sexes are armed with spurs, the males having two, and sometimes three, pairs, while the females have one or rarely two, although occasionally two spurs are developed on one leg and one on the other. The three rather large species are peculiar to India and Ceylon; the male Ceylon spur-fowl being more striking in

appearance than its Indian allies, having the plumage of the head, neck, back, and under-parts black and white, the rest of the upper-parts dark chestnut, ornamented on the wing-coverts with white black-edged spots, and the quills and tail black. The female has the head blackish, the chin and throat white, and the rest of the plumage chestnut, finely pencilled with black. Colonel Legge observes that "the shy habits of this bird would prevent its being detected in most places where it is even abundant, were it not for its noisy cries or cackling, so well known to all who have wandered in the Ceylon jungles. It frequents tangled brakes, thickets in damp nalas, forest near rivers, jungle over hillsides, and in fact any kind of cover which will afford it entire concealment. It runs with great speed, and has a knack of noiselessly beating a retreat at one time, while at another it ventriloquises its exciting notes until the sportsman becomes fairly exasperated, and gives up the attempt he has made to stalk it in disgust. The cock-birds begin to call about six in the morning, and when one has fairly commenced, the curious ascending scale of notes is taken up from one to another until the wood resounds with their cries. They always seem to keep in small parties, which perhaps consist of the young of the year with their parents." The nest, a mere hollow in the ground, is situated in the forest, or in thick jungle, under the shelter of a rock or near the projecting root of a large tree, and it would seem that the full number of the eggs laid is four, but the red spur-fowl (*Galloperdix spadiceus*) lays as many as ten.

Blood-Pheasants.

The pheasant-quail (*Ophrysia superciliosa*), occurring in the north-west of India during the cold season, is probably a native of Tibet, but is so rarely met with that scarcely anything is known of its habits. Never coming into the open, it prefers to skulk in the long grass, whence it can only be flushed with the help of dogs; and when on the wing its flight is slow and heavy. This is the smallest of the pheasant kind, being no larger than the common quail, but its affinities are with the blood-pheasants, as is shown by the shape of the wing with its short first primary, the length of the tail, and the long rather loose plumage. The male has the general colour grey washed with olive, each feather being edged with black, and the head and throat deep black, the former marked with various white bands. The female has the general colour warm light brown, paler on the under-parts, and spotted and marked with black, while the chin and throat are whitish. The much larger blood-pheasants are represented by three species from Tibet and Western China; the males being characterised by the peculiar grass-green colour of the plumage. The blood-pheasant (*Ithagene cruentus*) found in the higher regions of Nipal, Sikhim, and Bhutan is a handsome bird, the male having the forehead and a ring round the eye black, the crown buff, and the upper-parts grey, washed on the wings with green, and margined on the upper tail-coverts and tail with crimson; the cheeks, throat, and under tail-coverts being crimson; and the rest of the under-parts mostly green, with some of the feathers more or less margined with crimson. The naked skin round the eye and the legs are bright coral-red, the latter being sometimes armed with no less than four pairs of spurs. The female is mostly brown, lighter on the upper-parts, and reddish below, while the back of the head and nape are slaty grey. Found at elevations ranging from ten thousand to fourteen thousand feet, these birds are abundant in many of the valleys among forests of

pine and juniper. They seldom or never crow, but emit a weak, cackling noise. When put up, they take a short flight, and then run to shelter. During September flocks of ten to fifteen may be seen, males and females in almost equal proportions; and in December packs of seventy to one hundred birds collect.

The tragopans or horned pheasants, so often misnamed Argus pheasants, include five large and magnificent species, unsurpassed for beauty and the harmony of their tints by any other members of the group. The



CRIMSON TRAGOPAN ($\frac{1}{2}$ nat. size).

males are provided with a pair of erectile, fleshy, blue horns inserted on each side of the crown above the eyes, and during the breeding-season the throat is covered with a brightly-coloured lappet, hanging down several inches when the birds are excited by passion, but barely visible during the winter. Their habitat includes the higher wooded ranges of Northern India and China. By far the most brilliantly coloured species is the crimson tragopan (*Tragopan satyra*) ranging in the Himalaya from Kumaon to Bhutan. The male has the top and sides of the head black, the neck, mantle, and under-parts orange-carmine, and the rest of the upper-parts olive-brown, each feather being ornamented at the tip with a round

white spot, partially or entirely-margined with black; the outer wing-coverts being edged on each side with dark orange-carmine. The throat-wattle is salmon-colour with transverse blue bars, and the legs are pale flesh. The general colour of the female is black above, mottled and spotted with various shades of buff, the chin and throat being whitish, and the under-parts sandy finely marked with black and pale buff or whitish shaft-spots. These birds, writes Mr. Hume, in summer "are to be found at elevations of from eight thousand to ten thousand feet, always in thick cover, by preference in patches of the slender reed-like ringal bamboo, in the neighbourhood of water. Although always on hills near to, or bordering on the snow, they are never seen amongst it, and seem to shun it as much as the blood-pheasant delights in it." Beavan remarks that "the winter months, when the under-wood is not so dense as at other seasons, are the only period of the year at which even natives can get at them. The usual plan of capture is by making a hedge of bushes about three feet high, extending down the sides of a hill like the sides of a triangle with the base open. The sides are made to gradually converge until near the apex, where small gaps are left, in each of which a noose is placed. The birds are then slowly driven by men on foot walking in line. . . . A curious fact with regard to this mode of capture is, that the proportion of males to females is generally four or five of the former to one of the latter." The nuptial dances of this bird are described by Bartlett, who writes that the "males can only be seen to advantage in the early morning and in the evening, as they conceal themselves during the day; the females, however, are less retiring in their habits. When the male is not excited, the horns lie concealed under two triangular patches of red feathers, their points meeting on the occiput; the large wattle is also concealed or displayed at the will of the bird. The male has three distinct modes of showing off. After walking about rather excitedly, he places himself in front of the female, with the body slightly crouching upon the legs, and the tail bent downwards; the head is then violently jerked downwards, and the horns and wattle become conspicuous. The wings have a flapping motion, and the bright red patch on them is fully displayed. The whole of the neck appears to be larger than usual during this action, so do also the horns, which, moreover, vibrate with every motion. This scene is concluded by the bird suddenly drawing himself up to his full height, with his wings expanded and quivering, the horns erect, and the wattle fully displayed. The second mode consists of simply erecting all his feathers, and elevating one shoulder, thereby exposing a greater surface to view, without, however, showing his head-dress. The third mode is by simply standing boldly erect on an elevated perch, giving the head one or two sudden shakes, and causing the horns and wattle to appear for a few moments."

Quite unsurpassed among the pheasant tribe for splendour of
 Monals. plumage, the four species of monal are characterised by the males having most of the upper-parts glittering with metallic colours, and the head, except in Selater's monal (*Lophophorus selateri*), adorned with an elongate crest of racquet-shaped plumes. In place of the crest in the latter species, the crown is covered with beautifully curled feathers. The haunts of these birds are practically the same as those of the tragopans, that is to say, the highest forest-regions of the Himalaya and other Asiatic mountains, vegetation and considerable altitude

being essentials to their existence. The male Himalayan monal (*L. resplendens*) has the crest and head metallic-green shot with blue and purple, the back and sides of the neck purple shading into reddish copper and glossed with golden-green; the mantle and upper tail-coverts shining golden-green; the outer wing-coverts bluish green; the inner feathers, scapulars, and rump bronzy crimson in some lights, and purple edged with bluish green in others; the lower back snow-white; the tail pale chestnut; and the under-parts black slightly glossed with green on the throat. The female has a much more sombre plumage, the general colour of the upper-parts, chest, and sides of the breast being black, with a buff centre to each feather, the lower back and upper tail-coverts irregularly barred with the same colours, the sides of the head reddish buff mottled with black, the chin and throat white, and the rest of the under-parts mottled with black and buff, and with more or less distinct white shaft-stripes. The tail is black, barred with rufous and tipped with white. This species ranges through the forests of the Himalaya from Afghanistan to Bhutan. Mr. Hume says "there are few sights more striking where birds are concerned, than that of a grand old cock shooting out horizontally from the hillside just below one, glittering and flashing in the golden sunlight, a gigantic rainbow-tinted gem, and then dropping stone-like, with closed wings, into the abyss below." And Wilson writes that "the monal is found on almost every hill of any elevation from the first great ridge above the plains to the limits of forest, and in the interior it is the most abundant of our game-birds. . . . In summer, when the rank vegetation which springs up in the forest renders it impossible to see many yards around, few are to be met with except near the summits of the great ridges jutting from the snow, where morning and evening, when they come out to feed, they may be seen in the open glades of the forest and on the green slopes above. At that time no one would imagine they were half so numerous as they really are; but as the cold season approaches, and the rank grass and herbage die away, they begin to collect together, the woods seem full of them, and in some places hundreds may be put up in a day's walk. . . . In autumn they all descend into the forest, frequenting those parts where the ground is thickly covered with decayed leaves, under which they search for grubs; and they descend lower as winter sets in and the ground becomes frozen or covered with snow. . . . Still, in the severest weather, when fall after fall has covered the ground to a great depth in the higher forests, many remain there the whole winter; these are almost all males, and probably old birds. In spring all in the lower parts gradually ascend as the snow disappears. . . . In summer they are more separated, but do not keep in individual pairs, several being often found together. It may be questioned whether they do pair or not in places where they are at all numerous; if they do, it would appear that the union is dissolved as soon as the female begins to sit, for the male seems to pay no attention whatever to her whilst sitting, or to the young brood when hatched, and is seldom found with them. The call of the monal is a loud, plaintive whistle, which is often heard in the forest at daybreak or towards evening, and occasionally at all hours of the day." The eggs are placed in a depression in the ground scratched by the female under some sheltering rock or massive root, and are usually four or five in number, and dull white speckled with red. In Chanba a second species is found lacking the white lower back of the

common monal, and having the breast and under-parts glossed with green. While the male is represented by only very few skins, the female is still unknown. In the mountains of North-Eastern Tibet and Western China the equally brilliant and even larger bird *L. thuysii* occurs, the male being recognised by his black tail glossed with bluish green and spotted with white. Lastly, the splendid Sclater's monal, already mentioned, inhabits the Mishmi Hills in Assam, and has, in addition to its peculiarly feathered head, the whole of the lower back, rump, and upper tail-coverts white, and a white band across the chestnut tail.

Fire-Backed Pheasants. The crestless fire-backed pheasants from the Malayan region are about the size of bantam hens, and further resemble these birds in the shape of their rather short and vaulted tails. In two species (*Acomus erythrophthalmus* and *A. pyronotus*) the males have the lower-back and rump fiery bronze-red, while the females are entirely black, glossed with purplish or steel-blue, and armed with spurs like the male; but in the third, from Western Sumatra, the male has the plumage entirely black, and thus closely resembles the females of the other species. Closely allied to the above are the crested fire-backed pheasants, inhabiting the same countries, but ranging farther north into Tenasserim, the Shan States, and Cochin-China. The males are adorned with a full, erect crest, composed of bare-shafted feathers, supporting a bunch of plumes at the extremity, the sides of the head are naked and covered with large wattles, and the tail is long and shaped somewhat like that of the jungle-fowl. The male of Vieillot's fire-back (*Lophura rufa*) is further characterised by having the neck, mantle, and breast purplish blue, the lower-back and rump bronze-red, and the middle tail-feathers white. All the rest of the under-parts are black, the feathers of the sides and flanks with white shaft-stripes, the naked, facial skin and wattles bright blue, the legs and feet vermilion, and the strong spurs whitish. The female has the crest less developed, and the general colour of the plumage chestnut; the throat white; the feathers of the neck and chest margined with white on the sides; the breast and sides of the belly black, mottled with chestnut, and edged with white; and the rest of the under-parts white, mottled with black. The soft parts are like those of the male, but paler, and there are no spurs on the legs.

Bulwer's Pheasant. One of the most splendid of the group is Bulwer's pheasant (*Lobiophasis bulweri*) of North Borneo, in which the male has no less than thirty-two tail-feathers, and the female two pairs less. In the adult male the neck and chest are deep crimson, the rest of the plumage mostly black, each feather being edged with steel-blue at the extremity, and the long, curved tail pure white. The head is almost entirely naked, having only a few feathers down the middle of the crown, and ornamented with three pairs of elongate wattles, all being bright blue; while the legs, feet, and spurs are red.

Eared Pheasants. The five species of eared pheasants, from Central and Eastern Asia, are birds of large size, their loose hairy plumage making them look even larger than they really are. In all except *Crossoptilum leucurum*, in which the male appears to have more white in the tail than the female, the plumage of the sexes is alike, although the females lack the blunt spurs of the males. The top of the head is clothed with soft, curly feathers; the sides of the face being naked and covered with warts; while the ear-coverts are produced into long white tufts on

each side of the head. The tail is long, full, and rounded, the number of feathers varying from twenty to twenty-four in the different species; and the extremities of the middle pairs being much curved, with the webs long and free.

In Hodgson's eared pheasant (*C. tibetanus*), of Tibet and Western China, the whole of the plumage is white, with the exception of the black top of the head,



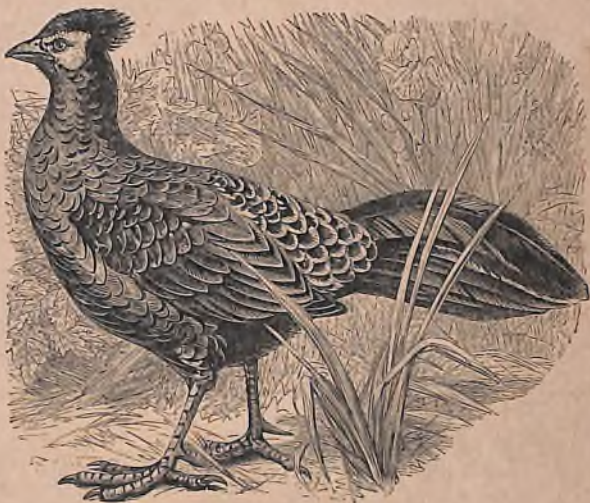
MANCHURIAN EARED PHEASANT ($\frac{1}{2}$ nat. size).

the dark brown quills, and the tail-feathers which are purplish bronze towards the base, shading into dark greenish blue and deep purple towards the extremities. The naked sides of the face are scarlet, and the legs coral-red. The Manchurian eared pheasant (*C. mantchuricum*) figured in the illustration is a somewhat differently coloured bird: the back of the head and neck being black shading into brown on the mantle and wings, and dirty white on the lower-back, rump, and upper-tail coverts: while the chin and throat, as well as the ear-tufts, are white, and the chest is brownish black, gradually becoming lighter on the under-parts.

The range of this species includes the mountains of Mantchuria and Northern China. These birds are met with in the pine-forests at an elevation of from ten thousand to twelve thousand feet. They are gregarious in their habits, and forty or fifty may sometimes be met with roosting in company on the pine-trees. Being remarkably hardy birds, they do well in confinement, and soon become exceedingly tame.

Kalij Pheasants.

On the lower altitudes of the middle ranges of the Himalaya, and thence through the Burmo-Chinese countries, we meet with pheasants approaching the crested forms of the fire-backed pheasants. Nearly a dozen species belong to this group, which includes the Kalij and silver pheasants, as well as the somewhat aberrant Swinhoe's pheasant (*Gennæus swinhoei*). All have a more or less elongate recumbent crest of hairy feathers, the sides of the head naked, and the long tail laterally compressed and vaulted, with the middle pair of feathers at least three times the length of the outer ones. The legs of the male are armed with a pair of stout spurs, but in the females these appendages are wanting. The most western form of the genus, the white-crested kalij (*G. albocristatus*), inhabits the Western Himalaya and Nipal; the male having the long hairy crest white, the general colour of the upper-parts black, glossed with purplish and steel-blue, and margined, especially on the rump, with white; while the fore-part of the neck is dirty white, gradually shading into brown on the under-parts. Proceeding eastwards into Nipal, we meet with a species (*G. leucomelanus*),



HORSFIELD'S PHEASANT.

differing only in having the crest black, glossed with purple; while still farther east in Sikhim and Bhutan the darker form (*G. melanonotus*) has the black crest of the latter, but the white terminal margins on the feathers of the rump and upper-parts replaced by deep purplish blue. In Bhutan, Assam, and Burma, we find Horsfield's pheasant, which is the darkest of all, the whole plumage being black, glossed with purplish, or steel-blue, and only the lower-back and rump being edged with white; and we may consider this species as representing the ancestral stock from which all the others have been derived. There are numerous other species, among which we select the silver pheasant (*G. nycthemerus*) of Southern China, noticeable for its white upper plumage, ornamented with dark markings.

Koklass Pheasants.

Including seven species, these pheasants range through the Himalaya from Afghanistan to Tibet and Mantchuria. They may all be recognised by the long crest of the cocks, and by the feathers above the ears being elongated to form tufts surpassing the crest in length. The sides

of the head are feathered, and there is no marked naked space surrounding the eye; the tail is elongated and wedge-shaped, and the upper tail-coverts are long, extending more than half-way towards the extremity. In the typical koklass (*Pucrasia macrolopha*) of the Western Himalaya, the male has the crest bright buff, a large snow-white patch on each side of the neck, and the rest of the head, including the long feathers above the ears and the throat, black, glossed with dark green; the upper-parts, sides, and flanks being grey, with black middles to the feathers; the wing-coverts similarly marked, but browner, and tinged with rufous; and the middle of the breast and under-parts dark chestnut. The middle tail-



SILVER PHEASANT ($\frac{1}{2}$ nat. size).

feathers are mostly chestnut, the outer pair black shading into reddish brown towards the base, and tipped with white; while the bill is black, and the legs and feet are grey or purplish, and armed with a pair of spurs. The female has a much shorter crest, and no ear-tufts; the plumage being black, variously marked with sandy rufous and buff; the throat and under-parts white, the latter being marked with black; and the under tail-coverts chestnut, tipped with white. Of this species Mr. Wilson remarks that it is "common to the whole of the wooded regions from an elevation of four thousand feet to nearly the extreme limits of forest, but is most abundant in the lower and intermediate ranges. The koklass is of a rather retired and solitary disposition. It is generally found singly or in pairs; and, except the brood of young birds, which keep pretty well collected till near the

end of the winter, they seldom congregate much together." Unlike the great majority of their kind, these birds do not separate after the business of incubation is over, and probably pair for life, since at whatever season one is found, its mate is sure to be met with somewhere near. Their flight is extremely rapid, more so than that of any other Himalayan pheasant, and when they dart down the side of the mountains it requires an experienced shot to stop them. The nest is placed at the root of a tree, or under some overhanging tuft of grass, and contains from five to nine eggs, resembling those of the monal in colour.

True Pheasants.

Before mentioning the true pheasants, it may be observed that the well-known chir-pheasant (*Catreus wallichi*), from the middle ranges of the Himalaya, alone represents an allied genus. Resembling in general form and the shape of the tail the true pheasants, it lacks the bright metallic plumage of those birds, while the wing is of the monal type, with the first primary shorter than the tenth; the head being adorned with a full large crest, most developed in the males. Inhabitants of low-lying wooded valleys, and including about a couple of dozen of gorgeously-coloured species and varieties, the true pheasants range from South-Eastern Europe across Central Asia to Japan and Formosa. As already pointed out, the wing in all these birds is partridge-like, and differs from the characteristic monal type, the first flight-feather being much longer than the tenth; but, unlike the partridges, the tail is long and wedge-shaped—much longer than the wing. The sides of the head are naked, and there is no crest; but the ear-tufts are considerably lengthened in the male, and the legs are armed with a pair of sharp spurs. The home of the common pheasant (*Phasianus colchicus*) is South-Eastern Europe and Asia Minor, although the bird has for many centuries been established in Great Britain and various parts of the Continent to the west of its original habitat. The male has the top of the head bronze-green, and the rest of the head and neck dark green, shading into purple on the sides and front of the latter; the mantle, chest, breast, and flanks are fiery orange-red with a purplish green margin to each feather; the middle of the back and scapulars mottled and beautifully patterned with buff, black, and orange-red; the lower back and tail-coverts red, glossed with purplish lake; and the wing-coverts sandy brown. The middle of the breast and sides of the under-parts are glossed with dark purplish green, the rest of the under-parts being brown mixed with rufous; the tail-feathers are light olive-green, the middle pair being barred along the middle with black; the naked skin on the sides of the face is scarlet-vermilion; and the legs and feet are brownish horn colour. The female is mostly sandy brown, marked and barred with black and buff, shading into chestnut on the mantle and sides of the breast.

The majority of the species allied to the common pheasant may be divided into two groups, namely, those inhabiting that part of Central Asia west of the meridian of Calcutta, which have the rump and upper tail-coverts maroon or rufous, sometimes glossed with green; while in all the forms found to the eastward of that line these parts are greenish or bluish slate-colour. In the most westerly forms of the first group, such as the common pheasant and the nearly-allied Persian pheasant (*P. persicus*), which differs in having the wing-coverts white, and inhabits the valleys to the south-east of the Caspian, there is no white ring on the neck, but as we go eastwards we find other species, such as Severtzow's pheasant (*P.*

chrysomelas), from the Amu-Daria, and Shaw's pheasant, from Yarkand and Kashgar, in which the white ring, though absent in the typical examples, is in many individuals distinct or represented by a few white feathers. Farther north along the valley of the Sir Daria and ranging east through Turkestan to the valley of the Black Irtysh, we find the Mongolian pheasant (*P. mongolicus*), and still farther eastward, in Dzungaria, the allied *P. semitorquatus*, in both of which a



A BOUQUET OF COMMON PHEASANTS ($\frac{1}{2}$ nat. size).

wide and nearly complete white collar is present. In the eastern forms with the slate-coloured rump a very similar arrangement occurs, the western and more southern species having little or no trace of a white ring; but in the Chinese pheasant (figured on p. 407), ranging from the Amur, Manchuria, and Eastern Mongolia, through Eastern China, and its ally, *P. satscheunensis*, from the north of the Nan-Shan Mountains, as well as in the Formosan pheasant (*P. formosanus*), the white ring is well developed. It will thus be seen that the more northern species of both the rufous and grey-rumped groups have a white collar, while in the more

southern species of both this is absent, or at best ill-defined. Since it cannot be considered that the individuals with traces of the collar found among the southern species are the results of interbreeding with the northern ringed species, when their ranges are separated by chains of mountains, we must conclude that the original stock were probably of northern origin, and, like those still inhabiting the higher latitudes, possessed a white ring; that as the species spread gradually southwards this characteristic, from some cause or other, has been lost, but that numerous individuals still show traces of a reversion to the ancestral type. Of the aberrant species we may note the Japanese pheasant (*P. versicolor*), with the under-parts uniform metallic green, Elliot's pheasant (*P. ellioti*), from the mountains of South-East China, and Hume's pheasant (*P. humei*), from Upper Burma and the Shan Hills. In the two latter the lower back is black barred with white, and there are only sixteen instead of the normal eighteen tail-feathers. Still more different are Soemmerring's pheasant (*P. soemmerringi*), from Japan, which has the plumage chestnut shot with purplish carmine and fiery gold, and Reeves' pheasant (*P. reevesi*), from North China, with its white crown, black collar, tawny plumage, and a tail fully 5 feet in length in the oldest males. All the members of the genus are polygamous, each cock pairing with several hens.

Undoubtedly the most gorgeously adorned members of the whole pheasant family are found in the genus which includes the golden and Amherst's pheasants (*Chrysolophus pictus* and *C. amherstiae*), of the mountains of Eastern Tibet and Western and Southern China. The characters distinguishing the males are the long, full crest of hairy feathers and the cape-like mass of feathers covering the back of the head and neck, as well as the long tail and its greatly lengthened upper-coverts. The male of the species figured, although possessing fewer brilliant colours than the golden pheasant, has the colours purer and more harmonious. The top of the head, mantle, scapulars, and chest are dark bronze-green; the long crest blood-red; the feathers forming the cape pure white, margined and barred across the middle with black glossed with steel-blue; the lower back and rump widely tipped with yellowish buff barred with dark green; and the long upper tail-coverts white, irregularly barred with black and widely tipped with orange-scarlet. The wings and under tail-coverts are mostly black, with dark purplish green reflections; the long middle tail-feathers with arched bars and wavy lines of black; the throat and fore part of the neck brownish black, slightly glossed with green; and the rest of the under-parts pure white, barred on the flanks with black. Unlike the golden pheasant, both sexes have a patch of naked blue skin surrounding the eye; but the female has none of the brilliant plumage of the male, the general colour of the upper-parts being rufous and buff, marked and barred, especially on the wings and middle tail-feathers, with dark brown; the outer tail-feathers being chestnut mixed with black and barred and tipped with white, and the breast and under-parts mostly pale buff, barred on the breast and sides with dark brown. This species has been imported from Western China and Eastern Tibet to Europe, where, being of a hardy nature, it thrives in aviaries.

The game-fowls inhabit the jungles of the Indo-Malayan countries and many of the adjacent islands; the males differing from the other birds of this group in having a high fleshy comb extending along

the middle of the head from the base of the bill, and the sides of the face, chin, and throat naked, and provided with one or two more wattles. The red jungle-fowl (*Gallus banciva*), with its serrated comb and double-wattled throat, closely resembles its domestic descendant the game-cock in the colours of its plumage, and is a common denizen of the well-watered jungle-country of the lower ranges of the Himalaya, from Kashmir to Assam, and parts of Central India, especially in



COCK AND HEN OF AMHERST'S PHEASANT ($\frac{1}{4}$ nat. size).

the vicinity of scattered cultivation. It is also found throughout the Malay Peninsula and eastwards to Cochin-China, Sumatra, Java, and the Philippines. When running or feeding, jungle-fowl droop the tail, but when challenging their rivals, or paying their addresses to their mates, they carry it erect like the domestic cock. Of all their kind, these birds, even in a wild state, are the most pugnacious, the males often fighting till one or other of the combatants is killed. Besides the above, several other species are known, such as the Ceylon (*G. lafayetti*), the grey jungle-fowl (*G. sonnerati*), from India, which produces the

hackles so much in request for making salmon-flies, and the green jungle-fowl (*G. varius*), of Java, Lombok, and Flores, distinguished by having an entire upper margin to the comb, and only a single wattle on the throat.

Peacock-Pheasants. The peacock-pheasants present a different type, with their large, full, and rounded tails ornamented with metallic eye-like spots; the sides of the face being naked, or nearly so, and the legs of the males armed with two, and sometimes three pairs of spurs. Having a distribution very similar to that of the jungle-fowl, they only extend into India as far east as Darjiling, and inhabit the dense hill-forests ranging from a little above the sea-level to an elevation of some six thousand feet. The grey peacock-pheasant (*Polyplectrum chinquis*) of the Indo-Burmese countries, is a remarkably handsome bird, the male having the general colour of the upper-parts brown dotted all over with dirty white, and each of the feathers of the mantle and wings ornamented with a large, round, dark green eye-spot, showing violet, purple, and blue reflections, and edged with successive rings of black, brown, and dirty white; the upper tail-coverts and tail-feathers being similarly ornamented with pairs of oval spots, situated on each side of the shaft at some distance from the extremity, and wholly green in one light and purple in the other. The throat is thinly covered with white feathers, and the rest of the under-parts are brown with irregular, mottled, and dotted bars of dirty white; the naked skin on the sides of the face being pale fleshy yellow. The female is darker, and has the eye-spot on the back and wings represented by black spots slightly glossed with purple, while those of the tail are only present on the outer feathers and are much reduced in size. Mr. Clarke, writing of this species, says, it "is common in the north-east of Cachar, where it is found in dense bamboo-jungle, on the sides of ravines, and on the tops of the low ranges of hills, wherever there are jamum trees, as well as on the banks of the river Barak, wherever it is well wooded. On the rocky faces of the Barak banks there is a tree which, during the rainy season, is partially submerged, but in cold weather bears a fruit with seeds like those of a chilli. On these the birds feed greedily in the early morning and towards sunset; insects and worms, with this fruit, form their chief food, but I have on one occasion found small land-shells and pebbles in the stomach of an adult male."

Argus-Pheasants. Among the most singular representatives of the family are the argus-pheasants, distinguished by their large size, enormously developed and eyed secondary quills, which far exceed the outer flight-feathers in length, and their extremely long middle tail-feathers. The shape of the wing is specially remarkable, and may be regarded as representing the extreme type of monal wing; the first flight-feather being the shortest, and the tenth the longest, or exactly the reverse of what obtains in the quails and snow-partridge. The common argus (*Argusianus giganteus*) is met with in the forests of Siam, Tenasserim, the Malay Peninsula, and Sumatra, while in Borneo the smaller, Gray's argus (*A. grayi*), takes its place. The male of the true argus has the naked skin of the sides of the head, throat, and fore-part of the neck dark blue; the feathers on the crown and the short crest black; the upper-parts beautifully chequered, mottled, or spotted with black and buff; the chest rufous barred with black; and the rest of the under-parts black with wavy bars of chestnut and buff. The primary

feathers are ornamented on the outer webs with closely approximated rows of black and rufous spots, while on the basal part of the inner web there is a rufous



ARGUS PHEASANT DISPLAYING.

band minutely dotted with white and margined by a yellow black-barred line. The outer webs of the enormous secondary quills are adorned with a series of large eye-like spots, partly white, yellow, and rufous, and surrounded by a black ring.

In total length the bird measures 6 feet from the bill to the end of the tail. The female has the general coloration of the male, but lacks the beautiful ornamental marking, as well as the enormously developed secondaries and middle tail-feathers. Davison writes that these pheasants are quite solitary, every male having "his own 'drawing-room,' of which he is excessively proud, and which he keeps scrupulously clean. They haunt exclusively the depths of the ever-green forests, and each male chooses some open level spot—sometimes down in a dark, gloomy ravine, entirely surrounded and shut in by dense cane-brakes and rank vegetation—sometimes on the top of a hill where the jungle is comparatively open—from which he clears all the dead leaves and weeds for a space of six or eight yards square until nothing but the bare clean earth remains, and thereafter he keeps this place scrupulously clean, removing carefully every dead leaf or twig that may happen to fall on it from the trees above. These cleared spaces are undoubtedly used as dancing-grounds, but personally I have never seen a bird dancing in them, but have always found the proprietor either seated quietly in, or moving backwards and forwards slowly about them, calling at short intervals, except in the morning and evening, when they roam about to feed and drink. The males are always to be found at home, and roost on some tree close by."

Reinhard's
Argus.

Another allied pheasant is Reinhard's argus (*Reinhardius ocellatus*), from the mountains in the interior of Tonkin, in which the secondary quills are not longer than the primaries, though in the male the middle pair of tail-feathers are enormously lengthened, wide at the base, and tapering to the extremity. The male measures about 7 feet, from the bill to the end of the tail.

Pea-Fowl.

The gorgeously coloured pea-fowl differ from all the birds already noticed in having the upper tail-coverts developed into a long train far exceeding the tail in length. The common species (*Pavo cristatus*), of India, Assam, and Ceylon is too familiar to require description, but in the Indo-Chinese countries, ranging in the north from Chittagong, westwards through Siam to Cochin-China, and south through the Malay Peninsula to Java and possibly Sumatra, there occurs the Burmese pea-fowl (*P. muticus*), the male of which is distinguished by having the crest-feathers more elongate and equally webbed on each side of the shafts, while the wing-coverts and scapulars are black. Widely, though locally, distributed over the whole of India, the common species prefers broken and jungly ground in the neighbourhood of water and cultivation, but does not, as a rule, range to an elevation of more than four thousand feet, though it has been obtained as high as six thousand. In India the Hindus regard the pea-fowl with a superstitious reverence, and object to their being shot; and in native Hindu States, the prohibition being absolute, they are unmolested either by Europeans or natives. A variety of the pea-fowl has the whole of the wing-coverts, scapulars, and secondaries brownish black, glossed with purple and edged with green, and the thighs black instead of buff. It closely resembles hybrids between the two species already mentioned, but arises independently in flocks of the common pea-fowl which have been pure bred for years. Possibly it may be a case of reversion to the ancestral type, being unknown in a wild state.

PEACOCK ($\frac{1}{2}$ nat. size).

Turning to
Guinea-Fowls.

Africa we come to the various species of guinea-fowl, representing the pheasant tribe in that continent, but having the plumage of both sexes alike. Before passing to the better-known genera, we may briefly notice two rare West African forms of which very little is known. Of these the black guinea-fowl (*Phasidus niger*), occurring between Cape Lopez and Loango, is smaller than the common guinea-fowl, and has the whole of the plumage blackish brown, obscurely pencilled with brown. With the exception of a band of black feathers, from the base of the bill to the occiput, the head and neck are almost entirely naked, the skin being yellow shading into orange on the throat and neck, and the male having the metatarsus armed with a pair of stout spurs, thereby showing an approach to the pheasants. The turkey guinea-fowl (*Agelastes meleagrides*), met with further north, from Liberia to the Gabun, may be recognised by having the whole head and neck naked, the skin of the former being red, darker on the crown and hind-neck, while the lower-neck is milky white; the mantle and chest being white, and the rest of the plumage black finely mottled with white. Like the last species the male

has a pair of short stout spurs. The true guinea-fowls, including six species with naked heads covered on the top with a more or less elevated bony helmet, a pair of wattles at the angles of the gape, and black, white-spotted plumage, are found all over Africa, except the more northern parts, as well as Madagascar. The common species (*Numida meleagris*) is also a native of West Africa, ranging from Senegambia to the Gabun, and may be distinguished by having



CRESTED AND COMMON GUINEA-FOWLS ($\frac{1}{2}$ nat. size).

a wide vinous grey collar covering the upper-part of the mantle and chest. The bare skin on the sides of the face, neck, and chin, as well as the wattles are red, and the rest of the neck bluish. It is shown in the right-hand figure of the accompanying woodcut. Like the rest of its kind it is gregarious, often collecting in large flocks, particularly on the grass covered plains bordering the forest. It is shy and difficult to approach, always preferring to escape by running, in which respect it has few equals. The Abyssinian guinea-fowl (*N. ptilorhyncha*), which extends into Equatorial Africa, is peculiar in having a bunch of horny

bristles at the base of the upper mandible. The left-hand figure of our illustration on p. 433 represents the crested guinea-fowl (*Guttera cristata*), one of four species belonging to a group characterised by having a well-developed crest of black feathers, the general colour of the plumage being black spotted with pale blue, and the first four or five secondary quills margined with white, thus producing a white band



VULTURE-LIKE GUINEA-FOWL PERCHING.
(From Selater, *List of Animals in Zoological Gardens.*)

along the wing when closed. The present species is further characterised by the uniform black collar covering the upper part of the chest, and by the naked skin of the head and neck being cobalt-blue, except on the chin and throat, which are red. This is another West African form, ranging from Sierra Leone to the Gold Coast, its habits being very similar to those of the common guinea-fowl. Allied forms of both these genera are found in both Southern and Eastern Africa, but need no special mention.

Vulture-like The
Guinea-Fowl. vulture-like guinea-fowl (*Acryllium*

vulturinum) is a native of Eastern Africa, possibly ranging into West Africa. The head and upper half of the neck are naked, and covered with cobalt-blue skin, with the exception of a horse-shoe-shaped band of velvety reddish brown feathers round the nape. The feathers of the neck, chest and mantle are developed into long black pointed hackles, with white shaft-stripes and cobalt margins; the rest of the upper-parts being black, minutely dotted all over with white, and covered with small round black-edged spots; the sides and flanks are also similarly marked, but



GROUP OF GUINEA-FOWL.

are washed with purple, and the breast and under-parts are cobalt-blue, but black down the middle. The tail-feathers resemble the upper-parts in their markings, but the middle pair are much elongated and pointed. The male is similar to the female, but larger, and with four or five wart-like knobs on each leg.

Turkeys.

The last group of the family is a somewhat aberrant one, comprising the turkeys, all of which are natives of North and Central



COMMON TURKEY.

America, where three distinct species and two local races are known. The common turkey (*Meleagris gallopavo*) comes from the table-lands of Northern Mexico and the neighbouring States, and is recognised by the broad white tips to the upper tail-coverts and tail; while in the species (*M. americana*) of the Eastern States these parts are dark chestnut. The handsomest member of the group is, however, the ocellated turkey (*M. ocellata*) of Guatemala, Yucatan, and British Honduras, each of the tail-feathers being ornamented with a greenish blue eye-spot shot with purple, while the metallic parts of the body-feathers are golden or bronzen-green, and the naked head and

neck blue covered with red warts. Like its allies, the common turkey is polygamous, the female only attending to the duties of incubation, while the male, in addition to neglecting such labours, is even reported to destroy the eggs and young chicks. Mr. Brown, writing of these turkeys, observes, that "I am of the belief that they raise two broods of young in a season, as I have seen almost all sizes in the masting-season (October), when they congregate in large numbers in the cañons to feed on a small bitter acorn, common to the cañons and parks of Southern Arizona and southward. I have seen their roosting-places at night, in sycamore trees; I also saw one in an oak-grove on the side of a hill, but they appear more to favour the cañons."

American
Partridges
and Quails.

Distinguished from their Old World allies by the tooth-like processes on the edge of the lower mandible, these birds constitute a separate subfamily (*Odontophorinae*), represented by eleven genera, con-

taining nearly fifty species; the largest form being about the size of the common partridge, while the smallest is inferior in size to the migratory quail. In the majority of this group the bill is stout and grouse-like, and most have a longer or shorter crest. Of the three large partridges (*Dendrotyx*) inhabiting Central America, from Southern Mexico to Costa Rica, little need be said. They are rather handsome birds (especially *D. macrurus*), with tails as long as the wing, or nearly so. The scaled partridges (*Callipepla*) are easily recognised by their short crests, and grey and black-margined plumage, producing a beautiful scaled appearance. They are met with in the south-western United States and Mexico. Specially attractive is the mountain-partridge (*Oreortyx pictus*) from the Western States of North America, with the crest composed of two very long black feathers; the head, neck, mantle, and breast being grey; the rest of the upper-parts



CALIFORNIAN QUAIL.

olive-brown; the throat and fore-part of the neck deep chestnut margined with white; and the sides and flanks similarly coloured, but irregularly barred with black and white. One of the handsomest and most familiar members of the group is the

Californian quail (*Lophortyx californicus*), often seen in aviaries, and at once distinguished by its conspicuous crest of black club-shaped feathers. In the cock the forehead is buff, the rest of the head and the throat black, edged with a white band; the neck, mantle, and chest being grey, and having each feather margined with black and spotted with white; while the rest of the upper-parts are greyish olive-brown, and the under-parts buff, barred with black and shading into chestnut. The female has the crest shorter and browner, and the feathers of the head and neck are mostly dirty white, with dark middles. This bird, which



BLACK-THROATED CRESTED QUAIL.

inhabits the extreme western States, from Washington to California, ranging inland to Nevada, has been introduced into various parts of the world. A rather peculiar form is the South Mexican barred quail (*Philortyx fasciatus*) which has the greater part of both upper and under-parts barred. Central and Northern South America are the home of the seven species of crested quails (*Eupsychortyx*), differing from all those mentioned in having the tail shorter, as well as in their smaller size.

Closely allied, but lacking the crest, is the genus *Ortyx*, including such well-known forms as the Virginian quail (*O. virginianus*), or "Bob-white," as it is called in the States, and several other species, with the greater portion of the under-parts uniform chestnut or brick-red, and inhabiting the South-Western States and Mexico. Three striking and peculiarly marked species of quail constitute *Cyrtonyx*, inhabiting the southwestern United States, Mexico, and Central America; the males being distinguished by their full crest, black-and-white patterned head, and eyed under-parts.

MEGAPODES AND BRUSH-TURKEYS.

Family MEGAPODIIDÆ.

Megapodes.

We now come to the second section of the order, containing two families characterised by having the first toe on the same level as the others. The members of the present family are chiefly remarkable on account of their nesting-habits, their eggs being deposited in the sand or in a mound raised by one or more pairs of birds, and incubated by the heat caused by the fermentation of the decaying vegetable matter and the warmth of the sun. The young are hatched fully feathered, and able to fly almost from birth. The legs and feet of all these birds are remarkably strong and stout, and thus well

suited for scratching up the earth and preparing their nesting-mounds. The true megapodes include fifteen different species, widely scattered over the islands of the Pacific and Australia, one (*Megapodius cumingi*) ranging to the Philippines, another (*M. laperousii*) being found in the Ladrone and Pelew Islands, while an isolated western form occurs in the Nicobars. The plumage is remarkably sombre, being generally olive-brown or rufous above and grey beneath. The Nicobar megapode (*M. nicobariensis*) during the day frequents the dense jungle near the coast, and may be met with in pairs or in flocks of thirty or more. It is a difficult bird to flush, usually preferring to escape by running. The nesting-mounds are generally placed near the shore, and average about 5 feet in height and 30 in circumference. Davison met with one "which must have been at least 8 feet high and quite 60 feet in circumference. It was apparently a very old one, for from near its centre grew a tree about 6 inches in diameter, whose roots penetrated the mound in all directions to within a foot of its summit, some of them being nearly as thick as a man's wrist. I had this mound dug away almost to the level of the surrounding land, but only got three eggs from it, one quite fresh, and two in which the chicks were somewhat developed. Off this mound I shot a megapode, which had evidently only just laid an egg. I dissected it, and from a careful examination it would seem that the eggs are laid at long intervals apart, for the largest egg in the ovary was only about the size of a large pea, and the next in size about as big as a small pea. These mounds are also used by reptiles, for out of one I dug, besides the megapode's eggs, about a dozen eggs of some large lizard. I made inquiries among the natives about these birds, and from them I learnt that they usually get four or five eggs from a mound, but sometimes they get as many as ten; they all assert that only one pair of birds are concerned in the making of a mound, and that they only work at night. When newly made, the mounds (so I was informed) are small, but are gradually enlarged by the birds."

An exceptionally marked species, Wallace's megapode (*Eulipoa wallacei*), from Gilolo and some of the islands to the west of New Guinea, is characterised by having the secondary flight-feathers much shorter than the primaries, and the feathers of the middle of the back and most of the wing-coverts barred with bright chestnut. Still larger is the ocellated megapode (*Lipoa ocellata*) of Southern and Western Australia, distinguished by having the upper tail-coverts reaching to the end of the tail, and the plumage of the upper-parts mostly grey barred with black.

The brush-turkeys (*Talegallus*) include three or four species of **Brush-Turkeys.** large, dark-coloured birds, with stout bills, oval nostrils, and the head, throat, and front of the neck thinly covered with small scattered feathers; the genus being confined to New Guinea and some of the adjacent islands. The Australian brush-turkey (*Catheturus lathami*), shown in the woodcut, differs in having a large wattle at the base of the neck, the nostrils round, and the tail much longer. In both sexes the general colour of the upper-parts is dark brownish black, paler on the lower back and rump, the under-parts being dark brownish grey, broadly edged with white, the naked skin of the head and neck pinky red, and the wattle bright yellow. Gould observes that "at the commencement of spring the wattled talegallus scratches together an immense heap of decaying vegetable matter as a

depository for the eggs, and trusts to the heat engendered by the process of fermentation for the development of the young. The heap employed for this purpose is collected by the birds during several weeks previous to the period of laying; it varies in size from two to many cartloads, and in most instances is of a



AUSTRALIAN BRUSH-TURKEYS ($\frac{1}{2}$ nat. size).

pyramidal form. . . The materials composing these mounds are accumulated by the bird grasping a quantity in its foot and throwing it backwards to a common centre, the surface of the ground for a considerable distance being so completely scratched over that scarcely a leaf or a blade of grass is left. The eggs are

deposited in a circle at the distance of 9 or 12 inches from each other, and buried more than an arm's-depth with the large end upwards."

Another genus (*Æpypodius*) from New Guinea and Waigiou, is characterised by a fleshy crest running from the base of the bill to the crown, a pendulous wattle at the base of the fore-neck, and the chestnut upper tail-coverts.

The last genus of the family contains only the maleo (*Megacephalum maleo*), of North Celebes and the Sanghir Islands, which is the most remarkable of the group, both in its structure and habits. In both sexes



CELEBEAN MALEO (½ nat. size).

the head is naked, the crown being covered with a large black casque; while the plumage of the upper-parts, chest, flanks, thighs, and under tail-coverts is dark brown, and that of the breast and belly beautiful salmon-pink. These birds do not raise mounds in which to lay their eggs, but deposit the latter in holes dug in the sand. Mr. Wallace describes one of their laying-grounds as follows:—"The place is situated in the large bay between the islands of Limbé and Banca, and consists of a steep beach more than a mile in length of deep, loose, and coarse black volcanic sand, or rather gravel—very fatiguing to walk over. . . . It is in this loose, hot, black sand, that those singular birds the 'maleos,' deposit their eggs. In the months of August and September when there is little or no rain, they come down in pairs from the interior to this, or to one or two other favourite spots, and

scratch holes three or four feet deep, just above high-water mark, where the female deposits a single large egg, which she covers over with about a foot of sand, and then returns to the forest. At the end of ten or twelve days she comes again to the same spot to lay another egg, and each female bird is supposed to lay six or eight eggs during the season. The male assists the female in making the hole, coming down and returning with her. The appearance of the bird, when walking on the beach, is very handsome. They run quickly, but when shot at, or suddenly disturbed, take wing with a heavy, noisy flight, to some neighbouring tree, where they settle on a low branch, and they probably rest at night in a similar situation. Many birds lay in the same hole, for a dozen eggs are often found together, and these are so large that it is not possible for the body of the bird to contain more than one fully-developed egg at the same time. In all the female birds which I shot, none of the eggs besides the large one exceeded the size of peas, and there were only eight or nine of these which is probably the extreme number a bird can lay in one season."

THE CURASSOWS AND GUANS.

Family CRACIDÆ.

The second family of the game-birds with the first toe on the same level as the others contains a number of large Central and South American birds, some of which, such as the curassows, are nearly as large as turkeys, while others, like certain guans of the genus *Ortalis*, are considerably smaller than the common pheasant. All the species have a long and well-developed tail, and in the males the windpipe is long and convoluted, and, as one would expect, their cry is very loud and harsh. They differ from the megapodes, not only in their osteological structure, but also in having a tuft of feathers on the oil-gland. Moreover, their nesting-habits are different; the eggs being incubated by the parent in the ordinary manner; though some of the species habitually nest in trees, and lay white eggs. When first hatched, the young are covered with a patterned down, like the chicks of other game-birds. These birds are arboreal in their habits, the greater part of their time being spent among the highest forest trees. The different genera may be conveniently grouped into two sections, the first four having the upper mandible higher than broad,

while in the remaining seven it is broader than high. The true curassows differ from the allied forms in their large size, and also by having the feathers on the top of the head semi-erect and curled at the extremities; in the males the crest being uniformly black, while in the females it is more or less barred with white. The males are all much alike, the whole plumage being black glossed with purple or dark green, except on the under-parts, flanks, and under tail-coverts, which are white; in two species the tail-feathers being also tipped with the same colour. The plumage of the females, on the other hand, varies much in the different species, in the crested curassow closely resembling that of the male, while in the remainder the upper-parts are variously barred with black, white, rufous, and buff. It will thus be apparent that the distinctive specific characters are, as a rule, much more marked in the females than in the males. The crested

curassow (*Crax alector*) has the plumage of both sexes very similar, but the female, shown in the foreground of the cut, has the crest barred with white. This bird is a native of the forests of British Guiana and Northern Brazil, extending into Colombia. Distinguished by the purple gloss on the upper-parts, and the absence of a swollen knob at the base of the upper, and of a wattle on the base of the



CRESTED CURASSOWS ($\frac{1}{2}$ nat. size).

lower mandible of the male, it has the cere and base of the bill yellow, and the extremity horny blue, while the legs and feet are horn-coloured. Being easily tamed, and affording excellent food, these birds are often domesticated.

Passing over the smaller rufous coloured urumutu (*Nothocrax urumutum*), from British Guiana and the Upper Amazons, distinguished by its crest of recumbent feathers, and the naked space in front of the eye, we come to the three species of mituas, which are as large as the curassows, with

the greater part of the plumage black in both sexes. In two species the under-parts and under tail-coverts are chestnut, the first having the tail-feathers tipped with white and the second with chestnut, while in the third all these parts are white. All three may be distinguished from the curassows by their elevated and vaulted upper mandible and the want of curling of the crest-feathers.

Pauxi Curassow.

The last genus contains only the curious pauxi curassow (*Pauxis pauxi*) of the north-western parts of South America, remarkable for the large, fig-shaped blue casque on the forehead. The male has the entire plumage black, except the under-parts, under tail-coverts, and the tips of the tail-feathers, which are white; in the female the back, wings, and breast being chestnut, paler on the flanks, and barred and mottled with black.

Derbian Guan.

To the second group, with the width of the bill at the base greater than the height, belongs the rare Derbian guan (*Oreophasis derbianus*), from the wooded slopes of the Volcan de Fuego in Guatemala. The characteristic features of this bird are the elevated, straight, deep scarlet horn on the top of the head between the eyes, and the densely feathered base of the upper mandible. In both sexes the general colour of the head and upper-parts is black glossed with dark green, the base of the throat being almost naked, the front of the neck and breast white shading into buff on the sides, with dark shaft-stripes to the feathers, and the remainder of the under-parts brownish black, while there is a wide white band across the middle of the tail.



DERBIAN GUAN.

Guans.

A more numerous group is that of the guans (*Penelope*), including fifteen species from Central and South America. In all these the chin and throat are generally naked, with a wattle, and there is a large naked space surrounding the eye. An allied form (*Penelopina nigra*), with the plumage of the sexes different, occurs in the highlands of Guatemala, the male being entirely black, glossed with green, and the female rufous above barred with black, and beneath sandy mottled with dark brown. The habits of all these birds appear to be very similar; during the breeding-season they are only found in pairs, while at other times they congregate in large flocks, always frequenting the forest, and passing the greater part of their time in the largest trees, when not engaged in searching for fallen fruits and insects. In the next genus (*Ortalis*), including seventeen Central and South American forms, the throat is naked as in the two last, but there is a thin band of stiff-shafted feathers down the middle. The only member of the family which enters North America is the chachalaca (*O. vetula*), which has a wide range, extending from Southern Texas through Eastern Mexico

and Central America to Colombia; and, as might be expected, the bird varies somewhat in the different parts of its range. The aburria (*Aburria aburri*) includes but a single species found in the United States of Colombia and Ecuador, and may be at once recognised by its black plumage glossed with dark green, and the worm-like wattle situated on the naked part of the fore-neck. Finally, there are two species with the chin, throat, and fore-part of the neck covered with feathers comprising the last genus (*Chamæpetes*).

THE HOATZIN.

Family *OPISTHOCOMIDÆ*.

The very remarkable pheasant-like bird from the northern and western districts of South America, known as the hoatzin (*Opisthocomus hoatzin*), appears on the whole to be most nearly allied to the game-birds, and may therefore be mentioned here. Many ornithologists regard it, indeed, as representing a distinct order, but as the Editor does not see the advantage of unnecessarily multiplying ordinal terms, it is alluded to here merely as forming a family. On examining the skeleton of this bird, which has many striking peculiarities, the observer will be struck by the form of the breast-bone, with its nearly parallel lateral edges and feebly developed keel, of which the anterior part is cut away, and the posterior portion broad and flattened out. On this flattened surface the greater part of the weight of the body is supported when the bird is at rest. Another striking feature is the shoulder-girdle, the bones of which are completely welded to one another as well as to the breast-bone. The crop is enormous, and occupies the upper portion of the chest, being placed in a deep cavity in the pectoral muscles. The nest of these birds, which is built of sticks and placed in bushes near the water's edge, contains two or three, and sometimes as many as five oval-shaped eggs of a white colour, doubly spotted with rufous and purple, and remarkably rail-like in character. Unusual interest attaches to the young, which are hatched naked, with the thumb and index-finger provided with well-developed claws, enabling them to climb about among the branches soon after they are hatched; the bill, as well as the legs and wings, being used for holding on to the twigs. Moreover, when compelled, they are able to swim and dive with equal facility. The hoatzin spends its existence among the branches, consuming enormous quantities of leaves, and in spite of its large wings, possesses only the most limited powers of flight.

THE BUSTARD-QUAILS OR HEMIPODES.

Family *TURNICIDÆ*.

The little bustard-quails, usually included among the game-birds, and associated with the quails, are, however, so extremely distinct that they are frequently regarded as forming an order equal in importance though not in numbers to the Gallinæ. While in some respects they approach both the pigeons and game-birds, their affinities with the rails are undoubted, and we prefer, therefore, to leave their serial

position open. Like the sand-grouse and rails, they lay double-spotted eggs, quite different from those laid by any of the true game-birds; but the young are similarly covered with down, and able to run soon after they are hatched. Among the most singular features of this group it may be noticed that the females are always larger and more brightly coloured than the males; while the latter undertake all the cares of incubating the eggs and tending the young. In the typical genus (*Turnix*), which contains all the forms but one, the first toe is entirely absent, but in the Australian collared hemipode (*Pedionomus torquatus*) a small first toe is present. The twenty-one members of the typical genus are distributed over Africa, Madagascar, and Arabia, and also range through the Indo-Malayan countries to Australia; while one species, the Andalusian hemipode (*T. sylvatica*), inhabits South Europe. No less than four of these species are found in India, and as their habits have been more studied than elsewhere, we may take the Indian bustard-quail (*T. taigur*) as typical of the group. This bird, besides being found all over India, has a wide range throughout Burma, the Malay Peninsula, Siam, and South China to Formosa and the Liu-kiu Islands. As might be expected, the plumage of so widely-spread a species shows considerable climatic variation, examples from the dry plains of India having the prevailing colour of the upper-parts rufous; whereas in specimens from the Malay Peninsula, with its heavy rainfall, the general tone is greyish brown. In both sexes the upper-parts are barred and marked with black, many of the feathers being margined on the sides with whitish buff; while the chest and breast are buff barred with black, and the under-parts rusty buff. The female, besides being much larger, has the middle of the throat and chest deep black, while in the male these parts are white with narrow black bars. Mr. Hume writes that "scrub-jungle, intermixed with patches of moderately high grass on dry ground, is perhaps its natural home; but it may be met with anywhere in low bush-jungle and on the skirts of forests, and in inhabited districts greatly affects gardens, grass-preserves, and similar enclosures. It strays into stubbles and low crops in the mornings and evenings, even remaining in these at times throughout the day, but more generally retreating during the hotter noontide hours to the cover of some thorny bush or patch of grass upon the margins."

THE RAIL-TRIBE.

Order FULICARÆ.

This distinct order includes but two families, namely the rails, to which the great bulk of the species belong, and the fin-feet including only a few peculiar forms with grebe-like feet, and no after-shafts to the contour-feathers. Agreeing with the game-birds in the structure of their palate, these birds are most nearly allied to the cranes on the one hand,—an intermediate type being found in the American courlan, while they are also more distantly related through the hemipodes to the true game-birds. They probably represent one of the older and more generalised types of birds. An interesting point is the large number of species which, from disuse of their wings, have lost the power of flight, several of these having become extinct within the memory of man; while with many others

their extinction is but a matter of time. The chief characteristics of these birds are their long legs, elongated toes, loose and rather hairy plumage, feeble, rounded wings, and short tail. The body is generally narrow and laterally compressed, enabling them to thread their way among the reeds and grasses with great ease and rapidity; while the neck is long, and the head small, with a long or moderate bill. A large number of genera, including nearly 180 species, comprise the family, but space will only permit mention of some of the more important types.



MALE AND FEMALE CAROLINA RAILS.

True Rails. The typical genus, including such well-known forms as the common water-rail (*Rallus aquaticus*), is characterised by the beak being longer than the third toe and claw, with the nostrils nearer the feathers at the base than the anterior end of the nasal groove. In all the other genera mentioned below the bill is shorter than the middle toe and claw. The clapper-rail (*R. longirostris*) is a well-known North American form, with the general colour above ashy grey streaked with blackish brown, the chin and throat white, fore-neck ashy brown, shading into isabelline on the chest and upper-breast, and into whitish on the under-parts, the flanks being barred with greyish brown and white. This bird is a resident in many of the south-eastern United States, but only met with in the salt-marshes near the Atlantic, unless driven in-shore by high

tides. In spring considerable migrations take place during the night, and are always conducted in perfect silence. Audubon writes that "from about the beginning of March to that of April, the salt-marshes resound with the cries of the clapper-rail, which resemble the syllables *cac, cac, cac, cac, cà, càtrā, càtrā*. The commencement of the cry, which is heard quite as frequently during day as by night, is extremely loud and rapid, its termination lower and protracted. At the report of a gun, when thousands of these birds instantaneously burst forth with their cries, you may imagine what an uproar they make. At this period the males are very pugnacious, and combats are rife till each has selected a female for the season. The males stand erect and cry aloud at the least sound they hear, guard their mates, and continue faithfully to protect them until the young make their appearance." The nest is large and very deep, constructed of marsh-plants and fastened to the stems in the midst of the thickest tufts above highwater mark. This species may be called gregarious, the nests being placed on the most elevated grass-tufts within a few yards of each other. Eight to fifteen eggs of a pale buff colour, thinly spotted with light brown and purple, are laid, and, being delicious eating, large numbers are collected for the market. This species can swim fairly well, and can traverse the partially submerged weeds with great rapidity."

Weka Rails.

The next group we have to notice are the curious weka rails (*Ocydromus*), only found in New Zealand, and incapable of flight, though provided with ample wings. They may be recognised by their rather large size, nearly as big as the common pheasant, their bill shorter than the middle toe and claw, and their elongate wing-coverts, which extend nearly to the extremity of the quills, as well as by their stout, strong legs. A good account of this bird is given by Sir W. Buller, who writes that it is seminocturnal in its habits, and usually remains concealed during the day in thick fern or scrub, taking refuge in a hollow log or other natural cavity. Occasionally it digs itself a subterranean burrow, the bill only being employed for this purpose, which serves as a retreat as well as a breeding-place. This bird is remarkably bold and fearless, sometimes visiting the farmyards, and even entering houses. It is pugnacious and perfectly omnivorous, being well known to plunder and eat the eggs and young of ground-birds, and will, it is said, even attack a full-grown rat. The cry commenced at sunset and continued through the night, is a peculiar and not unpleasant whistle. A pair usually perform together, calling alternately and in quick succession, the male always taking the lead. As already stated, these birds usually breed in burrows, laying two and sometimes three eggs of the usual ralline type.

**Corncrake and
Carolina Rail.**

The corncrake or land-rail (*Crex pratensis*), representing a genus of its own, is found throughout the greater part of Europe and as far east as the Yenisei in Siberia, ranging south in winter to Africa, while it is also an occasional visitant to North America and Greenland. Nearly allied is the Carolina rail (*C. carolina*), in which the general colour above is olivaceous brown varied with black centres and white margins to the feathers; forehead, crown, front of the face, and middle of the throat and neck black; the eyebrow-stripes, sides of the face and neck, as well as the chest, ashy grey, the breast white, and the flanks barred with black and white.

Pigmy Rails.

A very beautiful little group of pigmy rails inhabit Africa and Madagascar, characterised by the soft tail-feathers, almost hidden by the coverts. In the South African form (*Corethrura rufa*) the general colour of the upper-parts, sides, and flanks is black, longitudinally streaked with white; the inner-quills, lower-back, and tail being spotted with the same colour. The head, neck, and chest are rich vinous chestnut, and the breast white streaked and barred with black. Andersson, writing from Damaraland, says that "I have only found

this species at Oman-bondé, where it is not uncommon, and breeds. It frequents stagnant waters, thickly fringed and studded with aquatic herbage, amongst the ever-progressive decay of which it loves to disport itself and to search for food. It is very shy and reserved in its habits, seldom going far from effective cover, and gliding through the mazes of the rank vegetation with astonishing ease and swiftness."



MORTIER'S WATER-HEN. (From Selater, *Proc. Zool. Soc.*, 1867.)

Water-Hens. We now come to a group, including the water-hens and coots, which are characterised by having a frontal shield at the base of the upper bill. The South Australian Mortier's water-hen (*Tribonyx mortieri*),

shown in the accompanying woodcut, is the only representative of its genus, and may be recognised by its short toes, which do not exceed the leg (metatarsus) in length, its large size, and feeble wings, with the primary and secondary quills about equal in length. The general colour of this bird is ruddy brown washed with olive, shading into greenish grey on the wing-coverts, which are spotted with white; the head and neck are dark olive-brown, and the rest of the under-parts greenish grey washed with olive, with a large white patch on the sides of the body. Gould states

that "the localities it affects are marsh-lands and the sides of rivers. It was daily seen by me on the Government demesne at New Norfolk, Tasmania, where it frequently left its sedgy retreat, and walked about the paths and other parts of the garden, with its tail erect like the common hen. Even here, however, the greatest circumspection and quietude were necessary to obtain a sight of it; for the slightest noise or movement excited its suspicions, and in an instant it vanished in the most extraordinary manner into some thicket, from which it did not again emerge until all apparent cause for alarm was past. Its habits and general manners are very similar to those of the moor-hen, but it does not dive or swim so much as that bird. It is very easily captured with a common horsehair noose. The nest, which is very similar to that of the moor-hen, is formed of a bundle of rushes placed on the border of the stream; eggs seven in number." In the following genera the toes are long, the third toe and claw exceeding the metatarsus in length. Passing over the common water-hen (*Gallinula*) and its allies, in which the

toes, although not lobed like those of the coots, have a narrow lateral membrane, and the nostrils are oval and situated in a distinct nasal depression, we find in South-Eastern Asia and the adjacent islands a large species known as the water-cock (*Gallinula cinerea*), distinguished by having no lateral membrane on the toes. The male has the plumage black, the upper-parts especially, the wing-coverts being edged with grey, and the scapulars and lower back with brown, while the under tail-coverts are buff barred with black. The female is browner and has the wing-coverts grey, while the under-parts are buff with dusky bars, except the throat and middle of the belly, which are white.



COMMON COOT.

The most striking birds of this group, as regards brilliance of colouring, are the purple gallinules (*Porphyrio*), with their handsome blue and purple plumage, variously shaded with dark green, olive-brown, and black. Closely allied to these is Mantell's gallinule (*Notornis mantelli*), a native of New Zealand, now nearly, if not quite, extinct, and the white form (*N. alba*), which formerly inhabited Norfolk and Lord Howe Islands. Finally, we must mention the coots (*Fulica*), at once recognised by their lobed toes. In habits they resemble both ducks and gallinules, being able not only to swim and dive well, but to thread their way through grass and reeds with ease and swiftness. In rising they flap along the surface of the water, and fly like rails with their legs dangling; and their notes resemble those of the gallinules, but are more harsh and grating. The distribution of the genus is cosmopolitan.

Gallinules
and Coots.

THE FINFEET.

Family *HELIORNITHIDÆ*.

As mentioned above, the birds representing this group are few in number, and belong to three different genera, one being found in Africa, a second in Central and South America, and the third in South-Eastern Asia and Sumatra. The Senegal finfoot (*Podica senegalensis*) is, as its name implies, a native of West Africa. The general colour above is dark brown glossed with dark green, the back and wings being ornamented with round ochreous spots edged with black; the sides of the face, neck, and throat are grey banded with white; and the rest of the under-parts white tinged with fulvous and barred with black on the sides.



SENEGAL FINFOOT.

Mr. Büttikofer observed these birds on the Junk and Du Queah Rivers in Liberia, where they were usually met with solitary, more rarely in pairs, slowly swimming about, and very shy and watchful, making for the bank at full speed on the approach of a canoe, and hiding themselves under the thick foliage of the overhanging shrubs. They are very hard to flush unless taken by surprise in the open, when they flutter hastily away, keeping so close to the water that they continually beat the

surface with their wings and feet. When swimming, they sit very deep in the water, and are therefore not easily killed in that position, especially as it is difficult to get within shot of them, and, unlike the rails, even when wounded, they never attempt to escape by diving. Their general habits are much like those of the common coot. Speaking of the closely allied Peter's finfoot from South Africa, Mr. Ayres says the birds he obtained were caught in traps set for otters. "They have the power of making an extraordinary noise, like the growling of a wild beast, which they do by drawing the air into their bodies, and forcing it gradually from their throats." Both birds made this strange noise when taken from the traps, fighting at the same time with all their might. The young of the American finfoot (*H. fulica*) are said to be hatched naked and carried about by the old bird, but very little appears to be known at present of the nesting-habits of any of these birds.

W. R. OGILVIE GRANT.



GROUP OF BUSTARDS.

CHAPTER XVIII.

THE BUSTARDS, THICKNEES, AND CRANES,— Order ALECTORIDES.

THE group known as Alectorides, under which were included in Mr. Sclater's classification the cranes, bustards, and certain other families, is one of those ill-defined assemblages of birds which afford illimitable difference of opinion as to the relations of their constituents. For instance, some ornithologists remove the bustards from the group to place them with the rails, while others would associate them with the *Limicolæ*. Others, again, would regard the rails (inclusive of the bustards) and the cranes as the representatives of two main subdivisions of the Alectorides. Moreover, but few accept the relationship of the thicknees to the bustards; some writers placing them among the *Limicolæ*, while Mr. Seebohm would include them in the *Gaviæ*. Admitting that the assemblage may be to some extent an artificial one, we think that its retention, at least as a provisional measure, is convenient—more especially as not only can it be defined, but that, in its present form, it aids in the definition of the two succeeding groups.

All the Alectorides¹ agree with the game-birds and rails in having slit (schizognathous) palates, and their young covered with down, and active almost immediately after birth, as well as in the absence of a projecting (ectepicondylar) process on the outer side of the lower end of the humerus. They are further characterised by the truncation of the hinder end of the lower jaw; and by this feature, as well as by the absence of any perforation of the extremity of the

¹ Except the kagu.

breast-bone by the bases of the metacarpoids, they are distinguished from the game-birds. From the rails they may be distinguished by the circumstance that when their nostrils are oval (holorhinal) either the number of toes is reduced to three, or if four toes are present either the breast-bone has no notch, or the oil-gland is naked; while from both the pigeons and sand-grouse they are separated by the upper end of the humerus being of normal form; the condition in which the young are born also forming a point of distinction between the former of those two groups. Briefly, then, the Alectorides may be approximately defined as including those schizognathous birds with active young,² in which the humerus has no process at the lower end, and the angle of the lower jaw is truncated; the nostrils being either schizorhinal or holorhinal, but, when the latter, either the number of the toes is reduced to three, or the sternum is entire, or the oil-gland naked; the upper end of the humerus being always of normal form. Such characters may seem not only trivial, but in some cases difficult to understand, although, when dealing with groups of such nearly allied birds, they are almost the only ones available. Like the orders treated in the two preceding chapters, the members of this group either have the toes free, or but partially connected by webs.

THE BUSTARD TRIBE.

Family OTIDIDÆ.

The stoutly built birds known as bustards and floricans agree with the rails in having the nasal openings in the skull of an oval shape (holorhinal); but they differ in having only three toes to each foot, and likewise in the absence of bare tracts in the plumage of the sides of the neck, and of an oil-gland. In their skeleton the breast-bone has two notches in its hinder border; and the furcula is U-shaped. Externally they are characterised by the relatively short beak, in which the oval nostrils are placed near the base, the stout and moderately long legs, in which the metatarsus is shorter than the tibia, the long wings, and the short tail; the number of primary quills being ten, and that of the tail-feathers twelve. They undergo a complete moult in autumn, and often a partial one in spring; and the plumage of the two sexes may be nearly similar, or considerably different. The bustards are confined to the Old World, where they are represented by between thirty and forty species, of which a considerable proportion are natives of Africa south of the Sahara. Essentially terrestrial birds, and chiefly inhabitants of open plains and steppes, the bustards are admirably adapted for running and walking, although they are likewise powerful and rapid in flight. Their mottled plumage of brown, black, and grey, harmonises with the coloration of their surroundings. In some the food is chiefly vegetable, although supplemented by insects and reptiles, but in others it consists mostly of animal matter.

The great bustard (*Otis tarla*), which formerly inhabited many of the wilder, open districts of Britain in large flocks, is the type of a genus which may be taken to include two species, and is characterised by the shortness of the beak and the absence of a crest on the head. The legs are

² In the sun-bittern the young are helpless, while those of the kagu are unknown.

relatively short, with a small portion of the tibia bare, and the metatarsus (as in the other genera) reticulated all round; while the wings are somewhat rounded, with the third quill the longest.

The male of the great bustard stands between 3 and 4 feet in height, and has a total length of 45 inches, whereas the female measures about 9 inches less. The male has a tuft of white bristle-like hairs, passing backwards and downwards from each side of the chin, and partially covering a narrow patch of bare skin. In the same sex the colour of the head is grey; the upper-parts are chestnut-buff, with black barrings; the primary quills blackish brown, but the rest of the wings white; the breast is marked with bands of chestnut and grey; the abdomen is white; and the tail-feathers are reddish, barred with black, and tipped with white. The female, as a rule, lacks the moustache, and the bands on the breast. Like many other members of the family, the adult male has an air-pouch opening beneath the tongue, and running some distance down the front of the neck, which is most developed during the breeding-season, but at other times probably becomes so contracted as to become almost unnoticeable. Always unknown in Ireland, and having disappeared at an earlier epoch from Scotland, the bustard was probably exterminated as a resident English species in or about the year 1838; and it is now known only as a rare and casual visitor to the southern counties. Eastwards its range extends across Central and Southern Europe, through Palestine, Turkestan, and Southern Siberia to Mantchuria; while it is a winter visitor to China and Japan, and occasionally straggles into Asia Minor, North Persia, and North-Western India. It also inhabits North-Western Africa, where it has now become rare; and it is very scarce in France and Greece, while for years it has ceased to exist in Scandinavia.

Haunting the great steppes and plains—whether barren or under corn cultivation—of Europe and Asia, the bustard is a shy and wary bird, associating during the winter in large flocks, but breaking up into pairs in the breeding-season, although even then several such pairs may frequent the same neighbourhood, and the immature individuals still remain in companies. Its food consists mainly of grain and the young shoots of cereals and other plants, but it will also consume insects, as well as small reptiles and mammals. Drinking appears to be quite unnecessary to these birds and their kin. Generally silent, the female when alarmed gives vent to a kind of hiss, as does her partner; but the male has also a call-note which has been compared to the syllable *prunt*. The breeding-season commences in May, towards the latter part of which the two, or occasionally three eggs are laid in a hollow in the ground, which may be situated either in the open plain, or in a corn-field, and may or may not have a scanty lining of dry grass. In colour, the eggs vary from pale buff to some shade of greenish or brownish olive, speckled with reddish brown or grey. During the breeding-season the males, which sometimes desert their consorts, are apt to be very pugnacious, instances having been known where they have actually attacked human beings. Mr. C. A. Nicholson observes that "bustards when flushed generally fly two miles or more, sometimes at least a hundred yards high. They never try to run; one that I had winged making the most awkward attempt possible to get away from me, and, though a young bird, showing much more disposition to fight than

to get away by running: They fly with a regular flap of the wings, and much faster than they appear to go. I cannot imagine greyhounds being able to catch bustards, though there seems to be good authority for believing they did." A full-grown male bustard will weigh from 26 to 30 lbs., or even rather more.

Far inferior in size to its larger relative, the little bustard *Little Bustard.* (*O. tetrax*) differs by the absence of the moustache in the male, and displays a greater diversity between the plumage of the two sexes, as well as a seasonal variation in that of the male. In the summer plumage, the latter sex, as represented in our illustration, has the general colour of the upper plumage buffish



LITTLE BUSTARD, IN BREEDING-PLUMAGE ($\frac{1}{2}$ nat. size).

brown, vermiculated with black, and two black and two white gorgets on the lower neck and breast. On the other hand, the female (which is equal in size to her partner) at all seasons, and the male in winter have the head and upper-parts streaked and blotched with black, and no black gorgets on the breast. In length these birds measure only about 17 inches.

The little bustard, which is but a rare and generally a winter visitor to Britain, is widely spread in suitable localities over Europe and Central Asia, ranging in winter to the trans-Indus districts of India and to Northern Africa. From Africa these birds migrate to their northern breeding-haunts in vast flocks during April, returning in still greater numbers in October, when it is said that in crossing the plains to the south of the Caucasus they reach to millions. Although

in many of their habits resembling the larger species, Mr. Hume states that their flight is very different, and that they often rise to a great height, and will flutter and twist about in the air. At other times, however, they fly rapidly and straight; and when on the wing always call continually. Wary in the cool of the morning and evening, during the heat of the day they lie close in the mustard-fields, which are their favourite haunts in the Punjab. "They rise suddenly," writes Mr. Hume, "with a great pat-pat of the wings; and, though quite invisible till they rise, startle one with the great breadth of pure white they suddenly reveal, the whole of the secondaries and much of the primaries being white."

An extinct bustard belonging to this or one of the allied genera has been described by the writer from the middle Miocene rocks of Bavaria, and thus serves to indicate the comparative antiquity of the group.

Long-Beaked Bustards. Africa south of the Sahara is the home of a number of species of bustards belonging to a genus (*Eupodotis*), distinguished from the preceding by the greater length of the beak and legs, and of which there is an outlying representative in India (*E. edwardsi*), and others in China and Australia (*E. australis*). The wings are large and long, and the plumage of the two sexes is nearly similar, although the females lack the short pouches found in the males of most of the species. As there are a great number of these bustards, and their general type of coloration conforms to that obtaining in the members of the preceding genus, it would be useless to attempt the description of any particular species, and our notice may therefore be confined to their habits. The great Indian bustard frequents open bare or grassy plains, and in the rainy season collects in small flocks, while in the cold weather it may be observed in wheat-fields, to which it resorts for the purpose of feeding on the grasshoppers which form its favourite food. Failing insect food, it will, however, take to fruit and seeds. When flushed, it generally flies for a long distance at a low elevation before settling again. This species differs from the common bustard in being polygamous; and during the breeding-season the males, like many other members of the family, are in the habit of making a display before the females, probably for the purpose of attraction. Describing this display, Mr. Hume remarks that, "first the male begins to strut about, holding his head up as high as if he wanted to lift himself off his legs; then, after a few turns, he puffs out the upper part of the throat just under the jaws then draws it in again, then puffs it again, and so on, two, three, or four times, and then suddenly out goes the whole throat down to the breast, and that part of it next the latter swells more and more; his tail, already cocked, begins to turn right back, and the lower throat-bag gets bigger and bigger and longer and longer, till it looks to be within six inches of the ground. All the feathers of the throat stand out, and, looked at in front, he seems to have a huge bag covered with feathers hanging down between his legs, which wobbles about as he struts here and there, with wings partly unclosed, and occasional sharp snappings of his bill. From time to time he utters a sort of deep moan, and stands quite still, and then off he struts again close up to the female, and then away from her." In addition to insects, these birds also consume numbers of rats, mice, and reptiles; and this coarse feeding renders their flesh unpalatable. Difficult to approach within gunshot range by stalking, bustards may frequently be bagged by driving. In length this

species measures from 45 to 50 inches in the male, of which the general weight is from 17 to 22 lbs.

Of the numerous African representatives of the genus, one of the best known is the Arabian bustard (*E. arabs*) of Abyssinia, in which the iris is pale brown, with dark radiating streaks, the beak is dusky above, and dirty white below, while the legs are yellowish. The finest of all is, however, the South African kori bustard (*E. kori*), — the *ghaum-pauw* of the Boers, — which attains a size and weight considerably exceeding that of its Oriental cousin. This bird derives its Dutch name from its habit of feeding on the gum of a species of mimosa, although



ARABIAN BUSTARD.

it is likewise very partial to grasshoppers; and it differs from many of its allies in being voiceless. Messrs Eglinton and Nicholls write that, when feeding on the open plains, the kori is a very "difficult bird to approach sufficiently near for the range of a shot-gun; and the best plan to adopt under such circumstances, if on horseback, is to ride slowly round at a distance of a couple of hundred yards from the bird and gradually narrow the circle. If this tactic is adopted it will, like most others of the bustard tribe, often lie down as if to escape notice, and thus a shot may be obtained, although not without the expenditure of time and trouble." Mr. Hume believes that the Indian bustard lays only a single egg; the two eggs which are not unfrequently found on the ground at a distance of a yard or so apart probably belonging to different birds.

Ruffed Bustards. The hubaræ (*Hubara undulata*) of Northern Africa and the nearly allied Macqueen's bustard (*H. macqueeni*) of Western Asia, represent a genus characterised by the rather short legs, the lengthened and basally depressed bill, and the presence of a ruff on the neck and a crest on the head; the latter appendages being larger in the male than the female. Breeding in Turkestan and South-Western Siberia, as well as in Afghanistan and Northern Persia, Macqueen's bustard ranges during the winter into North-Western India and Southern Persia, from whence a few individuals straggle into Eastern and Central Europe. In India this species usually makes its appearance in September, departing again with the commencement of the hot season at the end of March or beginning of April. During its sojourn there it may be met with in pairs, or even solitary, although far more generally in small flocks; its favourite haunts being barren plains dotted here and there with small patches of covert. It is a silent bird, and chiefly a vegetable feeder; although its African cousin is said to be insectivorous. Preferring running to flying, Mr. Hume states that Macqueen's bustard, when on an open plain, has a habit of squatting close to the ground beneath a protecting bush or stone, and is at such times invisible even to a practised eye. Directly, however, it reaches taller covert, it raises itself to its full height in order to have a good view of its pursuers. In districts where camels are commonly employed, these birds are easily approached by a gunner mounted on one of those animals.

Florican. Nearly allied to the bustards are the Indian birds known as floricans, of which there are two species, namely, the Bengal florican (*Sypheotides bengalensis*), and the lesser florican (*S. aurita*). They are characterised by the moderately long, arched, and somewhat broad beak; the long legs, in which a considerable portion of the tibia is bare; and by the males (which are smaller than the females) undergoing a second moult in spring, after which the plumage becomes mostly black, with more or less white on the wings, while either a head-crest or ear-tuft is developed, and the plumes of the breast may become much lengthened. The hen-birds and young males are coloured much after the ordinary bustard type, and the former undergo no spring moult. In the case of the lesser florican, the male of which has an ear-tuft in place of a crest, it is known that the winter plumage of both sexes is alike, but there has been some doubt whether this is so with the larger species, although it probably is.

Florican are exclusively Indian birds, spending the whole of their time in the country, although the smaller species makes seasonal migrations from one district to another. The dark and conspicuous breeding-plumage of the male would of itself be sufficient to indicate a difference in the habits of these birds from those of other bustards. We find, indeed, it stated by Hodgson that although the Bengal species dwells exclusively upon plains, yet it never frequents "nude or cultivated plains. Shelter of nature's furnishing is indispensable to it, and it solely inhabits wide-spreading plains, sufficiently elevated to be free from inundation, and sufficiently moist to yield a pretty copious crop of grasses; but grasses not so thick nor so high as to impede the movements or vision of a well-sized bird that is ever afoot and always on the look-out. In spite of the exquisite flavour for which these birds are so famed, florican are by no means fastidious in their food, scarcely anything, from

lizards and snakes to young shoots and grass, coming amiss. They are, however, generally more herbivorous than carnivorous, although when the country is overrun with locusts they feed almost entirely on those noisome insects. Shy and wary in disposition, the florican, except on the rare occasions when he is in thick covert, is a difficult bird to approach within range, more especially as he is a strong flyer, and will carry a heavy charge of shot without harm. Unlike a heron, a florican flies with its head stretched out in front, and its legs tucked away beneath the body. Except in the breeding-season, when they utter a kind of cluck, florican are silent birds; and they are almost peculiar in that the two sexes, even during the pairing-time, live apart from one another in small companies. During the latter season, the troops of males and females come into the same neighbourhood; and when a male wishes to attract a temporary partner, he does so by going through an elaborate series of performances somewhat similar to the well-known pantomimic display of the cock-turkey, although more prolonged and energetic; the bird at times rising perpendicularly in the air, and humming in a peculiar deep tone. The female lays two eggs in an apology for a nest at the foot of a tussock in some thick grass-jungle; one egg being generally more richly coloured than the other. In winter these birds become extraordinarily fat; and at that season florican-shooting in the valley of the Ganges and other districts is a favourite sport, which may be pursued either on foot or from the back of an elephant."

THE THICKNEES.

Family *ÆDICNEMIDÆ*.

Although placed by many ornithologists with the plovers, the genus of birds typically represented by the European thicknee or stone-curlew (*Ædicnemus scolopax*) agrees with the bustards in the holorhinal skull, and the absence of a process at the lower end of the humerus, as well as in the three-toed feet; and we may accordingly follow Dr. Fürbringer in regarding the group as nearly allied to the latter. Externally the thicknees differ from the bustards by the presence of a tufted oil-gland, by the form and position of the nostrils, by the feet being webbed to the second joint, and by the second, in place of the third quill of the wing being the longest. Internally, they differ by the vertebræ of the back articulating by cup-and-ball, instead of saddle-shaped surfaces, and thereby resemble the plovers. Both have two notches on the hinder border of the breast-bone, and in both the metatarsus is reticulated all round. In the thicknees the beak is of moderate length, stout, and nearly straight, with a slight depression at the base, and the ridge of the upper mandible prominent; the long nostrils, which do not open in a groove, being placed near the middle of its length. The wings are of moderate length; the tail is graduated and formed of twelve feathers; and the legs are rather long, with a small part of the tibia bare. In all the species the eye is large, and the plumage mottled and striated with shades of buff and brown. The European species, which measures from 16 to 17 inches in length, is especially characterised by the conspicuous streaking of the breast; the presence of a dark bar across the lesser wing-coverts, and the white tips to the greater wing-coverts.

A common summer visitor to the heathy and other open districts of England, as well as to many parts of North-Western Europe, the ordinary thicknee is a permanent resident on the shores of the Mediterranean and in North Africa, as well as in Palestine and Persia; while in summer it also visits Turkestan and Western Siberia, and in winter migrates to India. India also possesses a resident variety, distinguished by its shorter wing; while the genus is represented by four species in Africa, by two in South America, and one in Australia.

The thicknees are largely nocturnal in their habits, and frequent much the



COMMON THICKNEE ($\frac{1}{2}$ nat. size).

same kind of country as the bustards, where they feed chiefly on worms, slugs, and insects, although they will also devour field-voles and reptiles. Their cry is loud and clear, although harsh, and is uttered with the greatest frequency on moonlight nights. A rapid runner, the common thicknee is likewise a bird of strong flight, frequently flying at some considerable height above the ground. The two blotched or streaked eggs are laid in England upon bare stony ground, with which their coloration harmonises so exactly as to render them practically invisible; but in India, where the number is occasionally three, the hollow is lined with a little grass. Both sexes take part in incubation; and if a sitting bird be disturbed, it will immediately run off, leaving the eggs to be protected by their resemblance to the surroundings. After running a short distance, the bird itself will generally lie

down and skulk, with its outstretched neck closely applied to the ground, and in this position is most likely to be mistaken for a large stone, unless its large eye should happen to attract the spectator's attention.

THE SERIEMAS.

Family *CARIAMIDÆ*.

The remarkable birds known as seriemas, which are represented by two species, assigned to as many genera, are confined to South America, and are some of those puzzling forms which render systematic ornithology so difficult and unsatisfactory. Various views have obtained as to the relationship of these birds, some ornithologists believing that they are allied to the secretary-vulture. On this view they were at one time placed among the Accipitrines; but as they possess the slit (schizognathous) palate, which is the older type, it is clear that if they have relation to the secretary-vulture, the latter (as Mr. Beddard suggests) must be transferred here, as being a more specialised form. Many ornithologists are, however, now of opinion that the nearest allies of the seriemas are the rails, bustards, and cranes; although there is still much divergence of view as to their exact position. Mr. Sclater's plan of placing them between the bustards and cranes, in near association with the trumpeters, which is followed here, must, however, be regarded as a more or less provisional measure; and it must be confessed that the inclusion of these two families in the Alectorides very seriously interferes with any attempt to define that group. In any case, a linear arrangement of the members of this and the allied order cannot possibly express their true relationships. While agreeing with the bustards in their holorhinal skulls, and the absence of tracts bare of plumage on the sides of the neck, the seriemas differ by the presence of four toes, and by the breast-bone having but one notch, as well as by the presence of a naked oil-gland; the latter being almost the only character by which the group can be differentiated from the rails, in which the oil-gland is tufted.

The Brazilian seriema (*Cariama cristata*), from South-Eastern Brazil, is a long-legged, and somewhat long-necked bird, of somewhat larger size than a bittern, and with a peculiarly upright carriage. The head is large, and the beak comparatively short, broad, and depressed, with its tip bent down somewhat after the fashion of that of a vulture. In the leg the tibia is bare for some distance, the metatarsus is covered in front with scutes, and the short toes are provided with strong curved claws, which also recall those of an accipitrine. A tuft of bristly feathers metatarises from the base of the bill, while there is also a short crest on the neck, and the feathers of the breast are lanceolate. The wing is short, although hard and powerful, with the fourth and fifth quills the longest, and the secondaries greatly elongated; the tail being long, graduated, and composed of ten feathers. The internal anatomy comes nearest to that of the cranes, with some approach to the rails. In general colour, the plumage is grey, each feather being marked with zigzag darker lines on the upper-parts; the elongated feathers of the head and neck are blackish brown; the quills are brown, with white bands on the inner

webs; and while the central pair of tail-feathers are uniform greyish brown, the other eight are blackish brown with white tips and roots. The iris of the eye is sulphur-yellow, the naked ring round the eye bluish, the beak coral-red, and the leg reddish brown in front, and redder on the sides. The female is more yellowish grey in colour, with a shorter crest on the neck. Burmeister's seriema (*Chunga burmeisteri*), from Argentina, now generally considered to represent a



BRAZILIAN SERIEMA.

distinct genus, is smaller and browner, with scarcely any tuft at the base of the back.

The most remarkable feature about the Brazilian seriema is its resemblance, both as regards form, carriage, and the coloration of the plumage, to the secretary-vulture: with which, as already mentioned, it has been associated by some ornithologists. If we are right in placing the bird in its present serial position, and associating the secretary-vulture with the Accipitrines, it is almost impossible to account for this resemblance in any satisfactory way; the circumstance that the

two birds are inhabitants of widely separated continents, putting mimicry out of the question. These birds are found in open districts in the interior of Brazil, where the ground is either clad with grass, or dotted over with low vegetation; and are generally found in pairs, or, during the breeding-season, in family parties of three or four. The coloration of the plumage harmonises well with that of the soil of the grassless districts. Mainly diurnal in its habits, the seriema often reveals its presence by its peculiar cry, which has been compared to the bark of a dog, and is most generally uttered in the early morning. In spite of being such an essentially cursorial bird, at night the seriema roosts on the bough of some tree. Its food consists chiefly of snakes, lizards, etc., on which account the bird is strictly protected by the Brazilians; and in this respect we may notice another resemblance to the secretary-vulture. Young rats, mice, worms, etc., also form a portion of the diet. During the pairing-time, which takes place in February, the males attract the females by a display analogous to that noticed under the head of the bustards. The nest of twigs is built in a low or moderately tall tree; and at the proper season contains a pair of pale-coloured eggs sparingly blotched with rusty-red. The down-clad young remain, it is said, a few days in the nest before they are carried down by their parents. Seriemas have laid in the London Zoological Gardens, and in two instances a young bird has been hatched, but in both the offspring has been devoured by its parent.



TRUMPETER.

THE TRUMPETERS.

Family *PSOPHIIDÆ*.

The trumpeters (*Psophia*), although less aberrant than the seriemas, form another South American family of somewhat doubtful affinity, which may be best placed here, as apparently connecting the seriemas with the cranes. While agreeing with the two preceding families in having oval (holorhinal) nasal apertures in the skull, they differ from both in that the breast-bone has no notch, while there are long tracts devoid of plumage on the sides of the neck, the number of toes being four. In appearance, these birds, of which there are several species, may be likened

to large, long-legged, blackish guinea-fowls; the head and beak being strikingly fowl-like. In these birds the body is stout; the neck of moderate length; the head of medium size; the beak short and swollen, with its base convex, and its tip bent down and compressed; and the leg is long, with much of the tibia bare; and the toes (of which the third and fourth are connected by a basal

membrane) furnished with sharply-pointed claws. The short wings have the fourth quill the longest; the tail is abbreviated; and the plumage is generally elongated above, while beneath it becomes downy. In the common trumpeter, or agami (*P. occipitans*), the general hue of the plumage is black, with purple and greenish reflections in certain parts, and steely blue on the lower neck and breast. The iris is reddish brown, the bare skin round the eye, as well as the leg, flesh-coloured, and the beak greyish white. The trumpeters are forest-haunting birds, living in troops, which may number as many as a hundred or two hundred head; and taking their name from the peculiarly clear and trumpet-like cry, which is uttered with widely opened beak, and lasts for fully a minute. To produce this deep-toned cry, the windpipe is specially modified, being elongated so as to extend under the skin of the abdomen. The trumpeters are poor flyers, nesting on the ground beneath the foot of trees, where they lay ten or more bright green eggs, and subsisting on fruits, corn, and insects. By the natives of Brazil these birds are tamed and domesticated for the purpose of protecting ordinary poultry; and in this state exhibit remarkable attachment and affection towards their owners, whom they follow about as closely as does a dog.

THE CRANES.

Family GRUIDÆ.

For a long period associated with the herons and storks, to which they present a marked outward similarity, the cranes differ widely from those birds in the structure of the palate, and the condition of their new-born young, as well as in many features of the anatomy of their skeleton and soft parts. Externally, cranes are characterised by their elongated legs and neck; generally long beak; the long wing, with ten primary quills; the plumed and elongated inner secondaries; the short, twelve-feathered tail; and the elevation of the small first toe above the level of the other three. In their skeleton they differ from all the preceding families of this order, in that the nasal apertures of the skull are in the form of long slits (schizorhinal); while they agree with the trumpeters in the absence of any notch in the breast-bone, and also in the presence of a very large aperture on the inner face of the lower end of the metacoracoid. Their cannon-bone resembles that of the ducks (see figure on p. 324) and flamingoes, in that the fourth trochlea is much shorter than the second—a feature which at once distinguishes this bone from the corresponding one of a heron or stork, in which the three trochlea are subequal (see figure on p. 290); and they differ from the bustards in the V-shaped furcula. In the presence of bare tracts, some distance up the neck, the cranes approximate to the trumpeters and rails; and they are further characterised by the oil-gland being tufted. Their plumage undergoes a double annual moult.

Cranes are now represented by about sixteen species, of which the greater number are confined to the Old World, while there are none in South America. Geologically, they are a somewhat ancient group, as remains referred to the existing genus have been obtained from strata of Upper Eocene age. This harmonises with the view of Mr. Beddard, by whom cranes are regarded as the

ancestral stock from which originated the rails, the *Limicola*, and most of the other birds treated in this chapter. It will, however, scarcely support his opinion that the herons are likewise descended from the cranes, seeing that a member of the latter existed in the London Clay, belonging to the lower part of the Eocene period; while it is scarcely likely that the cannon-bone of a heron could have been derived from that of a crane.

Although the members of the family have been arranged under several genera, it seems on the whole preferable to include all but the crowned cranes in the typical genus (*Grus*). In the ordinary cranes the long and straight beak is of moderate length, compressed and pointed, with the nostrils placed in a groove near the middle, and partially closed behind by membrane; the wings have the third quill the longest; a large part of the tibia is bare; the front of the metatarsus is covered with scutes; and the toes are short, with blunt nails. Generally there is a naked region about the eye and the base of the beak, while occasionally the entire head may be devoid of feathers. They are birds of large size, with the plumage either grey or white; and the elongation of the inner secondaries into a kind of false tail, gives them a peculiarly graceful appearance. Inhabiting extensive plains and swamps, and endowed with a powerful and long-sustained flight, most cranes are in the habit of performing migrations of great length. The windpipe being lengthened and arranged in coils within a cavity in the breast-bone enables them to utter, when alarmed or on the wing, a loud trumpet-like call, which is often audible at a distance of a couple of miles. Terrestrial in their habits,—it is said never perching on trees,—all the cranes build on the ground; their huge nests being placed in swamps, and the two or occasionally three eggs having a greenish ground more or less spotted with reddish.

Common Crane. The common crane (*G. cinerea*), which some three centuries ago nested in the British Islands, where it is now but a rare visitor, is the typical representative of the genus, and is characterised by the moderate length of the beak, which is high and sloping at the base, and straight in its terminal half, by the naked forehead, cheeks, and crown, and the general grey hue of the plumage. The naked part of the crown is reddish, the sides of the face and neck are white, and the elongated secondaries black. Young birds are nearly uniformly coloured. In length, full-grown specimens measure from 43 to 48 inches. The crane is widely distributed over Europe and Central and Northern Asia, visiting India, Persia, South China, and Northern Africa in winter, and passing through Japan on its migrations. Its breeding-range extends from the Arctic Circle in Western Siberia, to Italy and the Danube Valley. In North America this species is represented by the brown crane (*G. canadensis*). Cranes usually reach their breeding-grounds in Central Europe from the south at the end of March or April, while a month later they arrive in the Arctic regions. At all times gregarious, they migrate in vast flocks, which fly during the day at a great height in the air in a V- or W-shaped formation, each bird having its long legs stretched out behind. Writing of the flight of the American species, Dr Newberry observes that, under the orders of an experienced leader, "each bird keeps his place in the ranks; the advancing column now rides higher over some suspected



EAST AFRICAN BALEARIC CRANE.

spot, now falls along an open sandy reach, swaying meanwhile to the right or left. As it passes on, the individual birds are blended in the hazy distance, till, just before lost to view, the line becomes like an immense serpent gliding mysteriously through the air. When about to alight, fearful lest the shadows of the woods harbour unseen dangers, the cranes pass by the leafy intricacies where the ibises and other less suspicious birds feed, and choose a spot for the advantages it may offer of uninterrupted vision. By nature one of the most wary and discreet of birds, his experience has taught the crane to value this gift and put it to the best use. His vigilance is rarely relaxed, even when he is feeding, where less thoughtful birds would feel perfectly secure." This wariness renders the crane an exceedingly difficult bird to shoot; although the flocks frequenting the sandbanks of the Indian rivers may be readily approached in a boat, to the passing of which they are indifferent. Cranes feed regularly in the early morning, and also at other times in the day, and at night; while the vast quantity of grain a flock will consume, renders their visits by no means welcome to the cultivator. In sleeping, they invariably stand upon one leg, with the head and neck thrust in among the plumage of the back. In the bogs of Lapland the crane breeds in vast numbers; the nest being made of small twigs intertwined with long, sedgy grass, its diameter being about 2 feet, and its depth several inches.



COMMON CRANE.

The sarus crane (*G. antigone*) of India, which attains a length of 52 inches, together with the nearly allied Australian crane (*G. australiaca*), represent a second group of the genus, characterised by the longer beak, and by the head and neck being bare and covered for 3 or 4 inches with numerous crimson warts, from which grow a few scanty black hairs, most developed down the nape. Below this the neck is whitish grey, passing gradually into the blue-grey of the rest of the plumage, save the quills and inner webs of the tail-feathers, which are dusky slaty. In old birds, however, the elongated feathers become nearly white. The sarus is probably confined to India and Upper Burma, where it is always found in the neighbourhood of water, and is less gregarious than the common species, being generally seen in pairs. It is also far less of a grain-eating bird; while, except when driven by drought, it does not migrate. It is likewise tame and confiding, and so attached are the members of a

pair that on two occasions Mr. Hume has known the survivor pine away and die on the death of its mate; and he, therefore, recommends the sportsman, if he must kill one of these beautiful birds, always to shoot the pair.

White Crane.

Far more beautiful than either of the foregoing is the lovely white crane (*G. leucogeranus*), inhabiting a vast area in Central and Northern Asia, and migrating in winter to India, and probably other Oriental countries. It is characterised by having the head and neck only partially bare, and the whole plumage, with the exception of the black quills, white; the legs and naked skin of the face being red. North America also possesses a white representative of the genus in the whooping crane (*G. americana*). Mr. Hume observes that the Asiatic species "is the lily of birds; and stand in what position it may, the entire outline of its form presents a series of the most graceful and harmonious curves." This crane is found only where there are large sheets of shallow water, in which grow abundance of the rushes and other aquatic plants forming its chief nutriment. To show how deceptive is the appearance of cranes when seen from a distance, Dr. Coues relates that once, while prongbuck-shooting on the prairie, his companion and himself saw what they "took to be an antelope standing quietly feeding, with his broad, white stern towards us, and only about five hundred yards off. We attempted for at least fifteen minutes to 'flag' the creature up to us, waving a handkerchief on a ramrod in the most approved style. This proving unavailing, my friend proceeded to stalk the game, and crawled on his belly for about half the distance before the 'antelope' unfolded his broad, black-tipped wings and flapped off, revealed at length a whooping crane."

Other Species.

Among the numerous other members of the genus, space admits of reference to a few only. Of these the great wattled crane (*G. carunculata*), of South Africa, takes its name from the presence of two feathered flaps of skin depending from the chin; the general colour of the upper plumage being slaty grey, with the neck white and the remainder black. This crane goes about in pairs, which haunt one locality for years. The pretty little demoiselle crane (*G. virgo*), which breeds in North Africa, Spain, Southern Russia, and a large area of Central and Eastern Asia, while in winter it visits Central Africa and India, is distinguished from all the foregoing by its shorter beak, longer legs, and shorter neck, as well as by its inferior size, and the long lanceolate feathers of the neck and breast. In length this bird is only about 30 inches; and in colour the head, neck, and long breast-plumes are black; a tuft of loose white feathers extends outwards and backwards from the eye, while the general hue is purplish grey, with the quills black. In India, where it arrives late in October, this crane associates in flocks comprising from fifty to one hundred individuals, and frequents rivers rather than marshes. Being mainly a vegetable-feeder, it is very destructive to grain. The eggs are olive-green speckled with rufous; and, while the female is sitting, the male keeps constant guard. Although somewhat apt to wound its assailant with its sharp inner claw, this crane affords good sport with a falcon. Allied to this species is the much larger Stanley crane (*G. paradisea*)—often referred to the distinct genus *Tetrapteryx*—of South Africa; in which the whole plumage is leaden-blue, with the exception of the white crown of the head and the black extremities of the drooping secondaries. This species, although widely

distributed, is nowhere abundant, and is always found in pairs. It inhabits the Karru country, at a great distance from water, and is mainly carnivorous. In confinement it becomes extremely tame, although in the wild state it is very shy.

Crowned Cranes. The two species of African crowned cranes take their name from the narrow fan-shaped crest of twisted bristle-like feathers radiating from an elongated centre on the top of the head, by which they can be immediately recognised. They are further characterised by the stout body, moderately long neck, large head, and the moderate length of the beak, which is regularly conical; as well as by the broad wing, in which the fourth quill is the longest, and by the long legs and powerful claws. The cheeks are naked, and the feathers of the lower part of the neck hackle-shaped. Of the two species, the Balearic crane (*Balearica pavonina*) is mainly a North and West African form, while the Cape crowned crane (*B. chrysopelargus*) is from the southern districts. In it the general colour of the plumage is leaden-grey; the crown shows rings of white and yellow, with black tips to its component bristles; the bare parts of the face are red; the top of the head and chin are black, as is the tail; while the outer feathers of the wings are white and inner red, both being overhung by some loose yellow plumes. In the Balearic crane, while the front part of the naked area on the side of the face is red, the hinder portion is glistening white. The habits of both appear to be very similar to those of several of the true cranes; these birds associating either in pairs or small companies, and frequenting the neighbourhood of water. On the west coast the Balearic crane is domesticated by the natives.

THE COURLANS.

Family ARAMIDÆ.

Agreeing in its osteology and feathering very closely with the cranes, the Brazilian courlan or limpkin (*Aramus scolopaceus*) of tropical South America, is generally regarded as indicating a distinct family, although by some writers it is placed with the rails, from which it is at once distinguished by the slit-like nasal apertures of the skull. This bird, which measures 25 inches in length, is not unlike a large rail in general appearance; having a somewhat slender, straight beak, which is double the length of the head, and characterised by its extreme lateral compression. At the base of this beak the slit-like nostrils are situated in a groove extending along half its length. The legs and feet are long and slender; the lower half of the tibia being bare, and the compressed metatarsus covered with large scutes. The wings are broad and rounded. In colour, the Brazilian courlan is chocolate-brown, with purple and bronze reflections on the upper-parts, and some longitudinal white flecks on the head and sides of the neck. In the West Indies, Florida, and Central America its place is taken by the Florida courlan (*A. pictus*), distinguished by the white markings extending over the back, wing-coverts, and lower-parts. Courlan frequent swampy districts, and are remarkably rail-like in their habits, flying with the same slow, flapping flight, and, when flushed, soon dropping again. Among reeds, where they make regular paths, their movements are extremely rapid.

THE KAGU.

Family RHINOCHÆTIDÆ.

A remarkably grey-coloured bird from New Caledonia, known as the kagu (*Rhinochæetus jubatus*), forms the type of a distinct family nearly allied to the cranes, from which it is probably a specialised offshoot. Somewhat larger than a night-heron, the kagu is easily recognised by its moderately long beak, general grey colour, and the elongated pendent crest arising from the back of the head. While agreeing with the cranes in the form of the nasal apertures in the skull, and the absence of a notch in the breast-bone, the kagu differs by the presence of a powder-down patch on each side of the rump, and by the naked oil-gland; while it is unique among the group in having a bridged (desmognathous) palate. The plumage of the under-parts is reddish brown, as is the tip of the tail; the primary quills are barred with black, white, and rufous; and the beak, legs, and feet are orange. The kagu is a nocturnal bird, feeding upon worms, molluscs, and insects; but of its breeding-habits nothing is at present known. It is remarkable for the strange antics it performs; these being exhibited to a certain extent even in captivity, and recalling those of the cranes.

Madagascar An allied bird from Madagascar (*Mesites variegatus*), differs from
Kagu. the kagu, and resembles the other members of the group in having a slit (schizognathous) palate, and also in having the nostrils perforated instead of completely separated. It is further distinguished from that bird by the presence of a notch on each side of the lower border of the breast-bone, and by the more complex powder-down patches. The structure of the palate clearly shows that it is a less specialised bird than the kagu, from which it is separated as the type of a distinct family—the *Mesitidæ*. It may be mentioned that in the possession of powder-down patches these birds approach the herons; and it is in part owing to this feature that Mr. Beddard suggests a relationship between the two groups.

THE SUN-BITTERN.

Family EURYPYGIDÆ.

The last of these aberrant crane-like birds is the so-called sun-bittern (*Eurypyga helias*) of South America, which is structurally characterised by having a notch on each side of the breast-bone, a naked oil-gland, and powder-down patches, but shows no bare tracts on the sides of the neck. It is unique among the group in having helpless young. The sun-bittern is a comparatively small bird, measuring only 16 inches in length, with a long pointed beak, and a somewhat thin and elongated neck, and a peculiar transversely striped coloration of white, brown, and black. The head and neck are black, with a brown streak above the eye, and another running backwards from the angle of the beak to the neck; the chin and throat are white; the feathers of the back and scapular region are black striped with rusty red; the bastard-wing and wing-covers are black and white; the feathers of the neck barred with brown and black; those of the under-parts yellowish or

brownish white; the quills clear grey, mottled with white and black, and barred with brown; while the tail-feathers are similarly coloured, but distinguished by the broad bands of black passing posteriorly into brown. The iris is red, the beak waxy yellow, and the leg straw-coloured. This bird, which has not been inaptly compared to a large, broad-winged butterfly when in flight, always frequents the wooded banks of rivers, and is especially common on the Orinoco. Frequently solitary, although occasionally seen in pairs, the sun-bittern derives its name from



SUN-BITTERN.

its habit of basking in sunny spots, where it delights to spread out its plumage. Its food consists of flies and other insects, which are sought on the ground and low herbage; the bird at such times being in constant motion, with its head darting here and there, and but seldom taking to flight. In capturing insects it suddenly darts out its head with lightning-like rapidity, and scarcely ever fails in its aim. The nest is usually placed in a tree, at a distance of a few feet from the ground; the eggs being two in number, and of a greyish colour, with blotches and specks of reddish.

CHAPTER XIX.

THE PLOVERS, SANDPIPERS, SNIPE, JACANAS, AND GULLS — Orders LIMICOLÆ and GAVIÆ.

THE birds named above, together with certain allied forms, are all closely connected, but may be conveniently divided into two orders, of which the second is represented by the gulls and terns. Both groups agree with those treated in the immediately preceding chapters in having cleft (schizognathous) palates, and their young covered with down and active at birth. They differ, however, from all the preceding groups of birds in that the humerus (as shown in the figure on p. 295 of the third volume) is furnished with a projecting (ectepicondylar) process on the outer side of its lower extremity; while they are also characterised by the vertebræ of the back having their articular surfaces of a more or less cup-and-ball type, instead of saddle-shaped. In all of them the nasal apertures in the skull are slit-like (schizorhinal),¹ and in all the oil-gland is tufted, while on the upper back the spinal tract of feathers is forked. The whole group is a very extensive one, including considerably over three hundred species.

Plovers and Snipe. The plovers, snipe, sandpipers, coursers, etc., collectively constituting the order Limicolæ, are long-legged, and frequently long-billed, birds, characterised by the angle of the lower jaw being produced backwards and recurved, by the very general presence of basipterygoid processes on the rostrum of the skull, and by the feet being but seldom completely webbed, as well as by the absence of a certain feature connected with the bones of the wing which is characteristic of the gulls, and will be alluded to under that heading.² As a rule the breast-bone has two notches on its hinder border; and in some cases the third toe is serrated, while the third and fourth toes may be connected for some distance by a web, or all three front toes may have lobe-like expansions, or even a web. In all cases the first toe is small, and it may be elevated above the plane of the others, or even wanting. The wings are relatively long and pointed, with ten primary quills; while the tail is short, with the number of feathers variable. As a rule these birds undergo an autumnal and a spring moult; the young birds in their first plumage more or less closely resembling the adults in their summer dress. In their first autumn, the young begin to change into the second plumage, differing very little from the winter dress of the adults; the change taking place, however, not by a moult, but by an actual alteration in the colour of the feathers themselves, although a few battered feathers may be replaced. In the succeeding spring these

¹ Except in the black-backed courser (*Pluvianus*).

² Mr. Beddard (*Proc. Zool. Soc.*, 1890, p. 339) has formulated certain characters by which the skulls of the group can be defined from those of the cranes and gulls, but they are too abstruse to be quoted here.

immature birds assume the bright summer plumage of the adults, although they differ from the latter in having brighter wing-coverts; these feathers being only changed by the adults in the autumn, and thus permanently presenting the dull hues of the winter dress. In their habits all the members of the order are more or less migratory, and from this cause the winter distribution of the group is well-nigh cosmopolitan. Considerable diversity of view obtains as to the classification of the typical Limicolæ. By some they are divided into the three family groups of plovers, sandpipers and snipes, and pratincoles; the thicknees—here classed with the bustards—being added as a fourth. In his monograph on the distribution of these birds, Mr. Seebohm classed the whole of them (inclusive of the thicknees) in a single family, but in a later work he removed the thicknees and the black-backed courser to form one family, and the coursers and pratincoles, together with certain other birds, as a second family; both of which were placed next to the gulls. An equally marked diversity of view obtains as to the number of genera into which these birds should be divided; Mr. Seebohm being one of those who uses such terms in an extended sense. In both these matters we endeavour to take a middle course.

PRATINCOLES AND COURSERS.

Family *CURSORIIDÆ*.

The birds above-named differ from all the other members of the order in the want of basipterygoid processes on the rostrum of the under surface of the skull; while they are further characterised by having their oval nostrils opening on the surface of the beak without being sunk in a groove. In both these characters they resemble the thicknees, to which the black-backed courser presents a further approximation in the oval (holorhinal) nasal apertures of the skull. Externally, these birds may be distinguished from the thicknees and bustards by the presence of four toes in the pratincoles and by the metatarsus of the coursers being covered with scutes instead of reticulated scales. The absence of basipterygoid processes in these birds cannot justify their affiliation to the gulls; but it may be a question whether the pratincoles are rightly included in the same family as the coursers.

The forked tail and somewhat swallow-like appearance and habits of the pratincole (*Glareola pratincola*) render it, at first sight, somewhat difficult to believe that these birds are near relatives of the plovers; but closer observation will show that their comparatively long legs are adapted for running in the usual plover-like manner, and that it is only when on the wing hawking for flies that a superficial resemblance is presented to the swallows. Moreover, in certain members of the genus, the forking of the tail is well-nigh obsolete. As a group, these birds, of which there are ten species, are characterised by the presence of the first toe, and by the tail being more or less forked. The third toe is united to the fourth by a short membrane; and the first quill of the wings is the longest. By Mr. Seebohm they are regarded as specially modified allies of the coursers, retaining the first toe of the ancestral stock. Many of them show resemblances to the latter in their black under wing-coverts, white upper

tail-coverts, and the serration of the claw of the third toe. The group is confined to the Old World, where it is represented in Europe, Asia, Africa, and Australia; but the majority of the species are tropical. Like the coursers, the pratincoles feed almost exclusively on insects, although they differ from those allies in capturing their prey while on the wing. They frequent sandy plains or marshes, and the banks of rivers and lakes, as well as lagoons. At all times of the year they associate in flocks, although each male selects but a single partner. The common pratincole, which is the typical representative of the genus, is



COMMON PRATINCOLE ($\frac{1}{2}$ nat. size).

a small bird measuring from 9 to 10 inches in length, and inhabiting the warmer parts of Europe, Asia, and Africa; an occasional straggler rarely reaching the British Islands. In colour most of the upper-parts are clove-brown; the primaries nearly black; the upper tail-coverts white; the feathers of the deeply-forked tail white at the base, and elsewhere brownish black; the chin white; the throat pale buff, bordered by a black line ascending to the eye; the breast brownish buff; the under-parts and thighs buffish white; and the under wing-coverts and axillaries¹ chestnut. The especial characteristics of the species are the great length of the outer tail-feathers, and the chestnut axillaries. Nordmann's pratincole (*G. melanoptera*), which inhabits a large area

¹ The long and stiff under wing-coverts lying nearest to the armpit.

of Central and Northern Asia in summer, migrating in winter to South Africa, may be distinguished by its black axillaries; while the Indian pratincole (*G. orientalis*), ranging from India to North Australia, differs from the common species by the slight forking of its tail. The white-naped pratincole (*G. nuchalis*) and Büttikofer's pratincole (*G. megapoda*) may be cited as examples of an African group of the genus, in which the nape has a light-coloured collar, and the forking of the tail is very slight. Of the common species Mr. Seebohm writes that, although it sometimes frequents cultivated lands, "its favourite haunts are on the sandy tracts either near the sea or on the table-lands of the interior. The pratincole spends a considerable portion of its time in the air, hawking for insects like a gigantic swallow, skimming along with graceful motion, wheeling and darting about, chasing its prey in all directions. Upon the ground it is equally at its ease, and runs to and fro with surprising swiftness in spite of its short legs. Sometimes it even wades in the little pools with which its haunts often abound; frequently it flies at a considerable height, occasionally very low, just skimming along above the ground." Beetles and grasshoppers appear to constitute its favourite food. These birds do not make any nest, but lay their two or three eggs on the bare ground, in most cases without even taking the trouble of scratching a hollow for their reception. The eggs, which are generally laid in May, are nearly oval, and extremely fragile; their ground-colour varying from yellow to slaty grey, upon which are numerous streaks and blotches of dark blackish brown. Like many other members of the order, pratincoles endeavour to draw intruders away from their nests by simulating lameness or some other injury. An early migrant, this species usually reaches its breeding-grounds in Spain, France, the valley of the Danube, Asia Minor, or North Africa during April.

Although agreeing with the lapwings in the scutes covering their legs, the handsome birds known as coursers resemble the pratincoles in the absence of grooves in the beak for the nostrils, and likewise in the characters of the base of the skull; but they differ in the absence of the first toe, in the short and nearly even tail, and in their habit of taking their food while on the ground. The typical genus includes nine well-defined species, which are mainly restricted to the warmer parts of the Old World, exclusive of Australia; while the African black-backed courser represents a genus (*Pluvianus*) by itself, distinguished from all other members of the order by the oval (holorhinal) nasal apertures of the skull.

Cream-Coloured Courser. The best known and typical representative of the group is the cream-coloured courser (*Cursorius gallicus*), which inhabits the desert areas stretching from Northern and North-Eastern Africa, through Arabia, Persia, Baluchistan, and Afghanistan, to the Punjab, Sind, and Rajputana, and occasionally wanders into Britain and other parts of Europe. A somewhat aberrant member of the group, as regards coloration, this species is characterised by the general pale, wood-brown hue tinged with reddish buff of the upper-parts; the head being buff on the top, and grey tipped with black behind; a white, and below it a black streak running above the eye; the primaries and under wing-coverts nearly black; the secondaries dark brown with buff outer webs and white tips; the tail-feathers marked with a black spot near the end; the under-parts buffish white; and the legs

cream-colour. The nearly black axillaries and under wing-coverts, coupled with the buff outer webs of the secondaries, will, however, serve to distinguish it from all its allies, the small courser (*C. somalensis*) being smaller, with greyish buff axillaries. In length the cream-coloured courser varies from 9 to 10 inches.

Essentially a desert-bird, the cream-coloured courser (as may be seen in a case of desert-haunting birds in the Natural History Museum at South Kensington) harmonises so closely in coloration with its sombre surroundings as to be almost invisible at a short distance. In such districts, Mr. Seebohm states that "it lives



BLACK-BACKED COURSER ($\frac{1}{2}$ nat. size).

on the arid sand-plains or on the bare elevated plateaus, where scarce a tuft of scanty herbage or a bush is to be found. It loves to frequent the bases of sand-hills, and is sometimes seen in the miserable desert-pastures or amongst the sand-downs on the outskirts of the oases. In these dismal, uninteresting regions the courser trips about in pairs, or less frequently in little parties. If it is not exactly a shy bird, it appears to be a very wary one, and runs quickly off to conceal itself as the traveller approaches. It prefers to run like lightning over the sand rather than to take wing, every now and then pausing for a moment to look warily around to see if it is still pursued. When alarmed, it often runs off and conceals itself either by squatting close to the sand, or hiding under a stone or tuft of herbage, where its sand-coloured plumage effectually conceals it from view.

It generally runs a little distance before taking wing, and seldom seems to fly very high. If a flock be observed, they are usually seen scattered up and down the sandy tract, not feeding close together. When danger threatens, each looks out for itself, taking refuge in the nearest available cover, or crouching flat down on the sand." The food of this bird consists of insects and their larvæ, more especially the swarms of grasshoppers frequenting its haunts. It is reported to generally lay its two or three eggs in a hollow of the ground, which may be a natural one or excavated by the bird itself; but in the Punjab it may nest among stubble or beneath tussocks of grass. The eggs have an ochraceous buff ground-colour, blotched and speckled with buffish brown, and marbled with greyish veinings which appear to underlie the darker colours.

Black-Backed This species (*Pluvianus ægyptius*) differs, as we have seen, in
Courser. the character of the nasal region of the skull from its allies, and is on this account referred to a distinct genus. Externally, it may be recognised at a glance by its uniformly black back and scapulars, the black also extending as a band on each side of the breast, running forwards as a streak below the eye to the beak, and crowning the summit of the head. It resembles Jerdon's courser (*C. bitorquatus*) of India, in having white bands across some of the primary quills, and also in the absence of serrations on the claw of the third toe; while in the relative shortness of the metatarsus it approaches Lichtenstein's courser (*C. senegalensis*) of tropical Africa, in which the serrations of the claw of the third toe may also be sometimes wanting. An accidental visitor to Spain, Algeria, and Palestine, the black-backed courser inhabits the Nile Valley, from Cairo to Khartum, and thence ranges across Central Africa to the Gabun and Angola.

This courser, often termed the black-headed plover, is very common on the banks of the Nile, where several pairs may often be seen on a single sandbank; and brings itself under notice by the loud chattering cry it utters every time it takes wing. The most remarkable peculiarity in its habits is its custom of burying its eggs in moist sand where they undergo incubation, the trait having been verified by Captain Verner during the Sudan expedition. That gentleman on two occasions had the good fortune to come across a clutch of three eggs thus buried, in the second instance having seen the bird at work. A relative also noticed that in another case one of the birds damped the sand round the eggs by first wetting its breast at the water's edge, and then running to squat down for a couple of minutes. The action of the sun on the damp sand gives rise to a bleaching process in the eggs, which in their regularly oval contour resemble those of the cream-coloured courser.

THE PLOVER TRIBE.

Family CHARADRIIDÆ.

The rest of the more typical members of the order may be included in the family *Charadriidæ*, of which the essential feature is that the rostrum on the base of the skull is furnished with basipterygoid processes. This family may be subdivided into three subfamilies, of which the first is represented by the plovers,

dotterels, and lapwings. While agreeing with the pratincoles and coursers in having the third and fourth toes connected by a web at the base, these short-billed birds of the subfamily *Charadriinae* differ in that the nostrils are situated in a groove extending considerably in advance of the basal fourth of the beak.

**The Ringed
Plovers.**

The plovers of the genus *Ægialitis* and the two following genera may be distinguished from all other forms by the peculiar shape of the beak, coupled with the circumstance that in the sharply-pointed wings the first quill is the longest. As regards the beak, this, after tapering regularly for about half its length, swells out suddenly both above and below near the tip. In this character these birds resemble the lapwings, from which they are distinguished, not only by a difference in the relative lengths of the quills of the wings, but likewise by the circumstance that the two central tail-feathers are of a uniform brown colour



COMMON RINGED PLOVER.

for more than two-thirds their length, without any white at their base, and also by the metatarsus being reticulated. Of plovers in general, Mr. Seeböhm writes that they inhabit almost every description of country, "from the bare mountain tops to the richly cultivated lands, the open moors and commons, and the seashore. During the breeding-season they are more or less sociable, and in winter often congregate in large flocks. They run and walk with ease, and their flight is powerful, moderately quick, and well sustained. Their usual note is a loud and shrill whistle,

often considerably modulated, during the pairing-season, into a not unmusical trill, uttered as the bird takes a short flight in the air, after the manner of the pipits." All feed on insects, worms, molluscs, etc., and they nest either in some depression on the ground, or on shingle or sand; while their eggs, like those of lapwings, are generally four in number and of the well-known pear shape, with a ground-colour of some shade of buff, upon which are brownish black blotches and streaks and underlying markings of grey. The ringed plovers derive their name from the dark ring or gorget round the neck of the majority of the species, a white ring being also generally present above the dark one; but in one species this only forms a collar on the back of the neck, and in another both are wanting. Obviously, therefore, this dark ring (which is black in the breeding-dress of the males) will not serve to characterise the genus. According to Mr. Seeböhm, the group may be best defined by the absence of the first toe, the dark transverse band near the end of the tail-feathers, and the white abdomen and axillaries; the two latter features serving to distinguish them from the three-toed dotterels, which also have a dark band across the tail. The beak is always much shorter than the head, and generally pale-coloured at the base; while the legs and feet are invariably of

a light tint. Moreover, while the central pair of tail-feathers have but very small white tips, in the other feathers of that part the size of this white tip gradually increases to the outermost one.

The ringed plovers include at least twelve species, which are distributed over the greater part of the world except South America, although but poorly represented in India and the adjacent countries during the breeding-season. The majority frequent the banks of rivers and lakes, rather than the coast, laying their eggs in a mere hollow of the ground. The prettily coloured common ringed plover (*Æ. hiaticula*), of which there is a larger and a smaller race,—the former more common in the British Islands and adjacent parts of Europe,—belongs to a group of the genus in which the central half of the outer webs of the innermost primaries is white; while it is specially characterised by the whole of the under-parts being white, with the exception of the lores and a single broad band across the breast both of which are black in adult males; and also by the web between the third and fourth toes extending only to their first joints. In length it varies from 8 to 7 inches. The larger race is the only one definitely known to breed in Britain, while the smaller one breeds in Greenland, Iceland, Novaia Zemlia, etc., as well as in Western Siberia, Turkestan, and North Africa; in summer it visits the greater part of Europe northward of the Alps, and in winter it spreads over the basin of the Mediterranean and Africa. In North America it is represented by the half-webbed ringed plover (*Æ. semipalmata*), differing by the web between the third and fourth toes extending to their second joints, and likewise by the presence of a shorter web between the second and third toes. The little ringed plover (*Æ. minor*), which is an occasional visitor to Britain, and breeds over the greater part of Europe and Asia north of the Himalaya, wintering in India and Africa, may be taken as an example of the second group of smaller species characterised by the dark outer webs of the inner primaries. It is specially distinguished by the scapulars being coloured like the back, and by the outer tail-feathers being less than a quarter of an inch shorter than the central pair, the latter feature distinguishing it from Hodgson's ringed plover (*Æ. placida*) of India. In length this species is 6½ inches, but a resident Indian variety is smaller. Another well-known representative of the first group is the American kill-deer plover (*Æ. vocifera*), which measures from 9 to 10 inches in length, and is characterised by the chestnut-buff colour of the lower back, rump, and upper tail-coverts. In England the breeding-season of the common ringed plover commences in March, and the flocks which have collected during the winter begin to break up into pairs; the eggs are not, however, laid till April, May, or June, and have been found as late as August. When their breeding-grounds are visited, the birds exhibit but little anxiety, as their protective coloration renders the eggs very difficult of detection.

The Sand-
Plovers.

The sand-plovers, as typically represented by the Kentish plover (*Ægialophilus cantianus*), while agreeing with the ringed plovers in the absence of the first toe, and their white abdomen, are distinguished by the lack of a distinct dark band near the end of the tail-feathers, and also by the white bases of the outer webs of the innermost primary quills; the latter feature forming a white wing-patch somewhat similar to that occurring in the common ringed plover and its allies, although smaller. There are some twenty species of sand-

plovers, distributed over the greater part of the world except the Arctic regions, but more numerous in the Southern than the Northern Hemisphere. The Kentish plover, which breeds on the shores of Kent and Sussex, as well as on the coasts of the seas and salt-lakes of a great portion of Europe and Asia, visiting India and Africa in winter, may be recognised by the white collar round the neck, the dark patch on each side of the breast, the presence of a white area on the central portion of the shaft of the third primary quill, and the black legs; the length varying from 6 to 7 inches. Beyond the circumstance that they are all shore-birds, mainly frequenting open stretches of sand, upon which the eggs are laid, there is nothing calling for notice in the habits of this genus. The wry-billed plover (*Æ. frontalis*), of New Zealand, is unique in having the beak bent on one side.

True Plovers and Dotterels. By many ornithologists the dotterels are regarded as belonging to a genus (*Eudromias*) distinct from that containing the true plovers, but this is not the view adopted by Mr. Seebohm; and, as we are in the main following his system, we will here rank them with the plovers (*Charadrius*). The black under-parts of the dotterels appear indeed to exhibit relationship with some of the true plovers; this affinity being confirmed by the coloration of the eggs and the mode of nesting in the two groups. Nevertheless, the inclusion of all these forms in a single genus renders its definition a somewhat difficult matter. Having the general characters common to all the plovers, the members of the present genus may be recognised, according to Mr. Seebohm, by the possession of either one or two of the following features, namely, coloured axillaries, the presence of the first toe, a barred tail, or a dark patch on the abdomen. The beak may be rather longer than in the ringed plovers, but in both groups there are twelve feathers in the tail. Whereas, however, the majority of the species (about a dozen in number) agree with the two preceding genera in the absence of the first toe, that digit is present in four members of the genus. The group is most numerous represented during the breeding-season in the Arctic region, although some species nest in Temperate Europe and Asia, and others in Australia and South America; while during the winter these birds are dispersed over the greater portion of the globe. Unlike the members of the two preceding groups, the true plovers and dotterels inhabit open plains, mountains, and the Siberian tundras, as well as the shores of seas and lakes, and in this respect resemble their cousins the lapwings. In constructing slight nests for the reception of their four eggs, they likewise differ from the foregoing members of the family.

Plovers. The handsome and well-known bird termed the golden plover (*C. pluvialis*) is the typical representative, not only of the true plovers, but likewise of the entire genus and family. The true plovers, in which the first toe may be absent or present, are collectively characterised by the barred tails of the adults, the black under-parts in the breeding-dress, and the minute reticulation of the scales of the metatarsus. The golden plover, which attains a length of from 10 to 11 inches, is specially characterised by having but three toes, all the tail-feathers barred, and the axillaries white. In the breeding-dress of the adult male the upper-parts are nearly black, spotted with yellow; the forehead, a stripe above the eye, the sides of the neck, the axillaries, thighs, flanks, and under tail-coverts being white, with some dusky mottling; while the lores, chin, throat, breast, and

abdomen are black. The beak and legs are nearly black, and the iris is dark hazel. In the female the white parts have more dusky mottlings, and the dark under areas are browner, with some white feathers. Breeding locally in Britain and some other districts of North-Western Europe, this species has its chief nesting-haunts on the fields of Norway and the Russian and Siberian tundras; while in winter it frequents the shores of the Mediterranean, whence it wanders as far south as the Cape. To the east of the Yenesei it is replaced by the Asiatic golden plover (*C. fulvus*), distinguished by its grey axillaries; this species wintering in India, Australia, and the intermediate regions, and being replaced in America by a variety whose breeding-grounds are in the northern half of that continent. The second British representative of the group is the grey plover (*C. helveticus*), which is a rather larger bird, easily distinguished by the presence of a small first toe and the black axillaries; its breeding-range comprising the circumpolar tundras beyond the forest regions, and its winter range including Southern Europe, Africa, India, Japan, Australia, Brazil, and Peru. It resembles the golden plover in undergoing a marked seasonal change of plumage.

The golden plover, whose habits may be taken as typical of those of the group, is a bird of powerful and sustained flight, flying when in flocks in a more or less wedge-shaped formation, and wheeling in the air, especially before pitching on the ground, in a peculiarly graceful manner. On the ground it is also equally active, running and walking with speed, and frequently wading breast-deep in the shallows. Frequenting in summer the open moors, heaths, and tundras, in winter it resorts to low-lying marshes, meadows near the sea, and flat coasts; while its Asiatic ally is at that time frequently to be seen on the marshy lakes (*jhils*) of India. To a certain extent gregarious, even in the breeding-season, the golden plover collects in immense flocks in autumn preparatory to its migration, and during the latter period moves in companies which may be numbered by thousands, Mr. C. Dixon stating that, towards the end of October and beginning of November, he has known these birds "fly over from Continental Europe in almost one incessant stream, the flocks succeeding one another so quickly as to form a nearly unbroken throng." This plover feeds largely by night, but the nature of its food naturally varies somewhat with its seasonal change of habit, in summer consisting largely of insects, and in winter mainly of various small aquatic animals. In Britain the breeding-season commences about the middle of May, the nest being formed of dry herbage, with scraps of heath and moss, and situated either in a hole in the ground, on a tuft of herbage, under the shelter of a bunch of cotton-grass, or, more rarely, among short grass or heath. The eggs are very like those of the lapwing, from which they may be distinguished by their superior size, the absence of olive in their markings, and their brighter colour. The parent birds are adepts in the art of inveigling away the intruder from the neighbourhood of their eggs or young, the latter scattering themselves in all directions at the first alarm, to seek protection by skulking among the surrounding herbage.

The dotterels, of which the typical forms have but three toes, and, as already said, are frequently separated under the name of *Eudromias*, are smaller birds, forming a somewhat heterogeneous group, with but few distinctive common characters, although none of them have the tail barred.

The common dotterel, which attains a length of 9 inches, is one of the species resembling the typical plovers in having the abdomen of the adult in the breeding-plumage black, and may be recognised by this feature, coupled with the rich chestnut hue of the lower breast at the same season, the grey axillaries, and the circumstance that the beak is shorter than the third toe without the claw; the two latter features serving to distinguish this prettily-marked bird at all seasons. Although both sexes are not very much unlike, the female is somewhat the larger and handsomer of the two, being brighter coloured, and having more black on the abdomen; but in both there is the same white crescent, narrowly bordered with black, on the breast. The dotterel chiefly breeds on the northern tundras, beyond the limits of forest, of Europe and Asia, although a few nest in the northern parts of Britain, while it winters in Palestine, Egypt, and North Africa; a few individuals remaining on the northern border of the Mediterranean. An allied form is the Oriental dotterel (*C. veredus*), which breeds in Mongolia, and winters in the countries from Java to Australia; this species being distinguished by its shorter third toe, and the white abdomen in the summer dress. "The dotterel," observes Mr. Seebohm, "is essentially a bird of the fallows, and where there is no cultivated land it picks out the dry, bare places on which to feed. It avoids the swamps, and is seldom or never seen on the banks of rivers or lakes. The seashore has no attractions for the dotterel, nor does it seem to care for pasture; but it loves to trip amongst clods of earth, and seeks its food on the bare mountain-sides. There it is very tame, and is easier to approach than any other species of plover with which I am acquainted." From this tameness the bird derives its title—the name "dotterel" signifying a foolish or dull person. Dotterels migrate in even greater numbers than the true plovers, and from the circumstance that out of the tens of thousands that pass in spring from Africa to the Arctic tundras scarcely any are seen to alight in the intervening countries, it is surmised that this tremendous journey is accomplished in the course of a single night. Dotterels formerly bred in the neighbourhood of Carlisle. The nest is merely a slight hollow in the ground, or among moss or grass, in which three eggs are deposited. Curiously enough, the male dotterel takes by far the larger share in the work of incubation and rearing the young; this being not unfrequently the case in those rare instances where the female is superior in size and brilliancy of coloration to her lord and master. The reason for such a total change in the relations of the two sexes remains, however, a complete mystery.

The three members of this group in which the first toe remains are the Falkland Island dotterel (*C. modestus*), the Magellanic plover (*C. sociabilis*), and the Australian four-toed dotterel (*C. rufiventris*).

Lapwings.

Closely allied to the plovers are the birds commonly known as lapwings or green plovers, some of the distinctive features of which have been already noticed on p. 476. These birds differ from the plovers in having at least the basal third of the middle pair of tail-feathers white; by the wings, which may or may not be armed with a spur, being blunt, with the first and second quills shorter than the third and fourth, which are of nearly equal length; and by the front of the metatarsus being covered with large scutes, instead of small reticulated scales. The head is often provided with a crest.



GIANT PENGUINS.

The first toe may or may not be present, and the presence or absence of that toe affords grounds for dividing the group into two sections, which some writers (whom we follow) consider worthy of generic distinction; the four-toed types being termed *Vanellus*, while those with but three toes are designated *Hoplopterus*. About fourteen species of lapwings are generally recognised; these being distributed over the temperate and tropical portions of Europe, Asia, Africa, and South America. These birds derive their common English name from their slow and flapping flight, which is at the same time graceful, and often very erratic. In general habits they closely resemble the plovers, but most of them are gregarious at all seasons; and in summer their favourite haunts are open downs,



COMMON LAPWING ($\frac{1}{2}$ nat. size).

moors, fallows, or marshy commons, although some kinds seek the neighbourhood of the coast in winter. Partially nocturnal, their food comprises insects, worms, and molluscs; and their well-known cries are loud and frequently melancholy in tone. Their nesting-habits and eggs are similar to those of the plovers.

Four-Toed Lapwings. The common lapwing (*Vanellus cristatus*) is the typical representative of its genus, and such a familiar bird as to need but little in the way of description. Belonging to a group in which there is no spur on the wing, this species is specially distinguished by the combination of a metallic lustre on the green plumage of the upper-parts, and the absence of white on the wing-coverts; while it is also the only member of the two genera in which both the upper and under tail-coverts are chestnut-buff. The crest is of great length. This handsome bird has the widest geographical range of any of the lapwings, extending

from Britain to Japan, and also occurring on the two sides of the American Continent in Alaska and Greenland; while in winter it migrates as far south as Northern Africa, Persia, and India. Resident throughout the year in the British Islands, in the Arctic regions of Scandinavia and the tundras of Siberia it is but a summer visitor. Not only is this bird the most widely distributed member of the genus, but the species is probably the one most numerous in individuals, as is attested by the enormous number of its eggs which reach the English market where they form by far the greater proportion of those sold as plovers' eggs. When associated in their enormous winter flocks, lapwings are among the most difficult of birds to approach, more especially from their constant habit of changing their ground. When the breeding-place is approached, the old bird, writes Mr. Seebohm, "glides steadily off the nest, runs a little distance, then rises in the air to flutter restlessly above the intruder's head, uttering its harsh, wailing cries. So closely do the eggs resemble surrounding objects in colour that it is no easy task to find them; but the old birds very often betray their whereabouts by hovering above them; at these times the birds are easily approached, often coming within a few feet. When the young are hatched, they soon follow their parents in search of food. If menaced by danger, the old birds quit their offspring at once, fly into the air, or reel and tumble along the ground as if wounded, while the nestlings scurry off in different directions and hide themselves among the herbage."

As an example of a species of this genus we may refer to the Cayenne lapwing (*V. cayennensis*), and its variety the Patagonian lapwing, in which the crest is very small. These birds, which are known in the pampas by the name of *teru-teru*, generally live in pairs, and have a curious habit of indulging frequently in a kind of dance or march, which is described by Mr. W. H. Hudson. This observer writes that anyone watching a pair of these birds, will see an individual from another pair rise and fly to them. Advancing to receive their visitor, the pair place themselves behind it; "then all three, keeping step, begin a rapid, uttering, resonant drumming note, in time with their movements; the notes of the pair behind being emitted in a stream, like a drum-roll, while the leader utters loud single notes at regular intervals. The march ceases; the leader elevates his wings and stands erect and motionless, still uttering loud notes; while the other two, with puffed-out plumage and standing exactly abreast, stoop forward and downward until the tips of their beaks touch the ground, and, sinking their rhythmical voices to a murmur, remain for some time in this posture. The performance is then over, and the visitor goes back to his own ground and mate, to receive a visitor himself later on." For the truthfulness of these observations the present writer can vouch from personal experience. On the pampas these lapwings are a perfect nuisance, dashing up during the breeding-season almost into the face of the traveller, and then suddenly wheeling off with a sudden swoop, at the same time giving vent to their harsh and monotonous cry of *teru-teru*. This extreme boldness, and perfect fearlessness of man, is however, as was long ago remarked by Darwin, characteristic of most of the birds of the Argentine pampas.

Of the three-toed lapwings, among which there are some species with a wing-spur and others without the same, while the presence of a crest is likewise inconstant, we select as the best known example the Egyptian

Spur-winged lapwing (*Hoplopterus armatus*), which breeds in the valley of the Nile, in Senegambia, and probably also in the intervening districts of Central Africa, migrating in the spring to Palestine and some parts of South-Eastern Europe. It has large spurs, and may be distinguished from its allies by the greater wing-coverts being white, and the lesser ones brown; and it is also unique in having, when adult, the crown of the head, forehead, nape, chin, throat, breast, flanks, and legs, black. This bird is extremely common in Egypt and Nubia, where it frequents the banks of lakes, rivers, and canals, as well as marshes and swamps. The chief interest connected with this species is that it



EGYPTIAN SPUR-WINGED LAPWING ($\frac{1}{3}$ nat. size).

appears to be the bird alluded to by Herodotus as being in the habit of entering the open mouths of crocodiles for the purpose of feeding. For a long time it was considered that the black-backed courser was the bird in question, and that the whole story was a myth. The late Dr. Leith Adams gave, however, good reasons for regarding the zic-zac (as this bird is called by the natives) as being really the kind alluded to, while the recent observations of Mr. J. M. Cook strongly confirm the original story. The narrative of the latter gentlemen, in a somewhat condensed form, is as follows:—"Early in 1876," he writes, "I was on the Nile, between the first and second cataracts, and noticed on a large sandbank some crocodiles of considerable size, and several of the birds which are called by all the natives the crocodile-bird. As we had plenty of time, I decided that we would spend a few hours in watching the crocodiles and the crocodile-birds. For this

purpose, during the dark hours we had a small pit dug on the western side of the large sandbank, and about the peep of day the following morning we ensconced ourselves in the pit, with the intention of remaining until the crocodiles came on to the bank, as we believed they did every day, to bask in the sunshine and sleep. We watched patiently until about noon, when two large crocodiles came out of the water on to the bank, and apparently were soon asleep. Several crocodile-birds commenced flitting over them; and through our field-glasses we watched one bird, and saw it deliberately go up to a crocodile, apparently asleep, which opened its jaws. The bird hopped in, and the crocodile closed its jaws. In what appeared to be a very short time, probably not more than a minute or two, the crocodile opened its jaws, and we saw the crocodile-bird go down to the water's edge. As the sandbank was, I should say, at least half a mile across, and the bird's back was turned towards us, we could not see whether it vomited in the water or drank, but in the course of a few seconds it returned to the crocodile, which opened its mouth again, and the bird again entered. The mouth was closed, and in a short time was opened again for the bird to come out, and the same operation was repeated at the river bank. We saw the same bird enter the crocodile's mouth three times, and on three occasions run to the water to either vomit or drink. Having satisfied our curiosity, and knowing that we could not bag the crocodile, and there being two or three crocodile-birds about, I took aim and shot two of them. I could not assert positively that I shot the actual bird that we had seen go in and out of the crocodile's mouth, but one of the birds was presented to the Leicester Museum, and the other I have in a case at home." The so-called crocodile-bird was subsequently identified with the present species.

Wattled Lapwings. That cordially hated Indian bird the did-he-do-it (so called from its cry, which alarms all worthier game in its neighbourhood), or red-wattled lapwing (*Lobivanellus indicus*), may be taken to represent a large group of species inhabiting the warmer parts of the Old World, all of which are distinguished from the members of the two preceding genera by the presence of a fleshy lobe or wattle between the eye and the beak. Like the other lapwings, they may be divided into two groups, according to the number of the toes; the four-toed species constituting the genus *Lobivanellus*, while those in which the first toe is absent are separated as *Sarciophorus*; the Indian yellow-wattled lapwing (*S. bilobus*) being a familiar example of the latter group. The red-wattled species, frequently termed the bronze-winged mottled lapwing, which may be distinguished by the broad white band at the end of the tail, ranges from Southern Persia and Baluchistan all over India and Ceylon, where it is one of the commonest of birds; while in Gilgit, and probably Kashmir, it occurs only as a summer visitor. To the east of the Bay of Bengal it is replaced by a variety differing by having a white collar on the back of the neck behind the black of the head and fore-neck. As there is nothing particularly noteworthy in the habits of these lapwings, we pass on to the consideration of the second subfamily.

Stilts. The beautiful, long-legged birds known as stilts and avocets are our first representatives of the *Totantinae*, or second subfamily of the group under consideration, all the members of which are characterised by the nostrils being situated in the basal fourth of the more or less elongated beak, and

by at least the third and fourth toes being united at their bases by a membrane. The genera of this subfamily are largely characteristic of the Arctic and Temperate regions of the globe; the great majority having a circumpolar distribution.

The stilts, or stilt-plovers (*Himantopus*), derive their title from the extreme elongation of their slender legs, which recall those of the jacanas and parras. Belonging to a group of four genera, collectively characterised by the metatarsus being reticulated on all sides, the stilts are specially distinguished by the length of the metatarsus, which is equal to or greater than that of the long, slender and nearly straight beak, by the absence of the first toe; the slight webbing of the front toes, and the black plumage of the upper-parts. The wings of these birds are long and pointed, with the first quill the longest; the tail is rounded; a large portion of the tibia is bare; and the bill is slightly curved upwards at the point, with the nostrils at the sides of its base slit-like in form. The genus includes six well-defined species and a variety, which are distributed over Southern Europe and Asia, Africa, Australasia, and a considerable part of America, although wanting in the northern regions of that continent. A single species, the black-winged stilt (*H. candidus*), which is an occasional visitor to Britain, inhabits Southern Europe, and may be distinguished from its allies



HEAD OF CHILIAN STILT.
(From Sclater, *Proc. Zool. Soc.*, 1873.)

by having in the adult condition the whole of the head and neck white, although immature examples have some black on the crown of the head and back of the neck. In the adult male, which measures from 13 to 14 inches in length, the upper-parts and wings are black, glossed with green on the back; the upper tail-coverts and tail are pearly grey; while the whole of the rest of the plumage is pure white; the beak being black, and the iris, legs, and feet crimson. Resident in India, this bird visits Burma in the winter, and straggles as far east as New Zealand; while in summer it resorts to Southern Europe, and is found at all seasons in many parts of Africa. One of its nearest allies is the Australian stilt (*H. leucocephalus*), in which the back of the neck is black, with a white collar separating it from the dark area of the black. Of the South American species, the Chilian stilt (*H. brasiliensis*), which winters in Brazil, has the black of the neck extending forwards beneath the eye.

Stilts are essentially marsh-birds, although they always keep to open water, in which they may be seen standing up to their knees on the look-out for insects, molluscs, tadpoles, etc.; their most favourite resorts being lagoons, where the water is brackish. They are generally found in small parties, and whether on land, in the water, or in the air, are remarkable for their graceful appearance. They walk

with a deliberate step, which may be quickened into a run; and they fly straight but slowly, with the neck outstretched and the long legs extended beyond the tail. Ordinarily silent and far from shy, in the breeding-season these birds utter a cry resembling the syllables, *kit, kot, kit*, and are most assiduous in endeavouring to lure the intruder away from the vicinity of their nests. In India stilts breed in enormous numbers, laying most of their eggs in June, although in Spain they are at least a month earlier; one of the favourite haunts being some salt-works near Delhi, where the brine is distributed in shallow pools over acres of ground. The nest varies according to the nature of the locality, being more bulky in moist



AVOCETS ($\frac{1}{2}$ nat. size).

situations, and sometimes even floating on the water. The four eggs are pear-shaped, and of a buffish brown ground-colour, upon which are blackish brown streaks and blotches, with underlying markings of grey.

Avocets.

Although closely connected with the stilts by two aberrant species, it seems on the whole convenient to separate the still more graceful avocets as a genus, under the title of *Recurvirostra*, the sole distinctive character applicable to all the members being the more fully webbed feet. In the more typical forms, however, such as the common avocet (*R. avocetta*), the beak is strongly curved upwards at the extremity, the webbed feet are furnished with a small first toe, and the plumage of the upper-parts is pied. The connection with

the stilts is formed in one way by the Peruvian avocet (*R. andina*), in which the plumage of the upper-parts is black; and in another by the banded avocet (*R. pectoralis*), in which, while the plumage is pied, the beak is straight, and the first toe wanting. The avocets include five species, having much the same distribution as the stilts, with the exception that none breed in India or the adjacent countries. The common avocet, which was formerly a frequent visitor to the fenny districts of England, is characterised in the adult dress by the black upper surface of the head and hinder part of the neck, and the white innermost secondaries; the young birds in their first plumage have the dark parts of the plumage brown, and the secondaries barred with white. The total length of the bird is 18 inches. Owing to drainage, the European breeding-places of the avocet are now restricted to certain islands off Denmark and Holland, the marshes of Southern Spain, the delta of the Rhone, and the lagoons of the Black Sea; but to the eastwards it nests in Palestine, Persia, Turkestan, the south-west of Siberia, etc., and also in Africa. In winter these birds resort to India, China, and, more rarely, Japan; and they reach their European breeding-places in April and May, and depart in September. The North American avocet (*R. americana*), ranging from the Great Slave Lake to Texas, differs at all seasons by its white secondaries, and in the breeding-plumage by the pale chestnut hue of the head and neck. The habits of the avocets are so similar to those of stilts, that one account will serve for both; and we may accordingly close our notice with the following description of the appearance of a colony of these birds on the Arkansas, observed by Dr. Coues. "The avocets," he writes, "walked leisurely about, up to the belly in water, with graceful, deliberate steps, each of which was accompanied by a swaying of the head and neck. When approached too closely, they rose lightly from the water, uttering their peculiar cries, flapped leisurely to a little distance, and again alighted to pursue their peaceful search for food, forgetting, or at least not heeding, their recent alarm. As they rose from the water, their singular long legs were allowed to dangle for a few moments, but were afterwards stretched stiffly backwards, as a counterpoise to their long necks: and, thus balanced, their light bodies were supported with the greatest ease by their ample wings. When about to re-alight, they sailed without flapping for a little distance, just clearing the water, their legs again hanging loosely; as they touched the ground, their long wings were held almost upright for an instant, then deliberately folded, and settled in place with a few slight motions."

Much more stoutly built, and with shorter and thicker neck and legs than the stilts, the oyster-catchers, or sea-pies, may be diagnosed by the metatarsus being inferior in length to the nearly straight and rather thick beak. The long and pointed wings extend, when closed, to about the extremity of the squared tail: the beak is somewhat compressed and truncate at the tip, with considerable specific variation in outline; but a small portion of the tibia is bare; the reticulated metatarsus is short and stout; and the first toe is wanting. The common oyster-catcher (*Hematopus ostralegus*), which is a resident in the British Isles, is the typical representative of the genus, and while four other species resemble it in their pied plumage, the remaining two are black. The distribution of the genus is almost world-wide. Agreeing with all the other Old World forms in its dull crimson-red legs, the European species is specially characterised by the

lower part of the back, rump, and upper tail-coverts being white, and by the white pattern on the primaries being well marked on the outer webs of the fourth and fifth quills of that series. In this species the beak and region round the eye are orange; all the upper-parts are black, with the exception of the lower-back, rump, and upper tail-coverts, the basal portion of the tail-feathers, and a band across the wing comprising the greater wing-coverts and some of the secondaries, which are white; the primaries being also more or less marked with the latter colour. With the exception of the chin, throat, breast, and a few of the wing-coverts, all the under-parts are white. In length, this bird varies from 16 to 17 inches. Migratory in many districts, this species inhabits the whole of Europe, and a considerable



COMMON OYSTER-CATCHER ($\frac{1}{3}$ nat. size).

portion of the eastern half of Asia, as well as North Africa; ranging to the Arctic Circle, and visiting Western India in winter. In Japan, Northern China, Amurland, etc., it is replaced by the Japanese oyster-catcher (*H. osculans*), distinguished by its long beak, and the white on the primaries not appearing till the sixth quill; while in the New World its place is taken by the American oyster-catcher (*H. palliatus*), in which (as in all the New World species) the legs are pale flesh-coloured, while the upper-parts below the black neck are, with the exception of the greater wing-coverts and tail-coverts, brown instead of black. The black species are the Australian black oyster-catcher (*H. unicolor*), represented by a variety in Africa; and the American black oyster-catcher (*H. niger*), characterised by the

great compression of its large beak, which in the South American race tends to curve upwards at the tip.

Mainly coast-birds, although frequently ascending rivers for a long distance inland, oyster-catchers derive their name from their habit of feeding largely upon bivalve molluscs, the shells of which their compressed beaks are admirably adapted for prising open. The same efficient instrument serves for detaching limpets from their hold on rocks, and extracts marine worms and other creatures from their burrows in the sand.

Ibis-Billed Oyster-Catcher. Nearly allied to the members of this genus is a remarkable bird from Central Asia (*Ibidorhynchus struthersi*) distinguished by the beak being curved down in the manner of that of an ibis. The beak and feet are red, the front of the head black, and the general tone of the remainder of the plumage olive.

Curlews and Whimbrels. Although evidently related to the preceding genera, the curlews belong to the second section of the subfamily, in which, at least for the lower portion of its front half, the metatarsus is covered with large scutes; and they are defined by this feature, coupled with the circumstance that the long beak is so arched that the chord drawn from the base to the tip will pass below the inferior border of the lower mandible. The curlews have moderately long and slender necks, with the beak generally longer than the metatarsus, although this is not the case with the Eskimo whimbrel (*Numenius borealis*) and the least whimbrel (*N. minutus*). In the legs a large portion of the tibia is devoid of feathers, and there is a small first toe. As a rule, only the lower portion of the front of the metatarsus is covered with scutes; but in the least whimbrel this segment of the leg is thus protected on all sides. The wings are moderate and pointed, with the first quill the longest, and the tail is squared. The plumage is coloured with various shades of brown and buff, producing a mottled appearance, recalling that of the thickknees, and is evidently adapted for protective resemblance. With the exception of the two species above mentioned, all the curlews have pale bars on the inner webs of their primary quills. Curlews are represented by nine species, two of which have well-marked local varieties; and during the breeding-season are confined to North America, Europe, North Africa, and Asia north of the Himalaya, although in winter they have a cosmopolitan range.

Various Species. The common European curlew (*N. arquatus*) is a large bird measuring from 21 to 26 inches in length, which may be diagnosed



COMMON CURLEW.

by its metatarsus exceeding 3 inches in length, and by the lower back and rump being much paler in colour than the remainder of the upper-parts. In the breeding-plumage of the adult male the general hue of the upper-parts is pale brown, shading into white on the wing-coverts, each feather having a dark brown centre; the under-parts are white, tinged on the neck and breast with pale brown, where the feathers are also streaked with dark brown. The rump is white; the upper tail-coverts are white or whitish, streaked or barred with brown; the quills dark brown with white bars; and the tail-feathers white or whitish with dark brown bars. The beak is dark brown, and the legs and feet are slaty grey. This species is resident in the British Islands, whence it extends as far east as the Caspian, beyond which the typical form is replaced by a paler variety; which ranges into Eastern Siberia and Amurland. The breeding-range extends from the confines of the Arctic Circle to Holland; and while the migratory individuals of the European form pass the winter in Africa, the Oriental variety is met with at that season in India. The whimbrel (*N. phaeopus*) is a smaller bird than the curlew, measuring only 16 to 18 inches, and having a relatively shorter beak; and may be distinguished, in common with some other species, by the crown of the head being of a uniform pale brown colour, with a lighter median longitudinal streak; its distinctive specific characteristic being that the lower portion of the back is much lighter than the rest of the upper-parts. Although a more northern species than the curlew, not breeding in the British Islands south of the Orkneys and Shetlands, the distribution of the whimbrel is very similar; the common form being replaced in Eastern Asia by a variety which winters in India and Australia. The nearly allied American whimbrel (*N. hudsonianus*), whose winter-range extends to Patagonia, differs by the chestnut axillaries and under wing-coverts, and the similarity in the colour of all the upper-parts. The still smaller Eskimo whimbrel (*N. borealis*), which breeds in Arctic America, and occasionally straggles during migration to Britain, differs by the absence of barring on the primary quills; while the least whimbrel (*N. minutus*), which breeds in Eastern Siberia and winters in Malayana and Australia, may be distinguished from the latter by the metatarsus being covered with scutes both in front and behind.

Habits.

All the members of the genus are of very similar habits, frequenting moors, inland marshes, and uplands during the summer, and seeking the coasts more while on migration and during the winter. Even more wary than the oyster-catchers, curlews take wing at the least alarm, and rarely allow themselves to be approached within gunshot range. Whenever alarmed, they utter their well-known piercing cry as they rise in the air; and these weird notes, especially when a whole flock of birds join in the chorus, may be heard at great distances across the moors. Gregarious in winter, the birds break up into pairs in the spring: and in the breeding-season lay, in a slight nest on the ground, four somewhat pear-shaped eggs, of which the ground-colour is olive-green, marked with spots of brown and grey. In summer, the food of the European species consists of insects, larvæ, and worms, sometimes supplemented with berries; but in winter it is largely composed of small marine crustaceans and molluscs. Although generally so shy and wary, in the breeding-season curlews are far bolder; and when the young are hatched, both parent birds will often fly anxiously round

and round the head of any intruder on their domain. Geologically these birds are known to date from the period of the middle Miocene, remains of small species having been obtained from strata of that age in France; and it is not improbable that they date from the still older upper Eocene beds of the Paris basin.

The Phalaropes.

The three species of phalarope, two of which are met with in Britain, are readily distinguished from other members of the family by the sides of the three front toes being provided with lobe-like expansions, somewhat similar to those of the coots, and likewise by the marked lateral compression of the metatarsus, which is covered with scutes on both aspects. The beak is of medium length, straight, somewhat depressed and relatively weak, with the oval nostrils at its base surrounded by an elevated rim. The first toe, although small, is present, and a small portion of the tibia is bare. In the elongated and pointed wings the first quill exceeds all the others in length, and the short tail is of a somewhat rounded form. The plumage, like that of the avocets, is remarkable for its softness. During the breeding-season these birds are confined to the northern regions of Europe, Asia, and America, two being inhabitants of the circumpolar regions, while the third pertains to the Western Hemisphere. They are all more aquatic in their habits than any other members of the family, and chiefly frequent deeply indented coasts, although also found on the shores of inland lakes. In general appearance they approach the sandpipers, but they have shorter legs; and the females are more brightly coloured than the males.



GREY PHALAROPE.

The grey phalarope (*Phalaropus fulicarius*), which is but an irregular visitor to the British Islands, attains a length of 8 inches, and is remarkable for the difference in the colour of the winter and summer plumage of the under-parts. The species may be recognised at all seasons by the comparative shortness and width of the beak, and by the central tail-feathers exceeding the outermost in width by half an inch. In the breeding-plumage the whole of the under-parts are of a rich chestnut, and the back and rump black; but in winter most of the upper-parts, as well as a patch before the point of the wings, are pearly grey, while the under-parts are pure white. Breeding in the circumpolar regions locally, but nowhere in Continental Europe, this species occasionally visits North Africa in winter, and has been recorded from New Zealand and Chili. The slightly smaller red-necked phalarope (*P. hyperboreus*), which has likewise a circumpolar distribution, although breeding locally in the Shetlands, Orkneys, and Outer Hebrides, may be recognised by the tapering and pointed beak, which (like that of the preceding) does not exceed an inch in length, and likewise by the smaller difference between the

lengths of the central and outer tail-feathers. The chief breeding-haunts are beyond the limits of forest; but in winter this species spreads over Europe, Northern India, the Malayan region, China, New Guinea, Mexico, and Central America. Finally, Wilson's phalarope (*P wilsoni*), which breeds on the great lakes of North America, and migrates in winter as far south as Patagonia, differs from both the others in the greater length of its slender tapering bill, which exceeds an inch.

The Hard-Billed

Sandpipers and

Ruffs.

The term sandpiper being a general one, applied collectively to many members of the family, it is necessary to prefix the term hard-billed to those of which we have now to treat. These birds are specially characterised by the nearly straight beak, and by the feathers of the



RUFFS AND REEVES.

forehead extending in advance of the angle of the gape. In length the beak is moderate, and it has its tip hard, and the nostrils slit-like and lateral. The first toe is always present; and the metatarsus (except in a Pacific species where they are absent from the greater portion of the back) is covered with scutes both before and behind; and some portion of the tibia is bare. In the long and pointed wings the first quill is the longest; but there is considerable variation in the form and number of the tail-feathers, which in the great majority of species are barred. The genus comprises about a score of species, of which a large moiety are represented in the British Islands, and throughout the breeding-season are distributed over the boreal and temperate regions of the Northern Hemisphere, but in winter become collectively cosmopolitan. Frequenting moors, marshes, and tundras during the breeding-season, these familiar and pretty little birds resort to the sea-coasts in the winter throughout many portions of their range and are in the habit of

performing migrations of enormous length. Their food consists of insects, crustaceans, and molluscs, supplemented by fruit; and their shrill, piping notes are among the most familiar sounds of the seashore. More or less gregarious and social in their habits, especially in the winter, with the single exception of the ruff, all are monogamous; and their scanty nests are usually placed on the ground, and contain, at the proper season, four pear-shaped spotted eggs. Among the better-known British forms are the common sandpiper (*Totanus hypoleucus*), the green sandpiper (*T. ochropus*), the redshank (*T. calidris*), the greenshank (*T. glottis*), and the ruff (*T. pugnax*).

This last is a remarkable and interesting species, characterised by the periodical assumption by the males of a large ruff round the neck, which is scarcely ever exactly similar in any two individuals; the general plumage of that sex being likewise very variable at the same season. The immature males and females resemble an ordinary sandpiper; but they may always be recognised by their white axillaries, coupled with the absence of any white on the quills and central upper tail-coverts. In length the male measures about 12 inches and the female some 2 inches less. Formerly common in the English marshes, the ruff is now mainly a passing visitor to Britain, its breeding-haunts range from the most northern lands of Europe and Asia as far south as the valley of the Danube and the Kirghiz Steppes, while in winter it wanders as far as the Cape, Northern India, Burma, and even more remote regions. Next to the extraordinary variation in the character of the plumage, the most interesting features about the ruff are the extreme pugnacity displayed by the cocks, and the circumstance that these birds differ from all their kin in being polygamous—the females largely exceeding the males in number. During the pairing-season the cocks congregate at certain spots known as “hills,” and there display their pugnacious propensities, although, as in French duels, but little serious harm results to the combatants. The nest, which is roughly lined with dead grass and sedge, is usually placed on a tussock in the middle of a swamp. Years ago enormous numbers of ruffs and reeves (as the females are termed) were netted in the Lincolnshire marshes during the breeding-season. By many writers ruffs are separated as *Machetes*.

Godwits.

Nearly allied to the preceding group are the birds known as godwits, distinguished by the feathers of the forehead not extending in advance of the angle of the gape, the extremity of the long beak being hard and but little expanded. A large portion of the tibia is devoid of feathers, and the claw of the third toe is comb-like. Were it not that there is a difference in the conformation of the upper-part of the breast-bone in the two groups, the godwits could scarcely be separated generically from the hard-billed sandpipers. These birds are represented by four species and two varieties, all of which breed in the Temperate and Arctic portions of the Northern Hemisphere, but migrate far to the south in winter, and two of which frequent the British Islands. Of the latter the bar-tailed godwit (*Limosa rufa*), which measures 15 or 16 inches in length, has in summer the upper tail-coverts and tail white with dark brown barrings, but is especially characterised by the lower back, rump, axillaries, and under wing-coverts being white with obscure brown markings. Breeding locally on the Arctic tundras of Europe and Western Asia, the ordinary form is replaced by a variety

eastwards of the Yenisei; while in North America it is represented by the American bar-tailed godwit (*L. fedoa*), in which the axillaries and under wing-coverts are chestnut. Rarer in Britain than the bar-tailed species, the black-tailed godwit



BAR-TAILED GODWIT.

(*L. melanura*) may be recognised by the tail-feathers being black with white bases, and by the white axillaries. This Old World form is represented in Eastern Asia by a variety, while in the New World its place is taken by the American black-tailed godwit (*L. hudsonica*), distinguished by its dark brown axillaries and under wing-coverts. All the godwits migrate far south in winter, the two Old World kinds then reaching Africa and India, and their eastern varieties visiting Australia. Although frequently breeding far inland, the godwits are essentially shore-birds

in winter, and to suit them for such a habitat acquire in autumn a mud-coloured livery.

Snipe-Beaked Sandpipers. The four species of the genus *Ereunetes* form a kind of connecting link between the preceding and the snipe, having the frontal feathers arranged as in the former, but the extremity of the beak soft, expanded, and rugose, as in the latter. The best known species is the red-breasted sandpiper (or snipe, as it is generally called), which breeds in Arctic America, where it is represented by two varieties, and migrates in winter as far as Brazil and Chili, occasionally struggling to Western Europe. In Siberia it is replaced by Taczanowsky's sandpiper (*E. taczanowskii*).

Turnstones. Long associated with the plovers, which they resemble in general bodily conformation and the shortness of the beak, the turnstones are classed by Mr. Seebohm with the snipes; and whether such an arrangement be natural or artificial, it certainly enables us to define the third subfamily, or *Scolopacinae*, with ease and exactness. Its members may be distinguished from the preceding forms by their toes being free to the base, and having no trace of webs. The turnstones differ from the other members of the assemblage, and thereby resemble the plovers, in that the nostrils extend beyond the basal fourth of the beak; the beak itself being short, thick at the base, tapering, and somewhat conical; while the metatarsus is covered with scutes in front, and reticulated behind. In the elongated wings the first quill is the longest, and the short and nearly even tail includes twelve feathers. The tibia is bare for a short distance, and the first toe is present. The turnstones are represented by three species, all of which breed in the Arctic regions, and migrate south in winter. The common turnstone (*Streptilas interpres*), which is a circumpolar species, visiting the British coasts in autumn and spring, and occasionally tarrying there for the winter,

may be recognised by its pure white chin and throat; the general coloration of the plumage being mottled black, white, and chestnut, and the total length of the bird $9\frac{1}{2}$ inches. The black turnstone (*S. melanocephalus*) of Western North America, in addition to its broader wings, differs by the white lower back, and the absence of a pure white throat and neck; while the plover-billed turnstone (*S. virgatus*), from the Pacific Coast of America, may always be recognised by the vaulted extremity of its beak, and the brown colour of the lower back.

The common turnstone, which in winter is one of the most cosmopolitan of birds, occurring as far away from its northern home as South America and New Zealand, takes its name from its habit of overturning pebbles and other stones

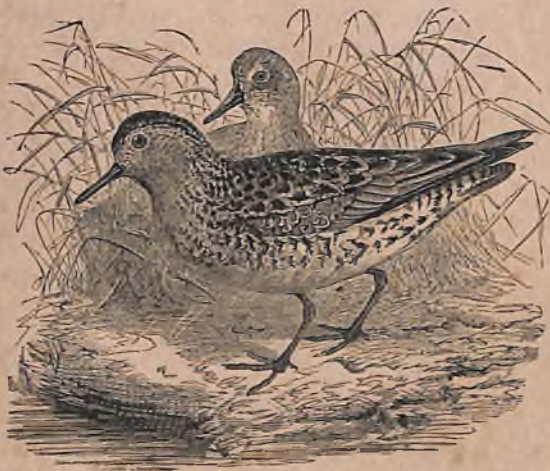


COMMON TURNSTONE.

with its beak for the purpose of obtaining the various marine creatures that lurk beneath their shelter. In such tasks the breast as well as the beak is occasionally brought into requisition; and an instance is on record where three of these birds combined their forces in order to overturn a stranded fish. Except during migration, the turnstone is essentially a littoral bird; and in Britain it is generally seen in pairs or small parties, frequently in association with other waders. Although generally running along the shore, and taking short flights when disturbed, it is not destitute of the power of swimming; and its cry is a clear loud whistle. The nest is but a poor affair, consisting of a sparsely lined hollow in the sand; and the four spotted eggs differ in coloration from those of the plovers, and resemble those of the sandpipers and snipe. The slight difference between the summer and winter dress of these birds affords further evidence of their scolopaceous affinities.

**Cleft-Footed
Sandpiper.**

Under this general title may be grouped a considerable assemblage of small wading birds, of which the knot (*Tringa canutus*), the dunlin (*T. alpina*), the broad-billed sandpiper (*T. platyrhynchos*), the little stint (*T. minuta*), and the sanderling (*Calidris arenaria*), are familiar British examples; the last-named forming a genus by itself on account of the absence of the first toe, which is present in the remainder. These birds differ from the turnstones in that the nostrils are situated in the basal fourth of the beak, and in the metatarsus being covered with scutes both in front and behind. The beak, which is narrow, slightly compressed, and rugose towards the tip, where it may be slightly bent down, is always shorter than the combined length of the metatarsus and third toe; the first primary quill of the wing largely exceeds the fourth in length; and the tail



KNOT SANDPIPER.

is uniformly coloured. In addition to the sanderling, the group comprises thirteen species, with certain local varieties, and is confined in the breeding-season to the higher latitudes of the Northern Hemisphere, although in winter becoming cosmopolitan. Of the numerous species visiting the British Islands, only the dunlin breeds there, and that but sparingly. Among these the curlew-sandpiper (*T. arcuata*), demands notice on account of its curved beak; while still more remarkable is the broadly expanded tip of the beak of the spoon-billed sandpiper (*T. pygmaea*), a species

probably breeding to the northward of Behring Strait, and separated by many writers, as *Eurhinorhynchus*. The sanderling (*Calidris arenaria*), easily recognised by the absence of the first toe, the black legs, and broad beak, breeds near the coasts of many portions of the Arctic Ocean, although not on the Norwegian and Russian portions, and has been taken as far south as Java.

Three sandpipers from the Southern Hemisphere, two of which inhabit the Australian region and the other South America, differ from the preceding in the slight inequality in the length of the first four primary quills of the wing, and are thus assigned to a distinct genus, *Phegornis*.

Painted Snipe.

The beautiful birds commonly termed painted snipe, of which there are three species inhabiting the warmer regions of both hemispheres, are distinguished from the members of the subfamily yet noticed by the difference in length between the shortest and longest primary quill being much less—instead of much more—than the length of the beak. They resemble the preceding forms, however, in that the length of the beak is much less than twice that of the metatarsus, and in the possession of a pale median line on the crown of the head, and two light stripes down the back, they are like the true snipe. The foot is four-toed, and a considerable portion of the tibia is bare.

The best known representative of the genus is the common painted snipe (*Rhynchœa capensis*)—so familiar to all snipe-shooters in Bengal—which is distributed all over Africa south of the Sahara, Madagascar, Arabia, India, Ceylon, Burma, and the Malayan region, and thence to the Philippines, China, Southern Japan, etc. This is one of the two largest species, and is specially characterised by the large number of buff eye-like spots on the primary quills of the wings. The adult female is somewhat the larger and more brightly coloured bird, and may always be recognised by the olive-green wing-coverts, in which each feather is crossed by nearly a dozen narrow dark bars. In the adult female the neck is deep chestnut, shading into black on the breast; and the outermost of the inner secondaries are white, forming a conspicuous stripe. The adult male, on the other hand, has only two dark bars on each feather of the wing-coverts; with a buff patch between them. In both sexes the quills of the wings are olivaceous grey, with narrow dark bars, and a series of five or more buff eye-like spots on the outer webs, and the inner webs with similar spots alternating with white bars. The olive-grey tail has four or five rows of these same buff spots on both webs of the feathers, all of which are tipped with buff. The plumage of the upper-parts is more or less olivaceous, with the feathers marked by fine zigzag lines; while the chin and lower breast are white, the white area of the latter passing on to the shoulder to form a stripe on the scapular region. In addition to the pale stripe down the middle of the head, there is likewise a light area round each eye. The Australian species (*R. australis*) may be distinguished by having two instead of four buff spots on the outer web of the eighth primary quill; while the female is peculiar in possessing a much convoluted windpipe. The South American painted snipe (*R. semicollaris*), wandering in summer as far south as Patagonia and wintering in Peru and Brazil, is a much smaller bird than either of the others, with conspicuous large round white spots on the black wing-coverts. Differing from the true snipe in their shorter beaks, and low, flapping flight, the painted snipe haunt the same marshy districts as the latter; and although they afford but poor sport, the beauty of one of these birds as it falls on the ground with outstretched wings and tail displaying the spots is quite unrivalled. Although resident throughout the year in India, the common species has to change its quarters a good deal in the drier districts of that country, and is only a migrant to the north-west. When breeding, they are always found in pairs; and, so far as the writer's experience goes, this is generally the case in Lower Bengal all through the colder months, but at certain times of the year Mr. Hume says that they are more frequently met with in small parties. The number of eggs seems to be four; and both parent birds are always in the neighbourhood of the nest. The young birds, when first hatched, have the beak quite short.

Woodcock and Snipe. The extreme length of the slender beak, which is more than twice that of the metatarsus, serves at once to distinguish these birds from their relatives, with whom alone they agree in having the toes completely free from webs. The long and straight beak is swollen at the sides, and soft and rugose at the tip, with the laterally-placed and basal nostrils covered with a membrane. The long wings are generally pointed, while the rounded tail comprises a variable number of feathers. Although in all the

species the metatarsus is covered both in front and behind with scutes, the tibia may be either feathered to its base, or partially naked; but a small first toe, elevated above the level of the others, is always present. There is but little difference between the summer and winter dress; and the peculiar mottled russet or ashy tone of the plumage is admirably adapted for concealing the birds in their native haunts. All these birds are more or less nocturnal in their habits; and all are endued with the power of strong, rapid, and long-sustained flight, frequently accompanied by those peculiar zig-zag dartings when frightened, which renders snipe-shooting in many countries so difficult to the inexperienced. The long and sensitive beak is adapted for probing in soft mud in search of the insects, larvæ, and worms on which these birds chiefly subsist. Although each male invariably pairs with a single female in all the species, some may be gregarious at certain seasons, while others are always solitary. All frequent either marshes or woodland swamps; and they make slight nests on the ground in which are deposited four pear-shaped and spotted eggs. In the young the beak is comparatively short. The genus comprises seventeen species, some of which are divided into local varieties, and have a world-wide distribution, four of the species occurring in the British Islands, where, however, only two breed.

Woodcock.

Contrasted with the common snipe, the woodcock differs so markedly in several features that if we had these two alone to deal with they might be referred to distinct genera, but the existence of more or less completely intermediate types renders it preferable to follow Mr. Seebohm in including the whole under the genus *Scolopax*. In the snipe a considerable portion of the tibia is bare, whereas in the woodcock (*S. rusticola*) it is completely feathered; there are fourteen tail-feathers in the former and twelve in the latter; in the snipe the primaries are long and the secondaries short, whereas the reverse is the case with its cousin; the black markings on the head of the snipe are longitudinal, and commence at the beak, while in the woodcock they are transverse and confined to the back of the head; the under surface of the tail-feathers of the woodcock have silvery white tips, which are wanting in the snipe; the snipe has uniformly coloured primary quills, while those of the woodcock are barred; lastly, the eggs of the woodcock have a much paler ground-colour than those of the snipe. Measuring from 13 to 14 inches in length, the common woodcock may be distinguished from its allies by the above-mentioned transverse markings on the head, and the silvery tips to the under-surface of the tail-feathers, coupled with the barred breast, and the bars on both webs of the primaries; and it will thus be unnecessary to describe the bird in detail, although reference must be made to its large, brown, beady eye. Breeding as far north as the Arctic Circle in forest-districts, and as far south as the Alps, Caucasus, and Himalaya, at considerable elevations, as well as in the mountains of Japan, the common woodcock ranges over the greater part of Europe and Asia, visiting India and the adjacent regions in winter. Although the individuals breeding in the extreme north are migratory, those whose nesting-haunts are more to the south are probably resident. The smaller North American woodcock (*S. minor*) differs by the narrowness of the first three primary quills, and the nearly uniform coloration of all the primaries and under-parts; the Moluccan woodcock (*S. rochussenii*) has a uniform breast and barred primaries;

while in the medium-sized Horsfield's woodcock (*S. saturata*) of Java and New Guinea, only the outer webs of the primaries are barred. In the same group with the woodcocks Mr. Seeborn includes six southern species which he terms semi-woodcocks, five of which are from South America, while the last (*S. aucklandica*) is from New Zealand. Possessing the longitudinal head-markings of the two



WOODCOCK IN COVERT.

groups of snipe, these birds differ from all the latter either by having not more than sixteen tail-feathers, or by the tibia being feathered almost or completely to the joint. Essentially nocturnal and solitary in its habits, the woodcock passes the day skulking among the thick shade of woods, from whence it issues forth at evening to search for food in the marshes or along the banks of streams. Worms, of which it will consume a prodigious quantity, form its chief nutriment: and it appears that it ascertains the position of these creatures by plunging

its beak deep down into the mud and remaining motionless for a few seconds. If any subterranean movement is then detected, the beak is once more plunged in the direction indicated, and the hapless worm extracted. When flushed during daylight, the woodcock rises with a "whirr" of its wings, and occasionally uttering a snipe-like cry. It always flies much less rapidly than a



WOODCOCK AND NEST.

snipe, and does not dart so much; while after a long journey its flight is so slow and flapping that in the Himalaya the writer has kicked up these birds from beneath his feet without at first realising what they were. During the pairing-season male woodcocks forsake for a time their usual skulking habits, and fly slowly up and down in the open at morn and eve in a peculiar manner, at the same time uttering a characteristic cry. The term "rôding" is applied to this nuptial flight; and if two cocks thus engaged should chance to meet, a fight immediately ensues. Breeding very early in the season, the woodcock nests in a mere depression of the ground, which it lines abundantly with dry grass and leaves; the four eggs being generally laid in April. The nest is

usually situated among dead fern, with the colours of which the plumage of the old birds harmonises. The young are at times carried to a safer spot by their parent, who takes them one by one between her thighs, and partially supports them by the beak.

Under this title Mr. Seebohm groups a small number of species
Aberrant Snipe. characterised by possessing longitudinal head-markings, and more than sixteen tail-feathers; the tibia being occasionally feathered to the ankle-joint, while the inner webs of the primaries are either plain, or have the bars confined to their terminal portions. Of these, the solitary snipe (*S. solitaria*), which breeds in Turkestan and the Himalaya, visiting India in winter, and represented by a variety in Eastern Siberia and Japan, may be distinguished by the white streaks on the outer borders of the scapulars; the usual number of tail-feathers being apparently eighteen. It inhabits bare, treeless districts. Another member is the wood-snipe (*S. nemorivaga*), of the Himalaya, India, and Burma, which has the habits of a woodcock, and may be recognised by the shortest secondary quills projecting more than half an inch beyond the longest of the primary coverts,—a character indicating limited flying-powers; while the tibia is usually feathered to the joint. The small pintail snipe (*S. stenura*), which breeds as far north as the Arctic Circle from the Yenisei to the Pacific, and winters in India, China, Burma, Malayana, etc., is characterised by its twenty-six tail-feathers, of which the eight outermost on each side are very narrow, although gradually increasing in width.

Typical Snipe.

The members of this group, while agreeing with those of the last in the longitudinal black markings on the head, are characterised by the number of tail-feathers never exceeding sixteen, by a considerable portion of the tibia being bare, and by the total absence of bars on the inner webs of the primary quills. Of these, the great snipe (*S. major*), which has sixteen tail-feathers, and measures from $10\frac{1}{2}$ to $11\frac{1}{2}$ inches in length, is characterised by the greater portion of the four outer tail-feathers on each side being white, and by the broad white tips to the median tail-coverts. A rare straggler during (chiefly autumnal) migration to the British Islands, the great snipe breeds in Northern and some parts of South-Eastern Europe, and as far eastwards as the valley of Yenisei, while in winter the majority sojourn in South Africa. Eastwards of the Yenisei its place is taken by Swinhoe's snipe (*S. megala*), which belongs to the preceding group, having twenty tail-feathers. The best

known member of the whole group is the common snipe (*S. galinago*), some of the leading features of which have been already alluded to on p. 498. This species, which attains a length of $10\frac{1}{2}$ inches, is, however, characterised by possessing fourteen tail-feathers, by the breast being marked with longitudinal dark streaks, and by the axillaries being white, more or less marked with grey. The breeding-range of the common snipe comprises Northern and Central Europe as far as the Arctic Ocean, and southwards to the Alps and Southern Russia, while eastwards it extends through Siberia and Turkestan to South-Eastern Mongolia. In winter the birds from the northern portion of this extensive area



COMMON SNIPE.

spread themselves over the countries on both sides of the Mediterranean, Persia, India, Ceylon, Burma, China, and the Philippines. In North America this species is replaced by a variety known as Wilson's snipe, in the typical form of which the beak is shorter, and the tail-feathers sixteen in number, while the axillaries are barred with brown, and the breast is marked with transverse bars. Intermediate forms, however, completely connect the two races; these being frequently met with in India. The breeding-area of Wilson's snipe extends from the Arctic Circle to the northern United States; while in winter the species ranges to central and northern South America. The last species to which we can allude is the jack-snipe (*S. gallinula*), which is a common winter visitor to Britain, and is characterised by its small size (length, $7\frac{1}{2}$ inches), its twelve tail-feathers, the purple gloss on the feathers of the upper-parts, and the metallic green hue of the inner webs of the scapulars.

Undergoing but slight seasonal variation in plumage, snipe are to be found at all times of the year among the protection afforded by the sedge, grass, or other

vegetation of marshy places, from which they rise suddenly when flushed, with the well-known *staich*, but without much whirring of the wings, and dart off with lightning-like rapidity. Of the flight of Wilson's snipe Dr G. B. Grinnell observes that "most birds when they rise from the ground appear to have some definite idea of the direction in which they wish to go, and having started in a particular line of flight, keep to it, unless turned by some alarming apparition before them. Not so with the snipe, however; he springs from the ground uttering his curious squeaking cry, darts a few yards one way, changes his mind, and turns almost at right angles to his original course; then he appears to think he



A FAMILY OF WILSON'S SNIPE.

has made a mistake, and now alters his direction, and so twists off, 'angling' across the meadow until he is out of gunshot. He then either rises high in the air and swings about for awhile, looking for a desirable spot to alight, or else settles down into a straight, swift course, which he keeps up until his fright is over, or he has come to a spot which is to his liking, when he throws himself to the earth, and with a peculiar toss of his wings checks his progress, and alights." Fortunately for the sportsman in India, where the common snipe is more abundant than elsewhere, these birds do not generally indulge in such vagaries, but fly straight away. The writer has, however, occasionally seen the common species dart, although the pintail does so but very rarely. Unless flushed, snipe are but rarely seen on the wing during the day; and their chief feeding-time, like their migration, is by night. In Europe snipe are essentially solitary birds, but this can scarcely be said to be the case in India, where a "whisp" of from six to a dozen

may often be seen flying together over a marsh; while these birds may often be flushed in crowds from one spot, where they must have been feeding in close proximity. They are never found away from covert, although on rare occasions the common species has been observed perching on a tree; and they never settle where the water is deep enough to wet the feathers of the breast. At ordinary seasons a very silent bird, when breeding, the common snipe utters a peculiar two-syllabled note, compared to *tyik-tyuk*, of which the utterance is accompanied by a nodding of the head. Moreover, the males at the same season indulge in the peculiar performance known as "drumming," during which they may be seen flying diagonally upwards or round and round in large circles, and then suddenly swooping down with vibrating half-closed wings and outspread tail; the "drumming," which has been compared to the bleating of a goat, being only produced during the descent.

In Britain newly laid eggs of the common snipe may be found from the middle of April till the middle of May; the nest being a hollow, lined with dried grass, usually placed in the middle of a tussock of rushes or coarse grass in a swamp, or under the protecting shelter of the same. The four eggs are somewhat variable in hue, the ground-colour being some shade of buff or olive, upon which are large blotches of rich, dark brown, with large underlying markings of lighter brown and grey. The main duty of incubation is performed by the hen-bird; and but a single brood is produced during the year. In the Arctic regions the eggs, like those of the jack-snipe, are not laid till June.

JACANAS AND WATER-PHEASANTS.

Family *PARRIDÆ*.

Mainly from the circumstance that many of them have a naked shield on the forehead, like that of the coots and moor-hens, the members of the present small family were formerly classed with the rails, although their true position appears to be here. From the *Charadriidæ* they are distinguished by the presence of unossified vacuities in the occipital surface of the skull; while they differ from all other birds in the extraordinary elongation of their toes. They are handsomely coloured birds, black, or black-and-white, being the predominating tints; but the young are less brilliant than the adults. The group is confined to South America, Africa south of the Tropic of Cancer, the Indian region, Australia, and Papua.

Jacanas. The jacanas (*Parra*), of which there are ten species, have a distribution coextensive with that of the family; and although their fossil remains have not been discovered, it is probable that they lived in Europe during the Tertiary period, and have reached their present habitat by a southerly migration. The species here figured (*P. nigra*) is an inhabitant of Brazil. They are long-legged, slenderly-built birds, with short tails, spurs on the wings, and the aforesaid shield on the head. Insectivorous in their diet, they frequent lakes and quiet rivers, where their long toes enable them to walk over the leaves of the water-lilies. The nest is a rude structure, built near the edge of the water; and the eggs, which vary from four to six in number, and have a bluish green ground with liver-coloured spots, often rest on the bare soil.

Water-Pheasant. The largest member of the family is the beautiful water-pheasant (*Hydrophasianus chirurgus*) of India and Ceylon, which is the sole representative of its genus, and is easily recognised by the elongation of the two central tail-feathers, and the pied plumage. These birds, which are abundant on the lakes of Kashmir, as well as those of India, usually assume their breeding-plumage in May or June; and they utter a peculiar mewing, or wailing sound, which can be



BRAZILIAN JACANA ($\frac{1}{2}$ nat. size).

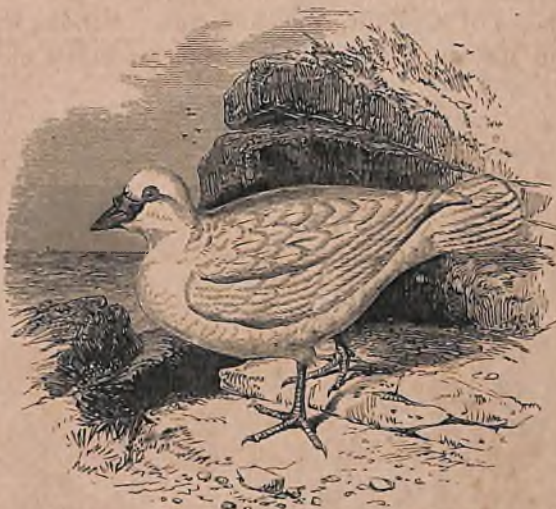
heard for a considerable distance. The nest may be either a floating structure of grass and herbage, or fixed among the growing stalks of rice, and in July or August receives a clutch of from four to seven bronzy brown or green eggs.

SHEATH-BILLS AND SEED-SNIPE.

Families *CHIONIDIDÆ* and *THINOCORIDÆ*.

In this place brief mention may be made of certain birds which appear to connect to some extent the members of the preceding families with the gulls. These

comprise the sheath-bills (*Chionis*), represented by one species (*C. alba*) in the Falkland Islands and Straits of Magellan, and a second (*C. minor*) in the Crozet and Kerguelen Islands; and the seed-snipe (*Thinocorus* and *Attagis*) of temperate South America. All these birds differ from the *Charadriidae*, and resemble the coursers and gulls in the absence of basipterygoid processes on the rostrum of the skull, as also of a pair of vacuities on the occipital face of the latter; the sheath-bills having more or less slit-like (schizorhinal) nasal apertures in the skull, while those of the seed-snipe approximate to the oval (holorhinal) type. The sheath-bills in Kerguelen Island, writes Moseley, "are present everywhere on the coast, and from their extreme tameness and inquisitive habits, are always attracting one's attention. A pair or two of them



COMMON SHEATH-BILL.

always forms part of any view on the coast. The birds are pure white, about the size of a very large pigeon, but with the appearance rather of a fowl. They have light pink-coloured legs, with partial webbing at the toes, small spurs on the inner

sides of the wings, and a black bill with a most curious lamina of horny matter projecting over the nostrils. Round the eye is a tumid, pink ring bare of feathers; about the head are wattle-like warts. The birds nest under fallen rocks along the cliffs, often in places where the nest is difficult of access. The nest is made of grass and bent; and the eggs are usually two in number, of the shape of those of the plovers, and of a somewhat similar colouring, spotted dark red and brown."

When first hatched the young are black. The adult birds utter a harsh note, and feed chiefly on



LATREILLE'S SEED-SNIPE.

seaweed and molluscs; their fearlessness being such that they will often allow themselves to be knocked on the head with a stick. The seed-snipe, or quail-snipe, are small, short-billed birds with the general appearance and habits of quail, living in dry inland districts, where they subsist on plants, roots, and insects. The

figured species (*Attagis latreillei*) inhabits the Falkland Islands and the higher mountains of the southern part of South America. In both genera the beak is rather short and compressed, with the aperture of the nostrils in most cases closed by a horny membrane covered with short feathers. Generally these birds are met with in pairs or small coveys of five or six, which frequent the same spots for long periods. Although they frequent desert regions, the nest is placed near a lake; the number of eggs being four or five.

THE GULL TRIBE.

Order GAVLE.

Formerly associated with the petrels, the terns, skimmers, gulls, and skuas, are now generally regarded as nearly allied to the *Limicolæ*, with which they agree



YOUNG GULLS COVERED WITH DOWN.

in the arrangement of their plumage. Externally these birds are characterised by the prevalence of pure grey and white in their adult plumage, and by the complete webbing of the three front toes, as well as by their long wings, in which the fifth secondary quill is wanting. Their skulls differ from those of the typical *Limicolæ* in the absence of basipterygoid processes on the inferior surface of the rostrum; while the hinder extremity of the lower jaw is abruptly truncated; and in the wing the flat bone, corresponding to the first joint of the human forefinger, has two circular perforations—a feature

distinguishing the skeleton from that of any of the plover tribe and their allies. Throughout the group there are deep grooves on the upper surface of the skull for glands; the development of these being very variable among the *Limicolæ*. Except in the skimmers, the beak is simple, and may be either straight or hooked. In the wing there are ten large primaries, and one minute and concealed; the whole plumage is remarkably compact, the contour-feathers having after-shafts; there are twelve tail-feathers; the spinal feather-tract is well defined by bare lateral areas on the neck, and forked on the upper-back; and the oil-gland is tufted. In their down-clad and active young, these birds resemble the plovers, but the down is of a more complex type. The first toe is raised above the level of the others, with which it is not connected by membrane; and the nasal apertures in the skull are schizorhinal, while the external nostrils are elongated, and placed rather low down on the sides of the base of the beak. In the general structure of the palate, as well as in the presence of a process on the outer side of the humerus (see figure in Vol. III. p. 295), the gulls resemble the plovers. Rarely, if ever, exceeding three in number, the eggs are spotted or scrolled with dark markings on the light-coloured ground.



GROUP OF BRITISH GULLS AND TERNS.

1, Common Tern ; 2, Black-Backed Gull ; 3, Glaucous Gull ; 4, Black-Headed Gull.

Gregarious and noisy in their habits, the gulls and terns are chiefly frequenters of the coasts, although many of them may be found on inland waters, while all may be driven inland by stress of weather. Even in England gulls may be seen following the plough in search of worms; and in parts of Argentina, as in the Colina district, at a distance of some two hundred miles from the sea, they appear to dwell permanently inland, nesting in the lagunas. In Britain, while some species breed on coast-cliffs, others nest on islands and inland lakes, grassy downs, and peat-mosses. All the members of the group are birds of powerful and sustained flight, and are capable of floating in the air with scarce a movement of their wings, while they are equally at home on the surface of the water, where their webbed feet enable them to swim with facility. The terns are, however, more essentially aerial and aquatic birds than the gulls, their short legs not being well adapted for walking on land. In the neighbourhood of the sea the food of all these birds consists mainly of fish and refuse, but when inland they consume worms, insects, the eggs and young of other birds, and the offal from slaughter-houses. Although the group as a whole has a cosmopolitan distribution, it is noteworthy that in the great area lying between South America and the neighbourhood of Australia and New Zealand not a single gull is to be met with, although terns are abundant. Along the southern shores of Australia, and also in New Zealand, a large, dark-mantled gull (*Larus pacificus*) makes its appearance as an isolated form. Geologically, the group appears to be one of the oldest of the existing orders of birds, remains of an extinct genus (*Halcyornis*) occurring in the London Clay, a formation belonging to the lowest division of the Tertiary period; while other forms, which have been assigned to the existing genus *Larus*, occur in beds pertaining to the lower portion of the Miocene period. According to the classification adopted by Mr. Howard Saunders, the order may be divided into two families, the first of which is again split up into three subfamilies.

THE TERNS, SKINNERS, AND GULLS.

Family LARIDÆ.

Including the three groups above-named, each of which represents a subfamily, the present family is characterised as follows. The beak has no cere at its base; there are two notches on each side of the hinder margin of the breast-bone; the toes may be either partially or fully webbed; and the claws are feeble or of moderate length.

Terns.

The terns, of which eleven genera are recognised by Mr. Saunders, constitute a subfamily (*Sterninæ*), characterised by the straight and rather slender beak, in which the two mandibles are of nearly equal length; by the feather-tracts resembling those of the plovers in their arrangement; and by the slight or distinct forking of the tail. In Britain the group is represented by two genera, and it is to these that our notice is mainly confined. The marsh terns form a genus (*Hydrochelidon*) represented by four species, three of which are British. Belonging to a group of genera, in which the tail may be either nearly square or deeply forked, and the head devoid of elongated plumes at the gape of the mouth,

the marsh-terns are specially distinguished by the rounded or slightly pointed tail-feathers, the short tail, which is less than half the length of the wing, the small beak, with the culmen less than twice the length of the metatarsus, and the feeble feet, in which the webs are considerably indented between the toes. All these terns nest in marshes, either on tussocks of grass, or among floating vegetation. The best known of the British species is the black tern (*H. nigra*), in which the under-parts in the adult summer plumage are dark leaden grey; the upper tail-coverts and tail being grey, the beak black, the chin and sides of the face like the under-parts, the crown nearly black, and the under wing-coverts pale grey. On the other hand, the whiskered tern (*H. hybrida*), which is but an occasional straggler to Britain from the south, has the beak blood-red, the chin and sides of the face pure white, the throat and breast grey, passing into blackish grey on the



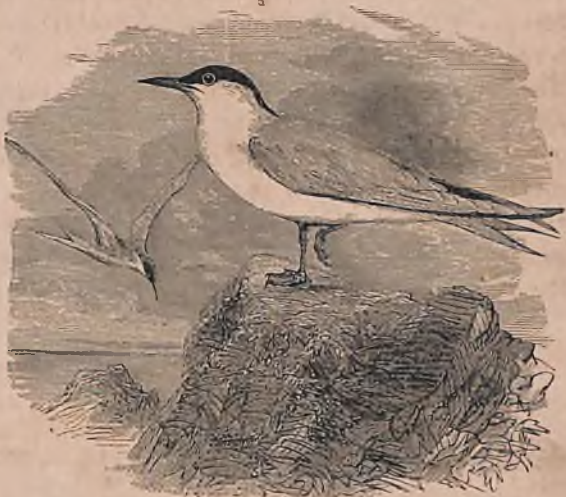
HEAD OF BROAD-BILLED TERN.
(From Saunders, *Proc. Zool. Soc.*, 1876.)

abdomen, and the under wing-coverts white. Abundant in Southern Europe, this tern ranges over a large part of Africa and most of Asia. The beautiful white-winged black tern (*H. leucoptera*), which

is likewise but a rare visitor to the British Isles, differs from both the preceding in that the upper tail-coverts and tail are white in the adult summer-plumage, the under-parts being black as far as the vent, and the under wing-coverts of the same hue, while the beak is dull red. Rare in Northern Europe, this species is more common in the south and east, whence its range extends over the greater portion of Europe. Mr. Saunders writes that "the black tern breeds in colonies, the nest being situated in marshes, and formed of decayed pieces of *Equisetum* and other plants, or heaps of wrack, which rise and fall with the tide; sometimes they are placed on the firmer hummocks of bog in the middle of shallow parts. The eggs are three in number, of various shades of ochreous clay, olive-brown, or olive-green, blotched with dark brown, especially at the larger end. The food of this tern consists chiefly of beetles and dragon-flies, with some small fish; it is also very partial to leeches."

The true terns, of which the common tern (*Sterna fluviatilis*) is the typical form, differ from the marsh-terns and their allies by the distinctly pointed outer tail-feathers; while they are further characterised by the shortness of the metatarsus, the moderately elongated tail, and the compressed and slender beak. With two exceptions, these terns have the crown of the head black; while, as a rule, the under-parts are white or grey, although in the Oriental black-bellied tern (*S. melanogaster*) they are black. The common species, as well as the Arctic (*S. macrura*), roseate (*S. dougalli*), and Sandwich tern (*S. cantiana*)

are large-sized forms belonging to a group of the genus in which the forehead is black to the culmen of the beak; whereas the sooty tern (*S. fuliginosa*) is the British representative of another group in which the front of the forehead is white in the adult plumage. From all the above the lesser tern (*S. minuta*), together with several other species, may be distinguished by its inferior dimensions: the length of the wing being less than 8 inches, whereas in the other groups it varies from 9½ to 12 inches. The broad-billed tern (*S. eurygnatha*), of which the head is figured on p. 510, is an inhabitant of the Atlantic coast of America, from South Brazil to the island of Trinidad, and is represented by a closely allied species on the Pacific coast of the New World.



COMMON TERN.

As an essentially tropical genus of the subfamily, brief mention must be made of the noddies, typically represented by *Anous stolidus*. These birds belong to a group of the subfamily, differing from the one including the two last by the graduated tail, in which the feathers are pointed, and the outermost shorter than the next pair. As a genus, the noddies are characterised by the short middle toe, the strong decurved beak, and by the fourth pair of tail-feathers, counting from the outer side, exceeding all the others in length. The common noddy appears to be generally distributed throughout the tropics, one of its best known breeding-haunts being the Tortuga Islands, off Florida. Its general colour is dark; but, like the allied species, it has a light grey patch on the crown of the head and forehead.



BLACK SKIMMER.

The remarkable birds known as skimmers, or scissor-bills, constitute a subfamily (*Rhynchopinae*), distinguished not only from the terns (which they otherwise resemble), but likewise from all other birds, by the peculiar structure of the beak; this organ being elongated and compressed to a knife-like form, with the lower mandible considerably longer than the upper one, which is freely movable. The single

genus of the subfamily is represented by three species, of which the black skimmer (*Rhynchops nigra*), distinguished by its dark beak, is North American, while the yellow-beaked skimmer (*R. albicollis*) is Indian, the third species inhabiting the Nile and Red Sea littoral. The American species has been observed flying close to the water, with the lower half of the beak immersed beneath the surface, doubtless searching for food.

Gulls.

The gulls proper, as distinguished from the other members of the order, form the third subfamily (*Larinæ*) of the typical family; the great majority of them belonging to the genus *Larus*, although the kittiwake and an allied species from the North Pacific are separated as *Rissa*; while Sabine's gull and a kindred but very rare form from the Galapagos Islands constitute the genus *Xema*; and Ross's gull (*Rhodostethia rossi*) and the ivory gull (*Pagophila eburnea*) respectively represent distinct generic types. As a subfamily, the gulls are characterised by the upper mandible of the beak being longer than the lower one, over which its tip is bent down; while the tail is usually squared, although in one genus it is forked, and in a second wedge-shaped. Some of the smaller gulls, like so many of the terns, assume a dark head and neck in the summer-plumage.

Fork-Tailed Gulls.

Sabine's gull (*Xema sabinei*), together with the Galapagos forked-tailed gull (*X. furcatum*), may be at once distinguished by the forking of the tail,—a character in which they agree with the great majority of the terns, as they also do in the assumption of a dark head during the breeding-season. Not a very uncommon straggler—especially in the immature state—to the British Islands, Sabine's gull breeds in Arctic America and Siberia, generally in company with the Arctic tern; two eggs being laid by the female on the bare ground. Of the second and larger species but little is known, only a few examples having found their way into European collections.

Ross's Gull.

As the forked tail serves to distinguish the members of the last genus, so the single representative (*Rhodostethia rossi*) of the present one is equally well demarcated by the wedge-like contour of the same appendage. It is likewise characterised by its small dove-like beak: while the delicate pink hue of its plumage is also a striking feature, although one shared by some other members of the subfamily. Formerly rare in collections, this gull has more recently been obtained abundantly off Point Barron: but its true polar haunts appear to be as yet undiscovered, although it has been seen in summer in Boothia Felix and Franz-Josef Land.

Typical Gulls.

Represented by nearly half a hundred species, the typical gulls of the genus *Larus* differ from both the preceding by the squared tail, while they are further characterised by the full development of the first or hind-toe. The genus includes both the largest and the smallest representatives of the subfamily; and while some species assume a dark head in the breeding-season, others lose all trace of dark tints in this region when adult. The smallest of the dark-headed species visiting the British Islands is the little gull (*L. minutus*), easily recognised by its diminutive size, and, when in flight, by the slaty black under surface of the wings. A straggler to Southern Norway, this gull is common in the Mediterranean countries, ranging eastwards to the Caucasus, and thence northwards

across Siberia to the Lena. Nesting in colonies in the vicinity of Lake Ladoga, together with the common tern, the female generally lays three or four eggs, which may be distinguished from those of the former by the orange-red, instead of yellow, colour of their yolks. Whereas the species just mentioned is but a very occasional visitor there, the black-headed gull (*L. ridibundus*) is a common denizen of the British coasts, showing an especial partiality for flat shores during the winter, but in the spring seeking marshes for the purpose of breeding. In this species the head and upper part of the neck are dark brown, and the beak lake-red in the summer-dress; but in the Mediterranean black-headed gull (*L. melano-*



BLACK-HEADED GULL ($\frac{1}{2}$ nat. size).

cephalus) the head is jet-black, and the beak coral-red, with a dark band in front of the angle; while the primary quills, in fully adult examples, are white, instead of parti-coloured. In America the group is represented by the laughing gull (*L. atricilla*), distinguished from the British species by its larger dimensions, and characterised by having the first three outer primaries black, with minute white tips. The largest member of the group is the great black-headed gull (*L. ichthyæetus*), ranging eastwards from the Levant to China, and northwards to Mongolia. In length the male may measure as much as 27 inches (against 16 inches in the black-headed gull); and in the breeding-plumage the adult has a jet-black head and upper neck, the beak orange-red, passing into red at the angle of the mandible,

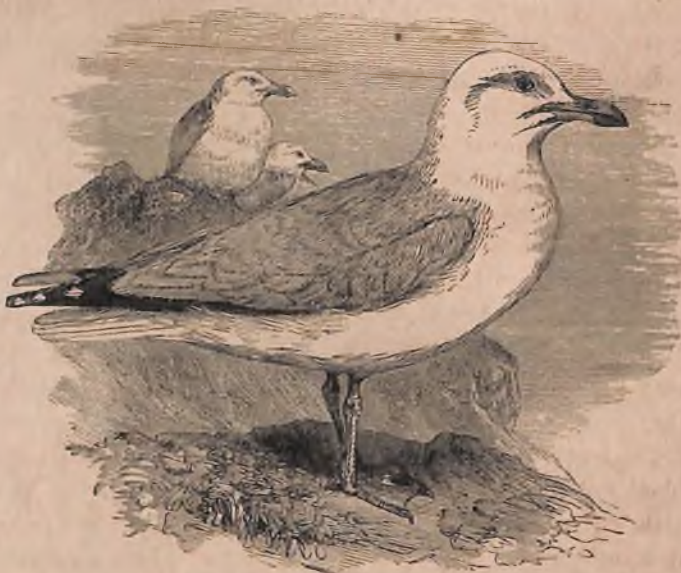
the first primary mainly white, with a black streak along the outer web; while on the second, third, and fourth quills of the same series the black forms a bar, followed by a broad white tip.



COMMON GULL.

With the somewhat misnamed common gull (*L. canus*) we come to the first of a group of mostly large species, characterised by the pure white head and neck in the summer-plumage of the adult. Measuring 18 inches in length, the adult in summer has the head and neck pure white; the back grey; the primaries mostly black, with white spots or tips; the beak yellow at the tip and greenish yellow at the base; and the total number of flight-feathers thirty-one. Breeding throughout Northern Europe and Asia, the common gull is now only a winter visitor to England, although it still nests in Ireland and Scotland. Its nests may be either scattered singly along the shore, or aggregated into larger or smaller colonies. On the two sides of North America this

gull is severally represented by an allied species. Another British species demanding notice is the herring-gull (*L. argentatus*), which considerably exceeds the last in size, measuring upwards of 23 inches in length. In the adult summer-plumage the head is white; the mantle pale pearl-grey; the beak wholly yellow; a ring round the eye yellow; and the legs flesh-coloured; while there are thirty-four flight-feathers. The range of this species includes Northern Europe, the islands of the Atlantic, such as the Azores, where it breeds, and North America; while in winter it visits the north of Africa. In Southern Europe, as well as in



HERRING-GULL.

Siberia, and various parts of America, the herring-gull is replaced by several very closely allied forms, mainly distinguished by the darker or lighter hue of the mantle, the pattern of the quill-feathers, and the colour of the legs and of the ring round the eye. These gulls are in the habit of following the shoals of the fish from which they take their name, and may often be seen hovering above the fry, preparatory to taking a plunge among them in the water. Their chief food consists, however, of various marine animals thrown up by the tide; although during the spring, and after rough weather, they frequently wander far inland.

Somewhat superior in size to the common gull (its length being about 21 inches), the lesser black-backed gull (*L. fuscus*) in the adult summer-plumage has the head white, the primaries blackish with white tips, the back blackish, and the legs bright yellow. This species is resident in Britain, and ranges eastwards to the Caspian, while southwards it extends into Africa, and westwards to the Canaries. Of the great black-backed gull (*L. marinus*), which is larger than all the preceding, a well-known observer, who writes under the *nom de plume* of "A Son of the Marshes," says that these birds "are not particular as to the nature of their food, so long as there is enough of it: a rat or a bird, a fish or a snail, or bread and milk, will suit almost equally well.

Tradition said that in the early

days of our oldest inhabitants the great black-backed gull bred on some of the wild flats of the Kentish coast, and in a portion of the lonely salt marshes of Essex." In attacking young lambs, these gulls invariably commence by pecking out the eyes of their victims; and as many as nine of these marauders have been captured during a single evening by setting a number of traps round a dead lamb. In length this gull measures upwards of 28 inches; and in the adult breeding-plumage the head is white, the back blackish, and the legs flesh-colour; the number of flight-feathers being thirty-four. Essentially an oceanic species, the greater black-backed gull is mainly an inhabitant of both sides of the North Atlantic, although it has been procured on the Pacific side of North America, and in winter it ranges as far south as the Canaries. In the Southern Hemisphere it is replaced by the southern black-backed gull (*L. dominicanus*), characterised by its stout beak, brownish black mantle, and olive-coloured legs. Largest of all the British



LESSER BLACK-BACKED GULL.

species, the glaucous gull (*L. glaucus*), in which the males may measure fully 32 inches, is readily distinguished by the adult summer-plumage being nearly white throughout, as well as by the comparative shortness of the wings and feet. Essentially an Old World Arctic bird, this gull only wanders in winter to temperate and tropical Europe; while in the North Pacific it is represented by the allied *L. glaucescens*, ranging from America to Kamschatka, and distinguished by the faint grey mottlings on the wings. Another occasional wanderer to the British Isles from the north is the Iceland gull (*L. leucopterus*), which may be distinguished from the last by its length not exceeding 22 inches, and likewise by the proportionately much longer wings and legs. Bonaparte's gull (*L. philadelphia*), a small species with a greyish black head and upper neck, is remarkable for its habit of breeding in tall trees.

Represented only by the common circumpolar kittiwake (*Rissa tridactyla*) and an allied North Pacific species (*R. brevirostris*) from

Kittiwakes.



KITTIWAKES NESTING.

the region lying between Alaska and Kamschatka, these gulls are distinguished by the shortness of the metatarsus and the absence or rudimentary condition of the first or hind-toe. It is not a little curious that while in most districts examples of the common kittiwake in which the latter toe persists are but rarely met with, in

Behring Sea this condition is much more common. Measuring 15 inches in length, the kittiwake, in the summer-plumage of the adult, has the upper-parts white and grey, the tail white, the first to the fifth primaries tipped with black, the under-parts white, the beak yellow, and the legs brownish black. The kittiwake is a resident in the British Isles, where it breeds in numbers on rocky cliffs, and feeds chiefly on surface-swimming fry of fishes and marine invertebrates. The nests, which are usually placed close together on narrow ledges of rock, are built of seaweed, and generally contain three eggs. The Pacific species, which exhibits a similar variation with regard to the first toe, may be distinguished by its orange-red legs.

Ivory-Gull.

Conspicuous on account of its uniform delicate white plumage, faintly suffused with a rosy tint, in marked contrast to which stand out the jet black legs and greenish yellow beak, the lovely ivory-gull (*Pagophila eburnea*) alone represents a genus characterised by the shortness of the beak, the long and slightly graduated tail, and the connection of the first toe (of which the claw is unusually long) with the metatarsus by means of a distinct web. A circumpolar inhabitant of the Arctic seas, this gull wanders into temperate regions during the winter; its breeding-places being in Spitzbergen and other regions in the far north. In contrast to the snowy white of the adult, the young of the ivory-gull are conspicuously spotted with black.

THE SKUAS.

Family STERCORARIIDÆ.

Closely allied to the gulls, the skuas are considered by Mr. Saunders to form a family by themselves, although many ornithologists are not disposed to admit the necessity for such separation. As a family these birds are characterised by the following features. The beak has a cere at the base, and the tip of the upper mandible hooked; the breast-bone has but a single notch on each side; the blind appendages (*cæca*) of the intestine are larger than in the preceding family; and the completely webbed toes are furnished with strong, sharp, hooked claws. Represented by six species, the skuas are all included in a single genus; and while four of them breed only in the colder regions of the Northern Hemisphere, there are two southern species, one of which (*Stercorarius chilensis*) is found on the western coast of South America as far as the Straits of Magellan, and thence northwards to Rio de Janeiro, the other ranging from Tierra del Fuego to the Cape, New Zealand, and the Indian Ocean. In the last edition of *Yarrell's Birds* it is stated that "the skuas may be considered as forming a conspicuous portion of the predaceous division among the swimming-birds, as indicated by their powerful and hooked beak and claws. Their food is fish, but they devour also the smaller water-birds and their eggs, the flesh of whales, as well as other carrion, and are observed to tear their prey in pieces, while holding it under their crooked talons. They rarely take the trouble to fish for themselves, but, watching the smaller gulls and terns while thus employed, they no sooner observe one to have been successful than they immediately give chase, pursuing it with fury; and having obliged

it from fright to disgorge the recently-swallowed fish they descend to catch it, being frequently so rapid and certain in their movements and aim as to seize their prize before it reaches the water." Of the two members of the group breeding within the limits of the British Islands, the largest is the great skua (*S. catarrhactes*), its only resort within those limits being the Shetlands.

Measuring upwards of 24 inches in length, the great skua has the two central tail-feathers less than an inch longer than the others, and may be further distinguished by the white bases to the flight-feathers; the general colour being dark brown. It nests in a hole of about a foot in diameter, laying one or two eggs on a lining of moss and heather. It is to this species that the two southern



POMATORHINE SKUA.

forms alluded to above are allied. Taking the other species in their order of size, the long-tailed skua (*S. parasiticus*), which measures 22 inches in length, has the two central tail-feathers upwards of 9 inches longer than the rest. Essentially an Arctic species, this bird is but a very occasional visitor to the British Islands. The pomatorhine skua (*S. pomatorhinus*), on the other hand, is a regular winter visitor to the last-named area; it may be distinguished by the two central tail-feathers being twisted upwards and exceeding the others in length by 4 inches, the total length of the bird being 21 inches. Lastly, we have Richardson's skua (*S. crepidatus*), measuring an inch less than the last, and distinguished by the two central tail-feathers being only 3 inches longer than the others. Circumpolar and subarctic in its breeding-range, this species is much more abundant in Britain than either of the others, nesting not only in the Hebrides, Orkneys and Shetlands, but likewise on the mainland in the counties of Caithness and Sutherland.

CHAPTER XX.

THE TUBE-NOSED BIRDS, DIVING BIRDS, AND PENGUINS,— Orders TUBINARES, PYGOPODES, AND IMPENNES.

WITH the exception that they are all thoroughly aquatic in their habits, the tube-nosed birds, as represented by the albatrosses, petrels, and shearwaters, have little or nothing in common with the diving-birds, as exemplified by the auks, divers, and grebes, or with the penguins; and it is merely as a matter of convenience that the three groups are treated in the same chapter. They accordingly need no collective notice, so that we at once proceed to the consideration of the leading features of the first of the three groups.

Tube-Nosed Birds. The members of this order take their name from the circumstance that the external nostrils are produced into tubes lying upon the surface of the beak and directed forwards; this feature being absolutely peculiar, and serving at once to distinguish them from all other birds. The horny sheathing of their beak is composed of several distinct pieces, separated from one another by more or less marked grooves; and the tip of the beak is sharply hooked. In the skull the palate is of the slit (schizognathous) type; while its nasal apertures are oval, or holorhinal, and the angle of the lower jaw is abruptly truncated behind. As in so many sea-birds, the upper aspect of the skull has very deep grooves, which, however, are always separated from one another on the forehead by a wide bar. The vertebræ of the back are articulated with one another by the usual saddle-shaped surfaces. In the wings, which are generally of great length, the humerus resembles the corresponding bone of the gulls in having a well-marked process on the outer side of its lower extremity, although the perforations in the basal bone of the second digit of the wing characterising that order are wanting. The tibia, or leg-bone, differs from that of all the birds hitherto considered in having a flattened plate-like crest projecting upwards on its front aspect some distance above the level of the head of the bone. The feet are characterised by the small size or even occasional absence of the first toe, while the three front toes are completely webbed. In the plumage there is a well-defined bare tract on each side of the neck, and the oil-gland is furnished with a tuft of feathers. The young, which are born in a helpless condition, and are fed for a considerable period in the nest by the parents, are clothed with down, arranged in a somewhat complex manner.

In habits, all the tube-nosed birds are marine and carnivorous, subsisting entirely on either carrion, cuttle-fish, or crustaceans, together with such refuse as they can pick up. They are all birds of sustained and powerful flight; and, with the exception of the members of one aberrant genus, are swimmers rather than

divers. In appearance several of them, more especially the fulmars, present a marked similarity to the gulls; the plumage in this instance being of the grey-and-white hue distinctive of that group. This resemblance must, however, be regarded as a purely adaptive one, brought about by the needs of a similar mode of existence, there being but little structural affinity between the members of the two groups. Generally, the tube-nosed birds have a more or less dusky-hued plumage, while they mostly differ from the chattering and screaming gulls by their comparatively silent habits. Although found in the seas of all parts of the world, the group is represented by the greatest number of species in the Southern Hemisphere, which may consequently be regarded as its headquarters. Very little is known of the group's geological history, although a species of shearwater has been stated to occur in the lower Miocene strata of France; the same beds also yielding remains of an extinct genus (*Hydrornis*), which has been tentatively assigned to this order.

THE ALBATROSSES.

Family *DIOMEDEIDÆ*.

The albatrosses are distinguished by their tubular nostrils being placed on the two sides of the beak, and widely separated from one another by the large median portion of its horny sheath. They are further characterised by the extreme length and narrowness of the wing, in which the humerus and ulna are greatly elongated; and also by the large number of quills in the wing, which may vary from thirty-nine to fifty, or more than in any other birds. In the foot the first toe is wanting; while the skull is characterised by the absence of basipterygoid processes on the rostrum of its inferior surface. All the albatrosses (which may be included in the single genus *Diomedea*) are of large size, and mainly frequent the southern tropical and subtropical seas, although one species ranges on the Pacific Coast of America as far north as Alaska. The occurrence of remains of a fossil albatross in the Pliocene deposits of the east coast of England is noteworthy.

By far the best known representative of the genus is the wandering albatross (*D. exulans*), which is the one represented in our illustration. It belongs to a group characterised by the absence of a groove in the horny sheath of the sides of the lower jaw, and also by the length of the wing being equal to three or four times that of the short and rounded tail. The span of wing varies from 10 to 12 feet, while the average weight of the bird is only some 17 lbs. The prevailing colour of the plumage is yellowish white, with the quills dusky, and, except in very old birds, the region of the back and the larger wing-coverts are irregularly barred with blackish. The beak and feet are whitish. Although the true home of this species is in the south seas, its wanderings occasionally extend to the north of the Equator. The smaller sooty albatross (*D. fuliginosa*), of the southern oceans generally, and the Pacific, alone represents a second section of the genus, in which the horny sheath of the sides of the lower jaw is marked by a longitudinal groove, while the wing is only about twice the length of the graduated tail. In the adult the plumage of the neck, back, and upper-parts is dark ashy grey, becoming lighter on the neck and fore-part of the back, where the tips of the feathers are

nearly white; the wings and tail are dark slaty; the beak, with the exception of the grooves, is black; and the legs and feet are pale reddish. In all the species the young, after passing the white downy stage, are more or less sooty in colour; so that in coloration the sooty albatross is one of the least specialised forms.

Habits.

The name albatross, it may be observed, is a corruption of the Spanish word *albatraz*, meaning a gannet; and was applied to these birds by the old voyagers, in conformity with that propensity to designate newly discovered creatures by familiar titles, which is so characteristic of the uneducated. All these birds are strictly oceanic in their habits, rarely visiting the



ALBATROSSES NESTING ($\frac{1}{4}$ nat. size).

land except for the purpose of breeding, and then selecting remote islands, like Tristan da Cunha, or even isolated rocks. Much has been written in regard to the flight of the wandering albatross, but, according to Moseley, these birds are by no means beautiful objects when seen following in the wake of a vessel, as the long and narrow wings seem out of proportion to the body, while five out of every six birds observed are in the brown immature plumage, and look dirty and draggled. After referring to the marvellous powers of flight of the species just mentioned, Gould observes, that although during calm or moderate weather, this splendid bird "sometimes rests on the surface of the water, it is almost constantly on the wing—and is equally at ease while passing over the glassy surface during the stillest calm, or flying with meteor-like swiftness before the most furious gale;

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land except for the purpose of breeding, and then selecting remote islands, like Tristan da Cunha, or even isolated rocks. Much has been written in regard to the flight of the wandering albatross, but, according to Moseley, these birds are by no means beautiful objects when seen following in the wake of a vessel, as the long and narrow wings seem out of proportion to the body, while five out of every six birds observed are in the brown immature plumage, and look dirty and draggled. After referring to the marvellous powers of flight of the species just mentioned, Gould observes, that although during calm or moderate weather, this splendid bird "sometimes rests on the surface of the water, it is almost constantly on the wing—and is equally at ease while passing over the glassy surface during the stillest calm, or flying with meteor-like swiftness before the most furious gale;

and the manner in which it just tops the raging billows and sweeps between the gulfy waves has a hundred times called forth my wonder and admiration. Although a vessel running before the wind frequently sails more than two hundred miles in the twenty-four hours, and that for days together, still the albatross has not the slightest difficulty in keeping up with the ship, but also performs circles of many miles in extent, returning again to hunt up the wake of the vessel for any substances thrown overboard." Moseley states that these birds make the utmost use of the momentum acquired by a few powerful strokes of the wings, taking all possible advantage of the wind, and progressing largely by a gliding movement. Still, however, he adds, they seem to move their wings more frequently than is generally supposed. "They often have the appearance of soaring for long periods after a ship without flapping their wings at all, but if they be closely watched very short but extremely quick motions of the wings may be detected. The appearance is rather as if the body of the bird dropped a very short distance and rose again. The movements cannot be seen at all unless the bird is exactly on a level with the eye."

During the breeding-season, when the light-coloured species are in the full beauty of their white plumage, albatrosses resort in large numbers to oceanic islands and rocks. In Tristan da Cunha both the wandering albatross and the smaller yellow-billed albatross (*D. chlororhyncha*) are found in numbers during the breeding-season; the latter being easily distinguished by its yellow gape and the broad yellow stripe on the tip of the otherwise black beak. Commonly known to the sailors as "mollymauks," the yellow-billed albatrosses, according to Moseley, "take up their abode in separate pairs anywhere about in the rookery, or under the trees, where there are no penguins. They make a cylindrical nest of tufts of grass, clay, and sedge, which stands up from the ground. The nest is neat and round, there is a shallow concavity on the top for the bird to sit on, and the edge overhangs somewhat, the old birds undermining it, as the Germans said, during incubation, by pecking away the turf of which it is made." The nest may be as much as fourteen inches in diameter, by ten in height; and at the proper season it contains a single white egg, somewhat larger than that of a goose. During incubation the egg is held in a kind of pouch, so that the bird has to be driven quite off the nest before it can be ascertained whether or not an egg is present. In all cases the sitting birds allow themselves to be approached without making the least movement, and almost seem to have forgotten the use of their wings. The wandering albatross builds a larger and more conical nest than the mollymauk, and its egg is about five inches in length, or about equal in size to that of a swan. At its larger end the egg has some specks of red, but is otherwise white. The male birds commonly stand or sit near their brooding partners; and when the latter are approached, they display their displeasure by savagely snapping their beaks at the intruder.

THE PETRELS.

Family PROCELLARIIDÆ.

Next in size to the albatrosses is the giant petrel (*Ossifraga gigantea*), the sole member of its genus, and the first representative of the second family of the

order. All the members of this family differ from the albatrosses by the nasal tubes being laid side by side upon the top of the beak. Generally the wings are long, but the number of quills does not exceed thirty-nine, and is usually about thirty, although occasionally reduced to twenty. The hind toe, although sometimes minute, is generally present; and there are usually basipterygoid processes on the rostrum of the inferior aspect of the skull. The giant petrel is distinguished from all the other members of the family by its large size, and by the length of the beak



THE GIANT PETREL.

exceeding that of the metatarsus. The beak is very stout, and has the nasal tubes of great length, and its outer sheath so produced as to reach beyond the proper apertures of the nostrils, thus giving the appearance of a single nostril. The tail is characterised by the presence of sixteen feathers. In general appearance and size this bird is not unlike some of the smaller dark-coloured albatrosses, its total length being about 32 inches, and the span of the wing 66 inches. Although pale-hued individuals are far from uncommon, the general colour of the plumage is typically dull slaty brown, becoming paler on the face, throat, and under-parts, and some of the feathers of the upper-parts tinged with chocolate, while those of the

back, as well as the wing-coverts, have paler greyish margins. The beak is yellowish horn-colour; and the legs and feet are greyish black.

Commonly known to sailors by the name of nelly, break-bones, or stinker, the giant petrel is widely distributed over the temperate and high southern latitudes, occasionally wandering to a considerable distance north of the Equator, and in power of flight is fully equal to the albatrosses. In habits it differs considerably from the latter, subsisting chiefly on the blubber and flesh of dead seals and whales, as well as the bodies of other birds. Moseley, who compares it in these respects to a vulture, writes that in Kerguelen, this petrel "soars all day along the coast on the look-out for food. No sooner is an animal killed than numbers appear as if by magic, and the birds are evidently well acquainted with the usual proceedings of the sealers—who kill the sea-elephant, take off the skin and blubber, and leave the carcase. They settled down here all round in groups at a short distance, a dozen or so together, to wait, and began fighting amongst themselves, as if to settle which was to have first bite." When gorged, they are quite unable to fly; and, like other members of the family, if disturbed they have an unpleasant habit of disgorging an ill-smelling oily fluid. These birds breed on Kerguelen and Prince Edward's Island, where they lay a single, dirty, white egg in a natural hollow of the ground. The newly-hatched young are covered with a long grey down; and later on the nestlings, when approached, are stated to squirt from their nostrils an oily fluid to a distance of six or eight feet, the old birds remaining a short distance away.

Fulmar Petrel.

In the Arctic regions and other parts of the Northern Hemisphere, the place of the giant petrel is taken by the gull-like fulmar (*Fulmarus glacialis*), which is likewise the only well-defined representative of its genus. Of much smaller size than the giant petrel, the fulmar differs by the beak being inferior in length to the metatarsus, and the proportionately shorter and stouter nasal tubes, in which the septum between the two nostrils extends to within a short distance of the orifice; the tail-feathers, moreover, are either twelve or fourteen in number. The fulmar measures about 19 inches in length, and displays great variation as regards colour. In the typical form, however, the head and neck are white, most of the upper-parts, as well as the tail-feathers, pearl-grey, the primaries slaty grey, and the breast and under-parts white. The iris is dark brown, the beak yellow at the tip, with yellowish white sides, and a greenish tinge at the base above, while the legs and feet are pale grey. A grey phase is also commonly met with, in which the head and neck, as well as the greater portion of both the upper and under-parts are ashy brown, with the back and wings somewhat darker than the rest. The fulmar breeds in the boreal regions of both hemispheres; but some authorities consider that in the North Pacific and Behring Sea it is replaced by two distinct species. In autumn and winter, the fulmar is by no means uncommon, although probably involuntary visitor to the southern shores of Britain, and has been recorded as far south as the Mediterranean.

In habits, the fulmar is very like its larger cousin, nesting in hollows in the ground, instead of in deep burrows like the shearwaters, and feeding largely on whale-blubber and refuse. Scoresby writes that these petrels "are remarkably easy and swift on the wing, flying to windward in the highest storms, and resting

on the water in great composure in the most tremendous seas; but it is observed that in heavy gales they fly extremely low, generally skimming along by the surface of the water. They are extremely greedy of the fat of the whale, and though few should be seen when a whale is about being captured, yet, as soon as the flensing process commences, they rush in from all quarters, and frequently accumulate to many thousands. They then occupy the greasy track of the ship; and being audaciously greedy, fearlessly advance within a few yards of the men



FULMAR PETRELS ($\frac{1}{2}$ nat. size).

employed in cutting up the whale." Highly gregarious during the breeding-season, the fulmars then collect on the turfy ledges of the St. Kilda cliffs in thousands. The single white egg is laid either in a slight nest of dried grass, or on the bare ground; and although the birds sometimes excavate a hollow of a few inches deep in the turf, they as often nest on its surface.

Allied Genera. Nearly allied to the fulmar is the silver-grey petrel (*Thalassoica glacialisoides*) of the Pacific and Southern Atlantic, distinguished by its more slender beak, in which the nasal tubes are shorter and more depressed, with their upper border concave. This species extends nearly as far south as the Antarctic pack-ice, where it is replaced by the snowy petrel (*Pagodroma nivea*),—a

pure white species of the size of a pigeon, with a short and weak bill. The "Cape hen" (*Majaqucus aquinoctialis*) and the spectacled petrel (*M. conspicillatus*) are larger southern species, of the size of the fulmar, with blackish brown plumage. The beak is longer than in the latter, with shorter nasal tubes, of which the two apertures look directly forwards. While the Cape hen is wholly blackish brown, the spectacled petrel has characteristic white bands across the head and throat.

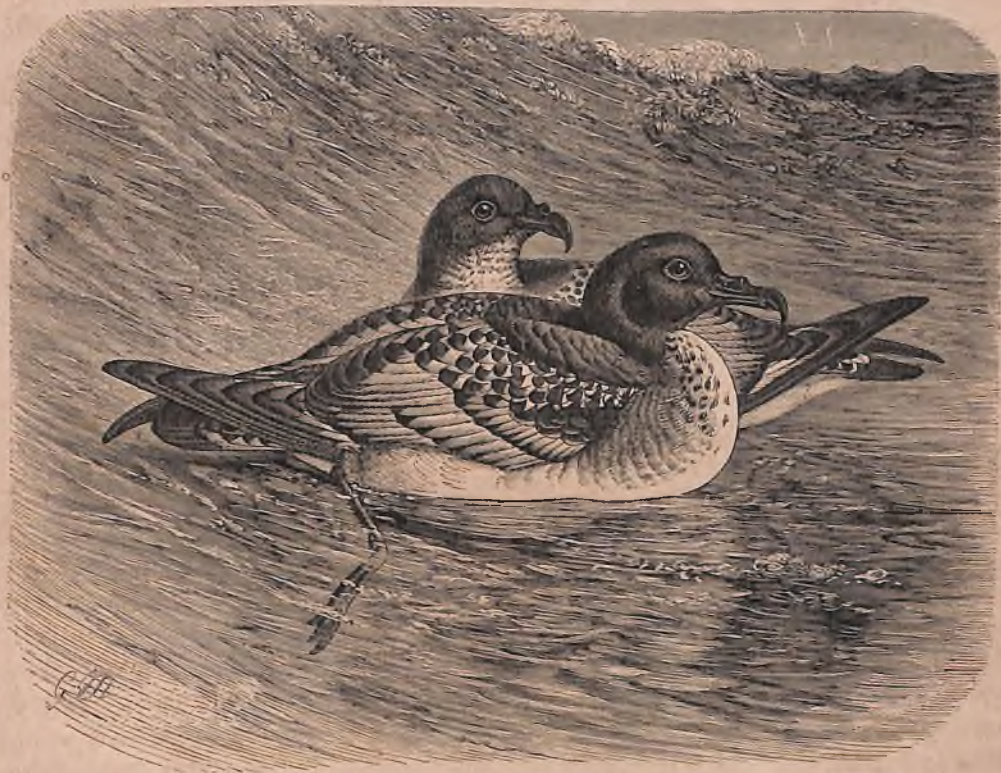
Nearly cosmopolitan in their distribution, the numerous group of Shearwaters. medium-sized dark-coloured petrels, known as shearwaters and included in the genus *Puffinus*, are characterised by the length and slenderness of their beaks, in which the short and depressed nasal tubes open by two separate orifices, generally directed obliquely upwards. The wings are long and pointed, with the first quill the longest; the graduated tail consists of twelve feathers; and the first toe is rudimentary.

Shearwaters may be divided into two groups, according as to whether the under-parts are white, or are dusky like the back. Among the better-known representatives of the former group we may mention the cinereous shearwater (*P. kuhli*) of the Mediterranean, Western Europe, and the East Atlantic, characterised by its stout beak, circular nostrils, and brownish grey upper plumage. The great shearwater (*P. major*), of the Atlantic Ocean generally, which measures 18 inches in length, and is an occasional autumn visitor to the British Islands, is a member of the same group, distinguished by its more slender beak, in which the nostrils form longitudinal ovals; the general colour of the upper-parts being sooty greyish brown, with paler tips to the feathers of the back. The commonest British representative of the group is the smaller Manx shearwater (*P. anglorum*), which measures only 14 inches in length, and has a uniformly blackish upper plumage, without pale tips to any of the feathers; it frequents the whole of the North Atlantic, although more abundant on the eastern than on the western side. Another species of this group is the dusky shearwater (*P. obscurus*), which is smaller than the last, with a more slender beak, and a deeper black to the upper plumage. Common to both the Atlantic and Pacific oceans, this species has been obtained from such widely remote regions as the Bahamas, the Galapagos Islands, and New Zealand. Lastly, we may take the sooty shearwater (*P. griseus*) as an example of the second group. This species, which may attain a length of 18 inches, is of a uniform dusky tint above and slightly paler beneath; its range being nearly or quite as extensive as that of the preceding species, and stragglers occasionally reaching the British Isles.

Capped Petrel. Allied to the shearwaters is the genus *Æstrelata*, as represented by the capped petrel (*Æ. hesitata*) and certain other species. It is characterised by the great compression of the rather short beak, in which the terminal curved "nail" is of very large size, and the short and very prominent nasal tubes. The long and pointed wings extend when folded considerably beyond the graduated tail, and the hind-toe is small and elevated. This species inhabits the warmer parts of the Atlantic, straying occasionally to England and France. While the forehead, the sides of the head, the neck, the upper tail-coverts, and the base of the tail are white, the crown of the head has an isolated black cap, and the upper-parts are bistre-brown; the whole length being 16 inches. The uniformly blackish brown Bulwer's petrel (*Bulweria columbina*) is a much smaller bird of

some $10\frac{1}{2}$ inches in length, and is the sole representative of its genus. It is more slenderly formed and longer-tailed than the last; frequenting the Atlantic in the neighbourhood of the Canaries and Madeira, and laying in holes or under the shelter of rocks.

Cape Petrel. From its superficial resemblance to a dark-coloured pigeon, the bird properly known as the Cape petrel (*Daption capensis*) is commonly designated in the colony the Cape pigeon. It represents a genus distinguished from those last mentioned by the presence of fourteen tail-feathers; and further characterised by the beak being broad and depressed, except at its tip,



CAPE PETRELS SWIMMING ($\frac{1}{2}$ nat. size).

where the nail is small, and occupies less than a third of the total length. The nasal tubes are depressed and concave, and are separated by a considerable interval from the terminal nail. In the leg, the metatarsus is shorter than the third toe, although much longer than the beak. This bird is of medium size and is easily recognised by the sooty head and neck, the mingled dusky and white plumage of the upper-parts, and the immaculate white of that below.

The Cape, or, as it is often called, pintado petrel, is an inhabitant of the South Atlantic and South Pacific oceans, occasionally straggling northwards of the Equator. In the Antarctic seas these birds are frequently met with in vast numbers: and an observer who accompanied a whaling expedition in the winter of 1892-93, writes that so eager were they for any scraps thrown over the ship's

side, that any number of them could have been caught with small hand-nets only large enough to contain one at a time, and many of them were thus captured by the crew. In stormy weather they not unfrequently come close into land. When gracefully hovering in the air, the bird may be seen to make a sudden dart downwards to the water, in order to secure some floating morsel of food it has espied, and on such occasions will dive readily. It is also said to throw up its tail after the manner of a duck, and thus to fish up bits of food from slight depths. When caught and placed on deck, it has to run some distance with outstretched wings before being able to rise; and when first hauled in or handled, invariably ejects from its mouth or nostrils a reddish oily fluid. These petrels breed on Tristan da Cunha and Heard Island, and probably also on some of the Antarctic Islands; on Heard Island their nests are made in holes in low basaltic cliffs.

Dove-Petrels.

The dove-petrels (*Prion*) are much smaller birds, represented by numerous species in the southern seas, and typically characterised by the great breadth of the base of their beaks. One of the best known is the common dove-petrel (*P. desolatus*), which is a small grey species with a broad boat-like beak, furnished with fine horny lamellæ projecting inwards from each side. It flies like a swallow, and may be seen in flocks about a ship, or cruising over the sea, or attendant on a whale to pick up the droppings from its mouth. Hence it is termed by sealers the whale-bird. Its food, as that of all the petrels except the carrion ones, seems to consist of the very abundant surface animals of the south seas, especially of small crustaceans. It breeds on Kerguelen, laying its single white egg in a burrow which may be as much as a yard and a half in depth. The broad-billed blue petrel (*P. vittatus*) is another well-known representative of this genus.

The Storm-Petrels.

The tiny storm-petrel (*Procellaria pelagica*)—the smallest of British web-footed birds—is the first representative of several genera of petrels, readily distinguished from all the foregoing by their diminutive proportions; the length of wing not reaching 7 inches. The storm-petrels are characterised as a genus by their very small size, by the even or rounded tail, by the length of the metatarsus being approximately equal to that of the middle toe with its claw, and by the presence of a white patch on the rump. The whole length of the true storm-petrel—the “Mother Carey’s Chicken” of the sailors—is rather less than 6 inches; the general colour of the plumage being sooty black.

This petrel is confined to the more northerly portions of the Atlantic, and except during the prevalence of severe storms and in the breeding-season, is but seldom seen in the neighbourhood of land. Essentially a child of the ocean, it is frequently met with far out at sea, where it will follow vessels for considerable distances, hovering over the surface of the water in a manner which has been compared to the flutterings of a large butterfly. The breeding-places of the storm-petrel include the Atlantic coasts of Europe, and portions of the shores of the Mediterranean; but, according to Mr. Ridgway, it is not known to nest on any part of America. The single white egg is deposited in a burrow of considerable length; and in the island of Soa it is stated that the burrows of several pairs often diverge from a common vestibule.

Allied Petrels. The small wedge-tailed petrel (*Halocypetna microsoma*), of the coast of Lower California, is the sole representative of a genus distinguished from the above by the tail being much rounded, the metatarsus exceeding the length of the third toe, and by the absence of any white on the rump. Leach's petrel (*Cymochorhea leucorrhoea*) belongs to an allied genus, comprising several somewhat larger species readily characterised by the deeply forked tail,



STORM-PETRELS ON THE WAVES ($\frac{1}{2}$ nat. size).

in which the feathers have very broad tips, while there may or may not be a white rump-patch. The species named has a very wide distribution, being common to both the Atlantic and Pacific. A fourth genus, represented by the fork-tailed petrel (*Oceanodroma furcata*) and Hornby's petrel (*O. hornbyi*), of the North Pacific, differs by the feathers of the forked tail being scalloped at the end, there being no white patch on the rump, and the plumage being either uniform bluish ashy or grey, with the forehead cheeks, or collar on the throat, and the under-parts white.

The preceding members of the family collectively constitute a subfamily characterised by the presence of at least thirteen secondary quills, by the metatarsus being covered with small hexagonal plates, by the sharp and curved claws, and by the leg-bones being shorter than the wing. On the other hand, the small Wilson's petrel, together with some allied species, forms a second subfamily distinguished by the presence of only ten secondaries, by the metatarsus being either booted or covered in front with large oblique scutes, by the flat and broad claws, and by the leg-bones exceeding the wings in length. In all the group the aperture of the straight nasal tubes is single and circular. Wilson's petrel (*Oceanites oceanicus*), which is somewhat larger than the storm-petrel, inhabits the Atlantic Ocean and Australian seas; while the other members of the genus are exclusively southern. The general colour of its plumage is dusky, with the quills and tail-feathers black. As regards their muscles, these petrels are highly specialised, and in the boot-like plates covering the metatarsus, they differ from all other water-birds. The white-bellied petrel (*Cymodroma grallaria*), of the tropical seas, has an even tail, and the metatarsus about twice the length of the third toe, exclusive of the claw. The plumage is parti-coloured.

**The Diving
Petrel.**

Like the albatrosses, all the petrels hitherto mentioned are essentially flying and swimming-birds, which dive but little. There is, however, a remarkable aberrant petrel inhabiting the Straits of Magellan which differs from all the other members of the order in its short wings and diving habits; while it is further distinguished by the nasal tubes being vertical and opening superiorly; the first toe being also absent. This bird (*Pelecanoides urinatrix*), which many ornithologists regard as the representative of a distinct family, is, indeed, in habits and appearance so like an auk, that, as Darwin remarks, when seen from a distance, either on the wing, or diving and swimming, it would undoubtedly be mistaken for one of these birds. Nevertheless, both in structure and plumage, it is essentially a petrel; and we must accordingly regard life. These birds, according to Moseley, may be seen in calm weather in Royal Sound floating in immense numbers on the water, the flocks sometimes extending over acres, and causing the sea to appear literally black. They dive with extreme rapidity, and when disturbed, rise and flutter a short distance along the surface, after which they again drop and dive.

THE DIVING BIRDS.

Order PYGOPODES.

This group admits of much less concise definition than the preceding, unless indeed we follow the example of many modern ornithologists in removing from it the auks. It has been proposed to transfer the latter to the gulls, with which they agree in having cup-and-ball articulations to the vertebrae of the back; but since it is certain that all the primitive birds had cup-like articular surfaces to their vertebrae, there seems no reason why the cup-and-ball

structure should not have been independently acquired in two distinct groups. Moreover, the auks differ from the gulls in the absence of any projecting process to the lower end of the humerus.

In this wider sense the diving-birds are characterised externally by the extremely backward position of their short legs, in which the front toes are either completely webbed or lobed, the first toe being either absent or rudimentary. In the skull the palate is of the cleft (schizognathous) type, the lower jaw is abruptly truncated behind, and there are large grooves for the reception of glands on the forehead, which are separated from one another merely by a narrow ridge. The humerus has no process at its lower end; but the tibia has an upwardly projecting crest, which may unite with the knee-cap or patella to form a long spike, projecting upwards in front of the femur. The young are born covered with down or feathers, and are soon active. In the plumage, the spinal feather-tract is either forked on the upper part of the back, or not defined on the neck; while the oil-gland is invariably tufted. The wings are relatively short; and the beak is comparatively straight and often much compressed, with its horny sheath generally composed of but a single piece.

Contrasted with the other ordinal groups in which the palate is of the cleft type, the divers are readily distinguished from the tube-nosed birds by the normal conformation of their nostrils, their active young, and the absence of a projecting process to the lower end of the humerus; the latter feature, together with the more marked upward extension of the crest of the tibia, and the lack of any perforations in the bones of the second digit of the wing, differentiating them from the gulls. They are not likely to be confounded with the *Limicola* or any of the remaining orders; from all of which, except certain of the group named, they are distinguished by the presence of grooves on the front of the skull. The group may be divided into three families, of which the second and third are much more closely related to one another than they are to the first.

THE AUKS.

Family *ALCIDÆ*.

The auks are characterised externally by the absence of the first toe; while in the skeleton the crest of the tibia is relatively short, the metatarsus is not laterally compressed, and the vertebræ of the back are articulated together by cup-and-ball joints. The front toes are fully webbed and furnished with sharp, claw-like nails; the tail, although short, is normal, and the beak, although frequently much compressed, deep, and short, is subject to great variation in form. The family includes the true auks, guillemots, pigmy-auks, and puffins; all of which are marine, and confined to the colder regions of the Northern Hemisphere.

The typical members of the family are characterised by the large size of the compressed beak, marked in front by oblique grooves, and feathered at its base close up to the slit-like nostrils, which are almost concealed by a dense velvety feathering, completely filling the fossæ in which

The True Auks.

The preceding members of the family collectively constitute a subfamily characterised by the presence of at least thirteen secondary quills, by the metatarsus being covered with small hexagonal plates, by the sharp and curved claws, and by the leg-bones being shorter than the wing. On the other hand, the small Wilson's petrel, together with some allied species, forms a second subfamily distinguished by the presence of only ten secondaries, by the metatarsus being either booted or covered in front with large oblique scutes, by the flat and broad claws, and by the leg-bones exceeding the wings in length. In all the group the aperture of the straight nasal tubes is single and circular. Wilson's petrel (*Oceanites oceanicus*), which is somewhat larger than the storm-petrel, inhabits the Atlantic Ocean and Australian seas; while the other members of the genus are exclusively southern. The general colour of its plumage is dusky, with the quills and tail-feathers black. As regards their muscles, these petrels are highly specialised, and in the boot-like plates covering the metatarsus, they differ from all other water-birds. The white-bellied petrel (*Cymodroma grallaria*), of the tropical seas, has an even tail, and the metatarsus about twice the length of the third toe, exclusive of the claw. The plumage is parti-coloured.

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they are situated. The wings are more or less short; and the tail is graduated, with its component feathers pointed.

On account of its extinction within the present century, as well as from being the largest representative of the family, and the only bird in the Northern Hemisphere incapable of flight, the great auk, or garefowl.



GREAT AUK ($\frac{1}{2}$ nat. size).

(*Alca impennis*), is of great interest. In common with many other northern sea-birds, it was formerly known as the penguin,—a name now transferred to the well-known birds of the Southern Hemisphere. In size, the great auk may be roughly compared to a goose, its total length being about 32 inches. It was especially characterised by the rudimentary condition of the wings, which, owing

to the reduction in the length of the ulna and bones of the digits, were quite useless in flight; while it was further distinguished by the beak being equal in length to the head, and furnished with numerous grooves on its lower, as well as on its upper mandible. In colour, the plumage of the head, neck, and back was black, while the under-parts, as well as a characteristic spot in front of the eye, were white.

Confined to the North Atlantic, and ranging as far north as Iceland on the one side and Greenland on the other, the great auk was a migratory species, which in winter wandered as far south as the Bay of Biscay and the shores of Virginia. Both in Greenland and Norway it appears to have been always rare; and its chief or only breeding-places were three rocky islands near Iceland, known as the Garefowl Skerries or Geirfuglasker, and Funk Island off the Newfoundland Coast. By the subsidence in the spring of 1830 of one of these islets, which as being the most inaccessible, was the favourite breeding-place, the birds were driven to one nearer the shore, where they were more easily approached; and in the course of the next fourteen years the species became extinct in Europe, the last pair having been killed in the summer of 1844. The existence of the garefowl on Funk Island was discovered about 1534, when the birds were so numerous as to be reckoned, it is said, by thousands; but incessant persecution for more than two centuries eventually brought about its extermination, which probably took place almost contemporaneously with its disappearance from Europe. On Funk Island, as Mr. Lucas remarks, it was customary for the crews of several vessels to spend the summer for the sole purpose of killing garefowl for the sake of their feathers. Although we have but traditions of these expeditions, it is indisputable that stone pens were erected into which the birds were driven like sheep, that they were slain by millions, and that their bodies were left to rot where they lay, while for some purpose or other frequent and long-continued fires were lighted on the island. The records of this slaughter are still extant in the numbers of garefowl bones to be met with in the soil of Funk Island; such relics, together with a few skins, and a number of egg-shells, being all that remain to us of the finest of the auks.

That the garefowl was generally a gregarious bird, more especially during the breeding-season, is evident from the foregoing; but it is stated that solitary pairs were occasionally found nesting with guillemots and razorbills. Although useless for flight, the wings were admirably suited as paddles; and the swimming and diving powers of the bird were probably unrivalled, its migrations being more extensive than those of many of its relatives which possess the power of flight. From the accounts of the natives of Iceland, it appears that the garefowl swam with its head elevated and the neck retracted, and that, when pursued, instead of flapping along the water, it immediately dived. As in allied species, the eggs are relatively large in proportion to the size of the bird, often measuring just over 5 inches in length; and they have also the same elongated form, with one end much larger than the other. They have a creamy-white ground-colour, marked with black or brown streaks and blotches, with underlying grey patches.

The common English razorbill (*A. torda*), which is the only other representative of the genus, differs from the garefowl not only by its greatly inferior size (length about 17 inches), but likewise by its well-developed

Razorbill.

wings and its relatively shorter beak, in which there are but two or three grooves on the lower mandible, and these indistinctly marked. Lacking the large white spot in front of the eye characterising the great auk, the adult razorbill in summer has a narrow white line extending from the beak to the eye. While in summer the chin and throat of the adult are brown, and the head, hind-neck, and upper-parts black, with the under-parts white, in the winter dress the white extends upwards to the throat, chin, and sides of the head, and the plumage of the upper-parts is browner. The razorbill is common to the coasts and islands of both sides of the North Atlantic, ranging as far north as latitude 70° in Greenland, while in winter it reaches Gibraltar, from whence it wanders a considerable distance up the Mediterranean. Resident throughout the year in the British seas, it breeds on all suitable rocky coasts, from the north of France to the North Cape, generally in large colonies. Concerning its breeding-habits, we find it stated in the third edition of *Yarrell's British Birds* that "about the middle or latter part of March in the South of England, and early in April in the northern portions of our islands, the razorbills, guillemots, and puffins converge to particular points, where, from the numbers that congregate, and the bustle apparent among them, confusion of interests might be expected. It will, however, be found that, as a rule, the guillemots occupy one station or line of ledges on the rock; the razorbills another; the puffins a third; the kittiwake-gulls a fourth; whilst the most inaccessible crags seem to be left for the use of the herring-gulls. The razorbills generally select the higher and rougher ledges, and they are partial to crevices, their eggs being sometimes deposited so far in that it is no easy matter to get at them; at other times they lay their eggs on the broader shelves along with the guillemots, but not so closely together."

Guillemots. Closely allied, both as regards structure, the colour, and seasonal chance of their plumage, and habits, to the razorbills, the guillemots differ by their more slender and straighter beak, in which there are no oblique transverse grooves, while the upper mandible is slightly curved near the point, and has a small notch on the side. The basal nostrils are partially closed by a membrane, which is itself partly feathered. There is still some degree of uncertainty as to the number of species of the typical guillemots, some writers, like Mr. Seebohm, recognising but one, while others, like Dr. Sharpe, admit several. Whether, however, we regard them as species or varieties, all the forms are characterised by the white plumage of the under-parts; this white area in the summer dress stopping short at the base of the throat, but in winter extending upwards, as in the razorbill, to the throat, chin, and sides of the head. In the typical form of the common guillemot (*Uria troile*) which inhabits both sides of the North Atlantic, the beak is of considerable length, and the head is of a uniform smoky brown. It is replaced in the Pacific by a somewhat larger form, known as the Californian guillemot. Both in the Atlantic and Pacific there are also certain guillemots, like the one in the foreground of the cut, characterised by the presence of a white streak extending backwards from the eye, and a white ring round the eye itself. Formerly regarded as indicating a distinct species, these ringed guillemots, as they are commonly called, are now generally considered to be merely sports. Pallas's guillemot, of Behring Sea and other parts

of the North Pacific is the largest representative of the second modification of the group, in which the beak is much shorter and deeper than in the preceding, while the nape of the neck and back of the head are black like the back. A portion of the base of the cutting-edge of the mandible is light-coloured. Finally, we have the so-called Brünnich's or polar guillemot (*U. bruennichi*), of the North Atlantic and Arctic Oceans, in which the size is smaller, and the whole of the cutting-edge of the upper mandible yellowish white. Mr. Seeborn considers, however, that Brünnich's guillemot is so inseparably connected by the Californian form with



COMMON GUILLEMOTS ($\frac{1}{4}$ nat. size).

the common guillemot, as to render it impossible to regard them as more than varieties of a single species. Whatever diversity of opinion may obtain as to the distinctness of the above-mentioned forms from the common guillemot, there can be none as to that of the black guillemot (*U. grylle*), which is referred, indeed, by some writers to a separate genus. It is a smaller bird than the common guillemot, from which it is at once distinguished by the whole of the under-parts being black in the summer dress; the beak being relatively short. Typically an inhabitant of the North Atlantic, it is represented in the circumpolar seas by a variety distinguished by the larger size of the conspicuous white patch on the wings. In the North Pacific it is replaced by the pigeon-guillemot (*U. columba*), character-

ised by the under surface of the wing being grey, instead of smoky white. The typical form of this species has a large white wing-patch; but there are two varieties (*carbo* and *motzfeldi*), severally distinguished by the presence or absence of white on the head, in which the wing is uniformly black on the outer side.

All the guillemots are very similar in their mode of life, being essentially oceanic birds, which only visit the rocks during the breeding-season, and are only found inland when driven there by stress of weather; while they are markedly sociable and gregarious. Their food consists of fish, supplemented by various crustaceans; the common species being especially partial to the fry of herrings and pilchards, which are captured at night in the open sea. Rapid, though heavy and laboured in its flight, the common guillemot is enabled to reach the summits of almost inaccessible cliffs for the purpose of breeding, where, as in the Farne Islands and at Flamborough, it congregates in myriads. On the ledges of the precipitous cliffs near Bampton—another noted breeding-place—the guillemots, are sometimes so densely crowded together as to remind one of a swarm of bees. The breeding-season in Britain commences in May and lasts till August; and while the other species agree with the rest of the family in laying but a single egg, the black guillemot deposits two. The eggs may be laid either on the bare ledges of rock or in fissures; and while at times several may be found together, at other times they lie singly. In coloration, guillemots' eggs are remarkable for their extraordinary variability. According to the writer last-mentioned, "the ground-colours are cream, white, blue, and yellowish green, dark and clear pea-green, and reddish and purplish brown, with every conceivable intermediate tint. Some are irregularly blotched, others are fantastically streaked with browns, pinks, or greys in endless variety, whilst a few are spotless or nearly so." Some closely resemble those of the razorbill, from which they may always be distinguished by appearing creamy-white instead of green when viewed by transmitted light.

Short-Billed Guillemots. The North Pacific is inhabited by six or seven much smaller guillemots, characterised by their very short beaks, of which the tip is not decurved. These constitute the genus *Brachyrhamphus*, and while in some species, like the marbled guillemot (*B. marmoratus*), the front of the metatarsus is reticulated, in others, such as the black-throated guillemot (*B. antiquus*), it is covered in front with large scutes.

The Little Auk. Breeding solely within the limits of the Arctic Circle, the little auk, or roche (*Mergulus alle*) is an Atlantic species, which only visits the British Isles in winter, and is even then far more common in the Orkneys and Shetlands than in the south. It is a very small bird, measuring only about 8½ inches in length, and differing from all the members of the family by the shortness of the symphysis of the lower mandible, in which the angle of the chin is much nearer to the tip of the beak than to the nostrils, instead of the reverse. The whole beak is shorter than the head, very thick, and broader than high at the base; the profile being arched, and the tips of both mandibles notched, while the upper one is faintly grooved. The rounded and lateral nostrils are placed at the base of the beak and partially covered with feathers. In coloration, the little auk very closely resembles the guillemot; the head, chin, and throat, as well as the

upper-parts being mostly black, while the remainder of the lower-parts, a spot over the eye, the tips of the secondaries, and the margins of the scapulars are white. In the winter plumage, on the other hand, the white area includes the throat, chin, and sides of the head.

The little auk ranges in the Arctic regions from Novaia Zemlia and Spitzbergen to Greenland, migrating southwards in winter as far as New Jersey on the one side of the Atlantic, and to the Canaries on the other. In its breeding-places, where it appears in May, it congregates in countless thousands, if not in millions. The single bluish white egg is laid so deep among the loose fragments of rock that it can only be reached with difficulty, and the young leave the breeding-places for the open sea before they can fly. An expert diver and a strong swimmer, the rotche feeds chiefly on crustaceans and marine worms. In

spite, however, of its oceanic habits, it appears to be ill-adapted to fight against the storms of winter, during the prevalence of which it is frequently driven far inland; and in the severe winter of 1894-95 hundreds were thus driven into England.



LITTLE AUKS.

Pacific
Pigmy Auks.

Related to the rotche are a number of small auk-like birds from the Northern Pacific, all of which differ from that species in having

the chin-angle nearer to the nostril than to the base of the beak. Among these are the tufted auk (*Simorhynchus cristatellus*), remarkable for the forwardly curving tufts of feathers at the root of the beak; the knob-billed auk (*S. pusillus*), taking its name from the presence in summer of a knob at the base of the beak which disappears in winter; and the parrot-auk (*S. psittaculus*). Still more remarkable is the horn-billed auk (*Cerorhyncha monocerata*), in which the compressed and curved beak is longer than in the preceding forms, and is pro-



HEAD OF TUFTED AUK.
(From Guillemard's *Cruise of the Marchesa*.)

vided at the base with a single horn-like knob above the nostrils, which is shed in winter. All these birds have much the same habits as the more typical auks,

generally frequenting 'sheltered bays when the weather is rough. The horn-billed auk breeds as far south as California and Northern Japan.



KNOB-BILLED AUKS.

other members of the family by the claw of the second toe being considerably longer and more curved than the other two, as well as by the presence of a rosette-like prominence at the angle of the mouth. They are further characterised by the circumstance that the feathers at the base of the beak stop short of the nostrils, and likewise by the peculiarity that the basal portion of the greatly compressed beak is furnished during the breeding-season with one or more sheath-like, deciduous pieces of an orange-red colour which are shed in winter. The much compressed beak is shorter than the head, and considerably deeper than long, with the profile of both mandibles

strongly arched, and the ridge of the upper one forming a sharp edge, while there are oblique transverse grooves on one or both mandibles. The common puffin may be compared in size to a teal, the average length in the southern portion of its habitat being about 12 inches, although in the Arctic regions it attains somewhat larger

Among the most

Puffins.

grotesque of all birds are the puffins, or sea-parrots, whose enormous, compressed, and brilliantly-coloured beaks seem out of all proportion to the size of their heads. Represented only by the common Arctic puffin (*Fratercula arctica*) in the Atlantic, the genus attains a greater development in that headquarters of the auk family, the Northern Pacific, where we meet with the horned puffin (*F. corniculata*), characterised by the great development of the horny process arising from the upper eyelid, and the handsome whiskered puffin (*F. cirrhata*), distinguished by the pendent crest of feathers at the back of the head, and the absence of grooves on the lower mandible. As a group, the puffins are distinguished from all the



HEAD OF WHISKERED PUFFIN.

(From Guillemard's *Cruise of the Marchesa*.)

dimensions, and has the beak deeper. Resembling the guillemot in general coloration, it differs in undergoing no seasonal change of plumage, and in the white area occupying the whole of the sides of the head, while the throat is encircled by a dark gorget. The beak has its terminal portion carmine-red, behind which are bands of slaty grey and yellow, with a red one on the lower mandible. With the annual moult both the sheath of the basal half of the beak and the warty red skin at the angle of the mouth are shed. In Europe the breeding-range of this species extends from the North Cape to the mouth of the Tagus, while in winter the birds wander as far south as Gibraltar, and thence pass up the Mediterranean to the Italian coasts. On the opposite side of the Atlantic the winter range reaches as far south as New York.

Essentially oceanic in their habits, puffins are gregarious at all seasons, and fly rapidly somewhat after the manner of ducks. Swimming easily, and diving with the expertness characteristic of the family, they feed chiefly on the fry of fish; while their single egg is laid either in a burrow in the ground or among the deep clefts of rocks. In colour, the egg is dull white, faintly spotted with grey and brown; and in the presence of these markings it forms one of many exceptions to the general rule that eggs laid in holes are white. From this circumstance, Mr. Seebohm suggests that these birds have only taken to laying in burrows comparatively recently; the faintness of the markings of the eggs being perhaps indicative that they are in the course of disappearance.



COMMON PUFFIN.

THE DIVERS.

Family COLYMBIDÆ.

In common with the grebes, the divers (*Colymbus*) differ from the auks (and thereby from all other birds) in that the crest of the tibia is prolonged upwards to unite with the knee-cap, or patella, thus forming a spike-like projection at the extremity of the bone, which must afford a most efficient lever for the muscles in the act of swimming. The two families are further characterised by the saddle-like form of the articular surfaces of the vertebræ of the back, by the presence of

a small first toe, and the absence of bare tracts on the sides of the neck; while the metatarsus is compressed and knife-like. In the divers the three front toes are fully webbed, and furnished with sharp claw-like nails; the number of primary quills in the wings is eleven; the tail, although short, is normal; and there are but fourteen or fifteen vertebræ in the neck. Moreover, the beak is long, sharp, and compressed; while the lores are completely feathered. Apart from the question of their relationship to the auks, the peculiar structure of the tibia seems clearly to indicate an intimate affinity between the divers and the grebes. Although an extinct representative of the family (*Colymboides*) has left its remains in the Miocene deposits of the Continent, the existing divers, of which there are three well-marked species confined to the Arctic and cooler regions of the Northern Hemisphere, are included in the single genus *Colymbus*. The divers, al-



GREAT NORTHERN DIVER.

though more slenderly formed, have somewhat the appearance of geese when seen on the water; but on land, owing to the backward situation of their legs, are widely different. In plumage, the two sexes are alike; but the winter dress differs considerably from that of summer, as do the young from the adult. The typical representative of the genus is the great northern diver (*C. glacialis*), attaining a length of some 33 inches, and character-

ised by its glossy black head and neck, the presence of two gorgets of velvety black and white stripes on the throat, and the belts of white spots of varying size crossing the dark back; the under-parts being white. Not uncommon—especially in an immature state—on the British coasts, and thence wandering as far south as the Mediterranean, this diver breeds in Iceland, Greenland, and North-Eastern Canada; while in North-Eastern Asia and Western Arctic America it is replaced by a larger variety (*C. adamsi*), distinguished by the white or yellow hue of its beak. Next in point of size is the black-throated diver (*C. arcticus*), which does not exceed 26 inches in length, and is characterised by its light grey head, the purplish black patch, surmounted with a black-and-white striped gorget on the throat, and the presence of two elongated areas on the black back between the shoulders, as well as others on the scapulars, marked by transverse white bands formed by nearly confluent square spots. The breeding-area of this species would seem to extend from the Hebrides and Scandinavia across Arctic Asia over the greater part of

America, although it does not include Greenland, Iceland, or the Orkneys. Some writers regard, indeed, a variety inhabiting the Pacific Coast of America as a distinct species, although this seems scarcely justifiable. Finally, the smallest, as well as the commonest species is the circumpolar red-throated diver (*C. septentrionalis*), so named from the presence of a patch of reddish grey extending down the throat of the adult in breeding-plumage. On the upper-parts the plumage is blackish brown in colour, with a comparatively small number of spots; the head and sides of the neck being ashy-grey, while the nape is marked by streaks of black, grey, and white. Young birds, in which the throat-patch is lacking, are much more fully striped. Although it does not breed at the present day in Great Britain to the south of Scotland, remains of this diver, discovered in the superficial



HAUNT OF THE BLACK-THROATED DIVER.

deposits of the East Coast, suggest that it was formerly a resident in this part of England, when the climate was colder.

Feeding almost exclusively on fish, and during the winter being oceanic in their habits, the divers resort to inland lakes for the purpose of nesting. Unlike the auks, they are not gregarious, consorting only in pairs, and these generally keep far apart from one another. Although they are strong on the wing, the backward situation of their legs renders the divers extremely ill adapted for moving upon land, where they walk with the greatest difficulty and ungainliness. Accordingly, in order to avoid the necessity of making the attempt, the slight nest is always constructed close to the water's marge, so that the sitting bird can at any moment resort to her native element by merely sliding downwards from her sitting-place. In contrast to their awkwardness on land, is the extreme agility displayed by the divers both on and beneath the surface of the water. They may, indeed, be regarded as almost the diving-birds *par excellence*, the great northern diver having been stated to remain below the surface for a period of eight minutes, and all the species will readily take a baited hook while diving. Seldom seen

on the wing except during the periods of migration, divers fly in a straight, arrow-like course, somewhat after the manner of ducks. The notes of all the species are harsh and grating. Arriving at its breeding-haunts in the Arctic regions, about the end of May or beginning of June, synchronously with the breaking up of the ice, the great northern diver forthwith sets about the work of nesting. For choice, an island is selected, but, failing this, the shelving shore of some lonely lake, or even of a mountain tarn, is taken for a site. The nest, which is constructed of grass and sedge, is placed in an exposed position, where the sitting bird may readily receive warning of approaching danger, upon which it takes at once to the water. This might at first sight seem fraught with danger to the eggs; but it appears that the safety of these is generally sufficiently assured by their protective resemblance to their inanimate surroundings; their colour being dark brown speckled with blackish. The usual number of eggs in a nest is but two; and both sexes take their share in the work of incubation.

THE GREBES.

Family *PODICIPEDIDÆ*.

Best known by the little dabchick of our English meres and rivers, the family of the grebes is distinguished from that of the divers by the toes being lobated instead of webbed, and furnished with broad, flat nails, rounded at the tips; by the presence of twelve primary quills in the wing; by the rudimentary condition of the tail; and by the number of vertebræ in the neck varying from seventeen to twenty-one. In all of them a bare stripe extends across the lores from the beak to the eye; the beak, although very variable in form, is always much elongated; and the nostrils are never protected by an overhanging lobe. The wings are short and concave, and when closed have the primaries concealed by the secondaries; while in the aborted tail a tuft of downy, soft feathers takes the place of the usual stiff rectrices. On the lower surface of the body, the plumage, which is usually of a pure white hue, is remarkable for its soft silky texture and brilliant lustre.

The grebes are more addicted to fresh-water than any other members of the order, some of them being inhabitants of lakes and rivers throughout the year, while others are oceanic during a large portion of their existence. They are represented by some sixteen species, ranging over the temperate and subtropical regions of both hemispheres; five of these being European, and two out of the latter breeding in the British Islands, while the other three are but winter visitants thereto. The eggs differ from those of the divers in the creamy white colour of their shells, and their green tinge when viewed by transmitted light; the usual number in a clutch being either three or four.

The Typical Grebes. Using the term *Podicipes* in a wide sense, it will include the greater number of species of the group, or all those in which the length of the slender beak varies from $2\frac{1}{2}$ to 6 times its basal depth. Among the larger members of the genus, the western grebe (*Podicipes occidentalis*) is the sole representative of a group characterised by the great length of the neck and beak, and the smooth head, which is devoid of tufts at all seasons of the year, while there

is no seasonal difference in the general plumage; this species being exclusively North American. The great crested grebe (*P. cristatus*), which is the largest member of the genus, and attains a length of from 21 to 22 inches, belongs, on the other hand, to a section in which the neck and beak are shorter, and the head of the adult is ornamented in the breeding-season at least, with coloured ruffs, tufts, or patches; while the general plumage in the breeding-season, differs considerably from that of the adult in winter, and likewise from that of the young. In this particular species the crest, although largest in summer, is borne throughout the year; but in others it disappears in winter completely. In its summer plumage, this bird may be recognised by its chestnut-coloured ear-coverts, and the white front of the lower neck and breast; while in winter it has the lores and a stripe over the eye white.

Confined to the Eastern Hemisphere, this species is remarkable for the extent of its breeding-area, which includes Britain and Southern Europe, the whole of Africa, and the greater portion of Southern and Central Asia, as well as Australia and New Zealand. It is noteworthy that the Australasian forms, though completely isolated, present no differences from the others. The smaller



CRESTED GREBE.

red-necked grebe (*P. griseigena*), which only measures 16 inches in length, takes its names from the chestnut hue of the front of the lower neck in the summer plumage, in which alone the crests on the head are present. Inhabiting a large portion of Northern Europe and Asia, this species appears to have a circumpolar distribution; although some writers regard the variety occurring in America and North-Eastern Asia as a distinct species, under the name of *P. holboelli*. A third group of the genus is characterised by the smaller size of its members, in which the neck is short, and the beak shorter than the head, while ear-tufts are present in the breeding-plumage. Its best known representative is the circumpolar Slavonian grebe (*P. cornutus*), which visits the British Islands and Gibraltar in winter, and, except in Norway, does not breed north of the Arctic Circle. Measuring a little over 13 inches in length, it is characterised by its compressed beak; and the combination in the breeding-plumage of a chestnut fore-neck with black ear-tufts. On the other hand, the black-necked grebe (*P. nigricollis*) may be recognised by the prevalence of black on both the fore-neck and the ear-coverts. Ranging over the greater part of Europe and Asia (except India and Burma), as well as

portions of Africa and the whole of Greenland, this species is represented by a variety in Western North Africa. Lastly, we have the familiar dabchick or little grebe (*P. fluviatilis*) of the Old World, and the least grebe (*P. dominicus*) of tropical America, together with some southern forms, as the representatives of a fourth group, characterised by the small size of its members, the very short neck and beak, and the absence of tufts or crests in the breeding-plumage. By many writers these species are regarded as constituting a distinct genus—*Tachybates*. The dabchick, which is the commonest of the British grebes, has a wide range in the Old World; its breeding-area including the subtropical portions of both the Northern and Southern Hemispheres south of latitude 42° , as well as elevated regions within the tropics, while in Western Europe it extends some 20° further north. Not exceeding $9\frac{1}{2}$ inches in length, the dabchick in breeding-plumage is characterised by the chestnut-red of the cheeks and front of the neck, which in the American species are always ashy grey.

Habits. With the exception that the dabchick, like its small allies, generally spends the whole year in the neighbourhood of fresh-waters, the grebes are very similar in their habits, all of them resorting to rivers and lakes for the purpose of breeding. Their diving powers are such that, when pursued, these birds seldom take to wing, but nearly always endeavour to escape by disappearing beneath the water, to reappear in the most unexpected place. Indeed, although the larger species fly strongly and well, with the neck stretched out and the wings moving rapidly, the dabchick but rarely takes to flight. The ordinary alarm-note of the great crested grebe may be expressed by the syllables *kek-kek*; but at the pairing-season a guttural sound is uttered. Their food consists of frogs, fish, molluscs, water-insects, etc., supplemented by the shoots and seeds of aquatic plants; and several instances are on record where the dabchick has been found choked through having endeavoured to swallow the common bullhead. The great crested grebe frequently associates in parties during the breeding-season; when, like its congeners, it makes its large nest of decaying water-plants so nearly level with the surface of the water that it is generally constantly wet. A colony of these birds on the Zaader Zee, near Danzig, is described by Mr. Seebohm, who writes, that "they were breeding in an immense reed-bed, and as our boat neared their nesting-grounds we saw the grebes sailing majestically, not to say indignantly, out of the side of the reed-bed. As soon as we reached the place I put on my waders, and was soon in a dense forest of reeds, where it was very easy to lose one's way. The water was above my knees, and the reeds were far above my head. After stopping to take the nest of a great sedge-warbler with four eggs, I soon found the colony of grebes. There were dozens of nests, but never very close to each other, and I soon filled my handkerchief with eggs. It was the 5th of June, and only about half the nests contained the full complement of eggs. The birds had evidently seen us long before we approached, and had had ample time to retreat with dignity. In the nests, which contained three or four eggs, these were warm and covered with damp moss; but in those containing only one or two, they were uncovered and cold." Mr. Seebohm was thus led to believe that the eggs are not covered till the female begins to incubate, and the purpose of covering them is as a protection against chill, and not for concealment; white eggs being quite in-

conspicuous in the recesses of a dense mass of reeds. The larger grebes are much hunted for the sake of the beautiful silky plumage of the breast; and on the Lake of Geneva it is customary in autumn to make up boating-parties, for the purpose of shooting the great crested species.

The Thick-Billed Grebe. The thick-billed, pied-billed, or Carolina grebe (*Podilymbus podiceps*), which is an exclusively American form, clearly represents a distinct genus, characterised by the shortness and stoutness of the beak, in which the length is less than twice the basal depth. The much arched beak is parti-coloured; the length of the metatarsus is less than that of the third toe without the claw; and the head is not tufted, although the throat is ornamented with a black patch. This grebe inhabits temperate North America and the West Indies, as well as the whole of Central and the greater part of South America.

THE PENGUINS.

Order IMPENNES.

Approximating to the diving-birds (to which they also present certain resemblances in the structure of their soft internal parts) in the backward position of their short legs and their upright posture when on land, the penguins of the Southern Hemisphere differ from all other members of the class in two important structural features. In the first place, the wings, in which the quills are rudimentary, are transformed into paddles; and, in the second, the short metatarsus is of great width, with its three longitudinal elements incompletely fused together, and separated from one another by small foramina. Consequently, these birds can scarcely be said to have a true cannon-bone. As regards their skulls, the penguins agree with the other birds treated in this chapter in having the palate of the cleft (schizognathous) type; and there are also hollows on the forehead for the reception of glands. The feathers are provided with after-shafts, and the spinal feather-tract is not defined on the neck, while the oil-gland is tufted. The young, although born covered with down, are at first helpless, and require to be tended for a long period in the nest. In addition to the rudimentary condition of the wing-quills, there are also no functional tail-feathers; and it is very noteworthy that the rudimental scale-like feathers with which the wings are covered are more numerous than the quills and wing-coverts of any other birds. As additional characters of the skeleton, it may be mentioned that the blade-bone or scapula is remarkable for its great breadth, while the bones of the wings are flattened; the humerus, which has no process on the outer side of its lower extremity, being very short. In habits the penguins are marine and carnivorous.

The general appearance of these birds is so well-known that it will be unnecessary to say much on this point. We may mention, however, that the beak is more or less elongated and straight, with its sides compressed and grooved, and its tip sharply pointed; the slit-like nostrils being situated within the lateral



RIGHT METATARSAL BONE
OF THE YELLOW-
CROWNED PENGUIN.

grooves. The three front toes are of moderate length and completely webbed; while the first toe is very small, and united to the sides of the metatarsus. Although it is possible that the penguins may have some affinity to the diving-birds, the structure of the metatarsus seems undoubtedly to point to their being an extremely primitive type, since it is difficult to believe that a metatarsus of this kind could have been evolved from the cannon-bone of an ordinary bird by a kind of retrograde evolution. This view is supported by the large number of the rudimental wing-feathers, to which allusion has been already made; and likewise by the circumstance that remains of a very large penguin having been obtained in New Zealand from strata of Eocene age, thus showing the extreme antiquity of the group. It may be added that some writers regard the penguins as constituting a group entirely apart from all the birds hitherto treated, and ranking on an equality with the ostrich-like birds described in a later chapter.

As already mentioned the penguins are confined to the Southern Hemisphere, where they range from the tropic to about the 80th parallel of south latitude. They are found not only on the Antarctic ice, but in South Africa, South America, Australia, and New Zealand, as well as many of the smaller islands of the southern oceans, more especially the Falklands, Kerguelen, and Tristan da Cunha. Although the whole of the penguins—some twenty in number—are included in the single family *Spheniscidae*, they are now generally divided into five genera, of which the leading characters may be briefly noticed. The largest members of the whole group are the king-penguin (*Aptenodytes pennanti*), of Marion Island, Kerguelen Land, and other districts in the southern ocean, and the still larger emperor-penguin (*A. forsteri*), of the Antarctic seas. In addition to their large size, these species, as shown in our coloured Plate, are characterised by the great length and slenderness of the beak, which is slightly arched, and the absence of any crest on the head. In the former the colour of the head, neck, and throat is brownish black; the region behind the ear having a pear-shaped patch of yellow, continued as a streak down the sides of the neck, and meeting on the upper breast; while the whole of the upper-parts are iron-grey, and the under surface glistening white, faintly tinged with yellow. In the emperor-penguin the yellow area is limited to a small patch behind the eye. Specimens of this species brought to England by Ross, stand, as mounted, just under 3½ feet in height; while the largest example captured by him weighed 78 lbs. Closely allied to these is the gentle penguin (*Pygoscelis taniata*), of Kerguelen Land and the Falklands—a species inferior in size only to the king-penguin, and commonly known as the “Johnny.” Devoid of a crest, this penguin is distinguished from the preceding by the long and pointed red beak being stouter and more feathered. In colour the plumage of the back is dark blackish and that of the under-parts white; the dark of the back being continued on to the head, the summit of which is marked by a conspicuous white patch.

The crested penguins, as represented by the “rock-hopper” (*Eudyptes chrysoloma*), of the Falkland Islands, the yellow-crested penguin (*E. pachyrhynchus*), of New Zealand and the Antarctic, and several others, belong to a third genus, characterised by the smaller size of its members, the short, deep, and compressed beak, in which the upper jaw has a distinctive oval form, and the presence of a

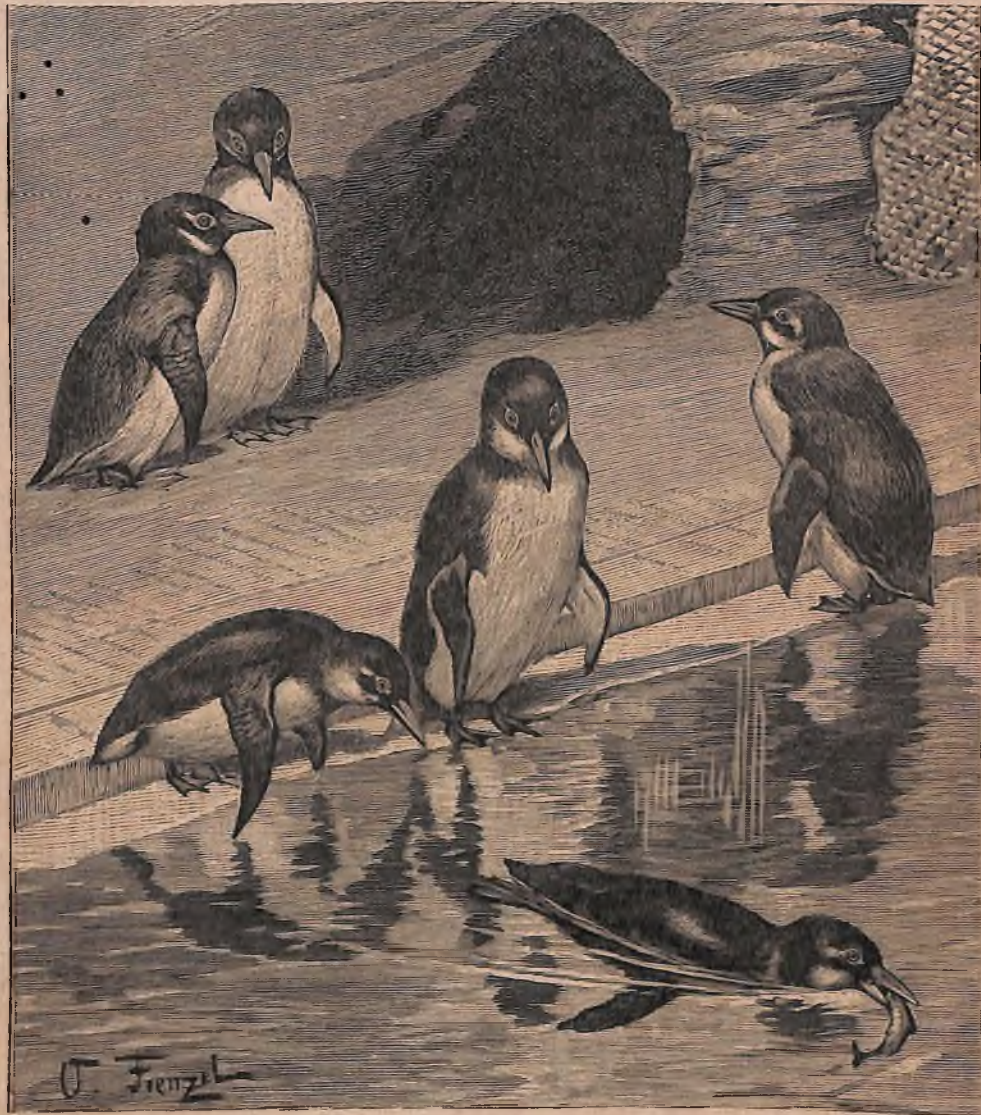
pair of yellow crests on the sides of the head, which are continued forwards as streaks above the eyes to the neighbourhood of the base of the beak. In the rock-hopper these crests are much elongated, attaining a length of from 3 to 5 inches, while in the New Zealand species they are much shorter, never exceeding a couple of inches in length. The total length attained by the latter species is 27 inches. Nearly allied is the little blue penguin (*Eudyptula minor*), of Southern Australia



ROCK-HOPPER PENGUINS ($\frac{1}{4}$ nat. size).

and New Zealand, which does not measure more than 19 inches in length, and has no yellow streaks or crests on the head; the general colour of the plumage of the upper-parts being light blue, with a median black line down each feather, while the under-parts are dazzling white. Fossil remains of both these genera occur in the superficial deposits of New Zealand. The remaining penguins are included in the genus *Spheniscus*, of which the black-footed penguin (*S. demersus*), of South Africa, Humboldt's penguin (*S. humboldti*), of Western South America, and the jackass penguin (*S. magellanicus*), of the Falkland Islands are well-known examples.

In these the beak is straight and moderately short, but very wide and deep, with the tip of the upper mandible slightly hooked, and that of the lower truncate. There are no crests; and the metatarsus is relatively long. In the adult of the black-footed penguin the general colour of the plumage is bluish grey above, and



GROUP OF BLACK-FOOTED PENGUINS.

white below; a band the colour of the back extending (as in Humboldt's penguin) from the front of each thigh up the sides to form an arch on the front of the neck, while the white of the throat is continued upwards on the sides of the neck to form a line through the eye. The total length is about 26 inches. In young birds a broad blackish band occupies the whole of the front of the lower part of the throat, and joins directly with the dark area of the back, while there is no white

line through the eye. Humboldt's penguin has the white line running just above the eye, and no white area below the same.

Habits.

Penguins, writes a recent observer, are the strangest creatures ever seen; presenting a most curious appearance, both when strutting about with their padded feet over the snow, or when gliding on their breasts down a slope, toboggan-fashion. When a visitor lands upon the Antarctic ice, the emperor-penguins approach him fearlessly with their duck-like cry; a proceeding which too often leads to their destruction. Their tenacity of life is, however, marvellous, exceeding even that of the proverbial cat; the writer just quoted stating that he has known an emperor-penguin to live after its skull has been hopelessly smashed in. All the species are gregarious, frequently assembling in tens of thousands; and when on the land during the breeding-season are in the habit of ranging themselves in long lines on the ledges of the rocks or ice, thus simulating the appearance of soldiers, when seen from a distance. Although the king-penguins in our coloured Plate are represented with the beaks extended horizontally, this position, according to



HUMBOLDT'S PENGUIN.
(From Bartlett, *Proc. Zool. Soc.*, 1879.)

Moseley, is incorrect, the birds really standing with the head and neck stretched vertically upwards. The food of penguins consists exclusively of fish, which the birds capture beneath the surface by their agility in swimming and diving, when the paddle-like wings are used as the chief instruments of progression. So thoroughly, indeed, are they at home in the water, that they are apt to be taken for dolphins rather than birds, as is testified by Moseley, who writes that on first approaching the shore of Kerguelen Land he was astonished at seeing what appeared to be a shoal of small porpoises or dolphins. "I could not imagine," he continues, "what the things could be, unless they were indeed some marvellously small cetaceans; they showed black above and white beneath, and came along in a shoal of fifty or more, from seawards towards the shore at a rapid

pace, by a series of successive leaps out of the water, and splashes into it again, describing short curves in the air, taking headers out of the water and headers into it again; splash, splash, went this marvellous shoal of animals, till they went splash through the surf on to the black stony beach, and there struggled and jumped up amongst the boulders and revealed themselves as wet and dripping penguins, for such they were." On landing, the penguins always make for certain well-defined tracts leading up to the "rookeries," as their places of assembly are called, and where they not unfrequently collect in thousands; these main tracts branching out into a number of diverging paths when they reach the rookery. The nest of the rock-hopper is merely a shallow depression in the black soil, which may or may not be lined with a few stalks of dry grass. In this are deposited two greenish white eggs, about the size of those of a duck, in the incubation of which both male and female birds take their share. The black-footed species, according to Layard, deposits, however, but a single white egg, which rests on the bare ground. On the other hand, the jackass-penguin is in the habit of nesting in burrows, which may be as much as twenty feet in depth; and the same is also not unfrequently the case with the little blue penguin of New Zealand, although the two eggs of this species are sometimes laid in the crevices of rocks. The breeding-time of this species on the islands off the Cape lasts through August, September, and October.

The penguins inhabiting Tristan da Cunha migrate about April, and return in July or August; but where they go seems not to be ascertained, although it is quite certain that they cannot remain at sea for such a protracted period. Although during their aquatic journey they do not travel with anything like the speed of birds on the wing, they have, as Moseley remarks, the compensating advantage of a constant supply of food. Writing of the habits of the little blue penguin, Gould observes that "its powers of progression in the deep are truly astonishing; its swimming powers are in fact so great that it stems the waves of the most turbulent seas with the utmost facility, and during the severest gale descends to the bottom, where, among beautiful beds of coral and forests of seaweed, it paddles about in search of crustaceans, small fish, and marine vegetables, all of which kinds of food were found in the stomachs of those I dissected." Of the jackass-penguin, Darwin says that when crawling, it may be said, on four legs, through the tussocks or on the side of a grassy cliff, it moves so very quickly that it might easily be taken for a quadruped. When at sea and fishing, it comes to the surface for the purpose of breathing with such velocity, and dives again so instantaneously, that I defy any one at first sight to be sure that it is not a fish leaping for sport. This species, by the way, derives its popular name from its habit, when on shore, of throwing back its head and giving vent to a cry not unlike a donkey's bray.

CHAPTER XXI.

THE TINAMUS, FLIGHTLESS BIRDS, ETC.

Groups CRYPTURI, STEREOORNITHES, RATITÆ, ODONTORNITHES, AND SAURURÆ.

Tinamus. SOUTH AMERICA is the exclusive home of a group of birds which, while resembling the game-birds to a great extent in outward appearance and habits, present a peculiarity in the structure of the bony palate of the skull by which they are distinguished from all the birds hitherto described, and thus approximate to the ostriches. These birds are the tinamus, constituting the order *Crypturi* and the family *Tinamidæ*, and are represented by thirty-nine species arranged under nine genera. That the tinamus are allied on the one hand to the game-birds, and on the other to the ostrich-like birds, seems most probable; and it is not unlikely that the type of palatal structure they display is the primitive one from which the others have originated.

Partridge, or quail-like, in general appearance, the tinamus have small heads, with short, slender, curved beaks; strong, naked legs and feet, in which the first toe is either small or represented merely by its claw; and short, rudimentary tails, which are frequently concealed by the coverts; the wings being also short and rounded. They are specially characterised by the circumstance that while the narrow breast-bone has a well-developed keel, like that of the game-birds, in the palate of the skull, which is of the cleft or schizognathous type, the vomer, or median element, is fused with the bones immediately in front and behind it, namely, with the maxillo-palatines in front and with the palatines and pterygoids behind, in which respect they approximate to the ostriches. A further resemblance to that group is afforded by the circumstance that the last few vertebræ of the tail do not coalesce to form a ploughshare-shaped bone. In the skull the apertures of the nostrils resemble those of the game-birds in their oval (holorhinal) shape; while on its under surface the sphenoidal rostrum bears well-developed basipterygoid processes. In the plumage the feathered tracts, both on the neck and elsewhere, are well distinguished from the bare intervening areas; the after-shafts of the feathers are rudimentary; there are ten primary quills in the wings; and the oil-gland is tufted. The young are active almost immediately after hatching, and are remarkable for the rapidity with which they acquire their full plumage; being, in fact, able to fly more rapidly than the adults. The general colour of the plumage is deep yellowish, marked above with bars of dark brown and black. The eggs of all the species are remarkable for their highly polished surface, which resembles a piece of glazed porcelain, the colour being either wine-red or bluish green. As regards food, the tinamus are vegetable-feeders. Since all the members of the family are very similar in general structure, it will be unnecessary to point out the

distinctive characters of the various genera; although it may be mentioned that the family may be divided into two sections, according to the presence or absence of a distinct first toe. Of the seven genera with a well-developed first toe, the robust tinamu (*Tinamus robustus*) and the solitary tinamu (*T. solitarius*), of Brazil, are representatives of the typical genus. The banded tinamu (*Crypturus noctivagus*), of Brazil, is a well-known member of the largest genus of the family which contains some sixteen species; while the martineta, or great tinamu (*Rhynchotus rufescens*), of Brazil and Argentina, is one of two congeneric species, which may be compared in size to a pheasant. Its eggs are of a wine-red colour. On the other hand, the spotted tinamu (*Nothura maculata*), and the allied Darwin's tinamu (*N. darwini*), both of



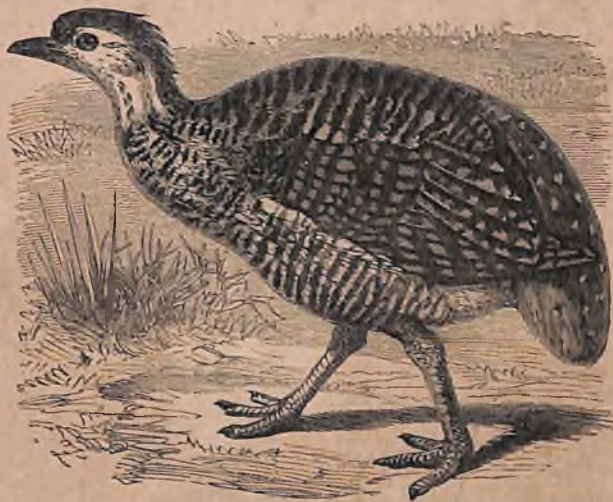
GREAT TINAMU, OR MARTINETA ($\frac{1}{2}$ nat. size).

which are inhabitants of the Argentine pampas, are more nearly the dimensions of a small partridge; their eggs being either purple-red or liver-colour. The two genera in which the first toe is rudimentary are each represented by a single species, of which by far the handsomest is the crested tinamu (*Calodromas elegans*), of Patagonia, in which both the upper and lower plumage is elegantly mottled, and the head adorned with an upright crest. This species, which is of the size of an English pheasant, lays from ten to a dozen blue-green eggs as large as those of a fowl. Pentland's tinamu (*Tinamotis pentlandi*), the representative of the second three-toed genus, lacks the upright crest.

Habits.

To ordinary observers, the tinamus, both as regards general appearance and habits, would be considered as game-birds, of which,

indeed, they take the place in South America, where they are commonly termed partridges. Endowed with far less powers of flight than ordinary game-birds, the various species of tinamus frequent either the open grassy pampas, or seek the shelter of woods. The species inhabiting the Argentine pampas, as the author can testify from personal experience, are in the habit of skulking like rails among the luxuriant grass, among which they run from under the very feet of the horses. They can be flushed only with difficulty, although when they do rise their flight is exceeding noisy and violent, and soon leads to the birds exhausting themselves. Writing of the spotted tinamu, Mr. E. W. White states, in Misiones these birds partake of the colour of the soil, which "is of a ferruginous clay, and differ herein completely from those of Buenos Ayres. They are so completely tame and abundant on the fine undulating grass-lands that extend hence southwards, that in the early morning they come right up to the houses, and the boys knock them over with stones." On account of their confiding disposition, coupled with their general stupidity, and the excellence of their flesh, these birds have been well-nigh exterminated in many districts where they were formerly abundant; large numbers being taken by riding in a circle and capturing them with a noose.



PENTLAND'S TINAMU.

Generally solitary, many live in close proximity, making their whereabouts known to one another by their soft plaintive cries. Of all the birds of the pampas, the great tinamu, according to Mr. Hudson, "is perhaps the sweetest-voiced, and sings with great frequency. Its song or call is heard oftenest towards the evening, and composed of five modulated notes, flute-like in character, very expressive, and is uttered by many individuals answering each other as they sit far apart concealed in the grass." The crested species, which is also a regular singer, seems to associate in coveys; and, like the game-birds, is in the habit of dusting its plumage in the sandy soil. The young, whose precocity in regard to the development of feathers has been already mentioned, leave their parents at a very early age to shift for themselves. The nests are built in a hollow on the ground, beneath the shelter of a tussock of grass or low bush, and scantily lined with herbage and feathers.

EXTINCT PATAGONIAN FLIGHTLESS BIRDS.

Group STEREORNITHES.

Although their intercalation between the tinamus and the ostrich-like birds somewhat interferes with a proper sense of the connection of those two groups, it

is necessary to mention here an assemblage of giant flightless birds, which were abundant during the Miocene Tertiary in Patagonia and parts of Argentina. These Stereornithes, as they are called, certainly cannot be included among the modern flightless group of giant birds, and it is uncertain whether they can claim a place with the preceding orders in the great subclass of *Carinatae*; so that they must, accordingly, be allowed to constitute a group by themselves, of which the exact serial position cannot yet be fixed. Attaining gigantic dimensions (the tibia of one species being upwards of 30 inches in length), these Patagonian birds are especially characterised by the great relative size and remarkable form of their skulls. In one species, for instance, the lower jaw measures 21 inches in length, and is of extraordinary massiveness; while in another, although shorter, this massiveness is still more exaggerated. The skull is characterised by the great depth and compression of the upper mandible of the beak, which terminates in a descending



SIDE VIEW OF SKULL OF GIANT FLIGHTLESS PATAGONIAN BIRD (*Phororhachis*)
(about $\frac{2}{3}$ nat. size). (From Ameghino.)

hook, towards which the extremity of the lower mandible gently ascends. The nasal apertures (*N*) are pierced very high up on the sides of the skull, and have no partition between them, and the lower mandible is truncated posteriorly, and has its two branches united by a very long symphysis. A feature in which these birds differ from the ostrich group is to be found in the circumstance that the quadrate-bone (*Q*) articulates with the rest of the skull by two heads at its upper extremity, as in ordinary flying-birds. In the leg-bones the tibia has a bony bridge at its lower end for the protection of the extensor tendons, and the first toe was generally present. Although well-developed wings were retained, these were useless for flight; but the metacoracoid was of the elongated form characteristic of flying-birds, and thus markedly different from the corresponding bone of the ostrich group. The leg-bones of these birds indicate two well-marked generic types, in one of which the legs were long and slender, while in the other they were more massive and relatively shorter; the former type being known as *Phororhachis* and the latter as *Brontornis*. Corresponding differences obtain in the form and proportions of the beak. Whatever be the exact serial position of these marvellous birds (all of which may be included in the single family *Phororhachidae*), it is

evident they were derived from flying-birds quite independently of the modern flightless birds.

Eocene Flightless Birds. As they may possibly have some connection with the Stereornithes, although it is almost as probable they may form a group by themselves, it may be convenient to mention here certain giant extinct birds from the Lower Eocene of France, England, and the United States, which constitute the family *Gastornithidae*. All have a bony bridge at the lower end of the tibia, while in the European *Gastornis* the component bones of the skull remained separate throughout life, and it is possible that there may have been a large tooth on each side of the upper jaw, while the symphysis of the lower mandible was short. In North America the group is represented by *Diatryma*.

THE FLIGHTLESS OR OSTRICH-LIKE BIRDS.

SUBCLASS Ratitæ.

With the exception of certain specially modified species like the dodo, in which the power of flight has been lost, the existing birds hitherto treated are characterised by the circumstance that the breast-bone is provided with a strong vertical median keel, to afford support for the muscles necessary for flight, while both the scapula and metacoracoid are separate elongated bones, forming an acute or right angle at their junction. On account of this general presence of a keel to the breast-bone, the foregoing orders are brigaded together into a single assemblage or subclass, known as the *Carinatae*, which may be anglicised into Carinates. As a rule, the Carinates possess to a greater or less degree the power of flight; and they are further generally characterised by the circumstance that in the pelvis the bones known as the ilium and ischium are united at their outer extremities so as to enclose a foramen¹; while the head of the quadrate bone, by which the lower jaw articulates with the skull, is double; and in the palate the vomer (except in the tinamus) is not fused with the neighbouring bones, or interposed between them and the rostrum of the sphenoid. On the other hand, in the birds now to be considered the breast-bone is invariably devoid of a keel, while the metacoracoid is short and united with the scapula, and the two bones form a very obtuse angle at their junction²; moreover, the furcula is incomplete, so that its two branches remain quite separate. All these birds further agree in having their wings greatly reduced, so as to be utterly useless for flight. They are also characterised by the extremities of the ilium and ischium (except in very old individuals of the rheas and emeus) remaining distinct³; and likewise by the single head of the quadrate bone, as they are by the vomer, which is broad behind, being interposed between the other bones of the palate and the rostrum of the sphenoid, and also frequently fused with some of them. Other features of the group are the absence of an oil-gland, and of any marked distinction between feathered and unfeathered areas on the skin: while the hook-

¹ This circular foramen or vacuity is shown in the pelvis of the skeleton of the parrot figured on p. 292 of Vol. III.

² This arrangement is shown in the figure on p. 294 of Vol. III., which is taken, by the way, from an aberrant Carinate.

³ See figure in Vol. III. p. 290.

like or uncinat processes of the ribs are never more than three in number, and are often rudimental, or even absent. In addition to the agreement in the structure of the skull, they resemble the tinamus in that the terminal vertebræ of the tail are not united to form a ploughshare-like bone.



KEEL-LESS BREAST-BONE OF
A RATITE BIRD.

On account of the invariable absence of a keel to the breast-bone, this group of birds, which includes the ostrich and its allies, are collectively designated the *Ratitæ* or Ratites—so named from the Latin term for a flat-bottomed boat. This group is reckoned as a subclass of equal rank with the *Carinæ*; and by many ornithologists is subdivided into orders, although we shall content ourselves by arranging its various members in families. The existing members of the group, which are comparatively few in number and have a remarkably scattered distribution on the surface of the globe, are widely different from one another in structure, and include the largest of all birds, while none of them are very small. Very different views have been entertained as to the relationship of these Ratite birds to the Carinates; it having at one time been supposed that the former might represent the ancestral stock from which the latter was derived. There is, however, now a pretty general consensus of opinion that the Ratites are derived from flying, and consequently Carinate birds, and that the tinamus are their nearest living allies.

THE OSTRICHES.

Family *STRUTHIONIDÆ*.

The ostriches are the largest of all existing Ratites, and therefore of all living birds, and they are at the same time the most specialised representatives of the subclass; this specialisation showing itself in the reduction of the number of toes to two, owing to the absence not only of the first or hind-toe, but likewise of the second. In this respect ostriches are perfectly unique among birds. While they agree with the majority of their allies in their short beak, ostriches are further characterised by the short stunted nails on the toes, the great proportionate length of the humerus of the rudimental wing, and the absence of after-shafts to the feathers. In the skeleton the furcula is wanting, the pubic bones of the pelvis unite in a symphysis (as they do in many reptiles but in no other birds), and the lower end of the tibia has no bony bridge over the extensor tendons; while there are also certain characteristic features in the base of the skull, into the consideration of which it will be unnecessary to enter. In addition to their large size and two toes, ostriches are characterised externally by the small and flattened head, in which the short beak is broad and depressed; the long, powerful, and practically naked neck; the full and massive body, provided with short wings; the muscular and partly bare thighs; and the stout metatarsus and foot. The beak has a very wide gape, reaching back to the line of the eyes; and the nostrils open near the middle of its length. The third toe is much larger than the fourth, and both are furnished with soft fleshy pads on the under surface. In the immature state the



OSTRICHES.



skin is covered with coarse plumage of a mottled dark brown and yellowish white hue, the neck being completely bare. In the adult female the colour changes to a nearly uniform dusky grey; but in the male, while the body-feathers are black, the tail-feathers and quills of the wing are pure glistening white; the neck in both sexes being clothed with short down. A peculiarity of the feathers of the wings and tail is that their two webs are of equal width. The young, like those of all the other members of the group, are active as soon as hatched; and the eggs are polished and pale yellowish white in colour; those from North



OSTRICHES FEEDING.

Africa being traversed by a number of minute punctures, while those from the Cape are smoother. Finally, the male is far superior in size to his partner.

There is still some uncertainty whether there is more than a single species of ostrich, although it is well known that the kind inhabiting Somaliland and East Africa differs from the more ordinary type, which is now confined to Africa, Arabia, Syria, and Mesopotamia. In the latter (*Struthio camelus*) the colour of the naked skin of the neck and thighs is reddish; whereas in the Somali ostrich (*S. molybdophanes*) it is bluish, and there is a conspicuous red patch on the front of the metatarsus. It is, however, probable that these slight variations indicate local races rather than distinct species. In regard to the dimensions attained by ostriches, it may be mentioned that an unusually fine male from the Niger basin,

measured 4 feet 10 inches in height at the back, and had a total length of 4 feet 3 inches. Ordinary examples of the same sex reach only about 3 feet 8 inches in height.

Distribution and Habits. —Although now confined to Africa, Syria, Arabia, and Mesopotamia, —and becoming every year scarcer in the three last-mentioned countries,—there is a probability that ostriches formerly existed within the historic period, in parts of Central Asia and possibly in Baluchistan, since there are several allusions to birds which can scarcely be anything else than ostriches in various ancient writings. Quite apart, however, from this, the evidence of its fossilised remains shows that an extinct species of ostrich, nearly allied to the existing kind, inhabited North-Western India during the Pliocene period; and a petrified egg from the province of Cherson in Russia, points to the former existence of these birds in that country. Originally it is probable that the ostrich ranged in suitable localities from Senegambia in the west, through Southern Morocco, Algeria, and Egypt, to Arabia, Syria, and Mesopotamia in the east; while in the other direction it extended from Algeria through Central and Eastern Africa. Being, however, essentially a bird of open, sandy districts, there are many regions in Africa, such as the neighbourhood of Zanzibar and large tracts on the west coast and in the Congo Valley, where, owing to the prevalence of forest, the ostrich never existed. Moreover, the constant persecution with which these birds have been harassed for years, on account of their beautiful plumes, has led to their almost complete disappearance from Egypt and Nubia, and they are now seldom found to the north of latitude 17°. The ostrich has also disappeared from large tracts in South Africa, although still to be met with in small parties in the great Kalahari Desert, and especially in the part lying to the southward of Lake Ngami. It is likewise still fairly common on the borders of Namaqualand and Damaraland, the great Mabebi flats, and certain parts of Matabililand and Mashonaland, where it is sometimes seen in large flocks.

Always inhabiting more or less desert-like districts, or flats covered with stunted patches of bush, where the elevated position of their head gives them a wide field of vision, ostriches in South Africa generally associate in parties of from ten to twenty individuals, although in the northern parts of the continent the flocks are stated to be smaller. In Southern Africa they frequently associate with herds of wildebeest and hartebeest; and their keen sight and wary nature, coupled with their unrivalled speed, render them almost the most difficult of all animals to capture. Outstripping the swiftest African antelopes in speed, the ostrich, in cool weather, could indeed easily escape from any horseman, were it not for its foolish habit of running in a circle, and thus allowing shots to be easily obtained. In running at speed the ostrich spreads its wings, and the distances it can traverse are enormous; indeed, during the daytime it is continually on the move. In the neighbourhood of the sea or lakes ostriches are reported to be in the habit of bathing during the hot season, when parties have been seen standing up to their necks in water; and salt of some kind seems absolutely essential to their existence.

The digestion of an ostrich is proverbial; and while in their general diet these birds are practically omnivorous, they are likewise in the habit of swallowing stones, sand, bones, or even pieces of metal, to aid in the trituration of their food. In captivity this habit probably becomes abnormally developed; and there are

instances where even the constitution of an ostrich could not resist the effects of some of the substances swallowed. Among the ordinary food of the ostrich are comprised small mammals and birds, snakes, lizards, and insects, as well as grass, leaves, fruits, berries, and seeds. Although they can go for protracted periods without it, and will not wander far out of their way to procure it, yet when water is at hand, ostriches will drink constantly. Young ostriches are said to be silent, but the old cocks utter a loud cry, which is likened by Livingstone to the roar of the lion, and by Canon Tristram to the lowing of oxen; this cry being generally uttered in the early morning. The ostrich's chief mode of attack or defence is by kicking with its immensely powerful legs, although, in the fights in which the cocks periodically indulge, the birds also peck at one another with their beaks.

Much interest attaches to the breeding-habits of the ostrich, although from many of the accounts having been derived from native sources, very erroneous notions are prevalent on this subject. At the pairing-season, which takes place early in the spring, each cock, after having gone through various performances to attract their attention, and frequently many contests with his rivals, associates with three or four hens. All these hens lay in a single nest, which consists solely of a large hollow excavated in the sand. There is still some uncertainty as to the number of eggs laid in a nest, although there is little doubt that this has been much exaggerated. As many as twenty are, however, frequently incubated; but in addition to these it appears that a certain number are deposited round the edge of the nest, which are never intended to be hatched, and are stated to serve as food for the young. Although it is generally stated that both sexes take equal shares in the work of incubation, this is incorrect, the cock-bird (as among all the other members of the subclass) undertaking almost the entire task. He sits, for instance, throughout the night, when the nest must be protected from prowling jackals; and in such regions, as the eggs are incubated by day as well as by night, he is only relieved for short periods during the day in order to procure food. Incubation during the day takes place, however, only in the cooler districts of the ostrich's habitat; in the hotter regions the eggs being left to themselves, with a covering of sand during the day.

Capture and Domestication. As already mentioned, advantage is taken of the peculiar habits of the ostrich to surround its flocks by a party of mounted men, and by this method many are killed in Africa. There are, however, many other ways of capture. For instance, the bushmen are or were in the habit of dressing themselves in the skin of an ostrich, and thus disguised penetrating into the midst of a flock, when the birds were despatched one after another by means of poisoned arrows. The hunter must, however, take care to keep to the leeward of his victims. In Somaliland the natives hunt the ostrich on camels; while in Arabia and the Sahara it is ridden down on horseback. The bushmen and Somalis also resort to the aid of pitfalls; while the lasso is employed by the Hadendowa Arabs of the Sudan, and some other tribes; and in Senaar a curved stick is used in boomerang-fashion for the same purpose. In Namaqualand the birds are either surrounded by a cordon of men on foot, who gradually close in upon the flock; or they are driven by mounted hunters past concealed relays of their companions, who in turn take up the pursuit till their victims fall through sheer exhaustion.

In addition to the methods noticed, the bushmen have also recourse to the plan of concealing one of their number in the sand of a nest, after the removal of the eggs, and by him the birds on their return are shot down with poisoned arrows.

THE RHEAS OR AMERICAN OSTRICHES.

Family *RHEIDÆ*.

In South America the place of the ostriches is taken by an allied group of birds known as rheas, or, as they are often termed, American ostriches, which are distinguished externally by the presence of three toes, furnished with claws instead of nails, and by the fully-feathered head and neck, and the absence of a tail. The wings also are proportionately longer, and are covered with long, slender plumes. Agreeing with the ostriches in the absence of after-shafts to the feathers, in their pale-coloured eggs, and in the superiority in size of the male over the female, the rheas are further distinguished by certain peculiarities in regard to the bones at the base of the skull, and likewise by the circumstance that the ischia, or



HEAD OF COMMON RHEA.
(From Sclater, *Proc. Zool. Soc.*, 1860.)

hinder lower bones of the pelvis, meet in a symphysis in the middle line, instead of the pubes doing so. The flattened beak is broad at the base and rounded at the tip, where it has a curved nail-like sheath; and the extremity of the wing has a horny process. The lores and region round the eye, as well as a ring round the aperture of the ear, are devoid of feathers, the ear aperture being clothed with bristles.

On the head and neck

the feathers are small, thin, and pointed; while those of the body are large, broad, and rounded, although so soft that no distinct vanes are formed. In coloration the two sexes are very similar, although the female is generally somewhat paler than her consort. The best known, and at the same time the most abundant, of the three species by which the single genus is now represented, is the common rhea (*Rhea americana*), inhabiting the pampas of Argentina and Patagonia. This species is far inferior in size to the ostrich, but it is the largest of the three. Black on the crown of the head and nape, as well as on portions of the upper neck and the fore-breast, with yellow and bluish grey on the sides and other parts of the neck, the general colour of the plumage on the back, sides of the breast, and wings, is brownish ashy grey in the cock; while the

remainder of the under-parts are dirty white. The iris of the eye is pearl-grey, the naked portion of the skin flesh-coloured, the beak horn-brown, and the leg grey. In the female the feathers of the nape and front of the breast are somewhat lighter in hue. The place of the ordinary species is taken in Eastern Patagonia by the far less common Darwin's rhea (*R. darwini*), distinguished by its smaller size, relatively shorter legs, which are feathered down to the ankle-joint, as well as by the more mottled and less uniformly coloured plumage, and the pale green eggs. Lastly, we have the long-billed rhea (*R. macrorhyncha*) of Northern Brazil, which is also a small form characterised by its longer beak, larger and more flattened head-feathers, the longer feathers of the body, and the more slender legs, as well as by the general darker coloration, which is brownish grey mingled with black.



HEAD OF LONG-BILLED RHEA.
(From Sclater, *Proc. Zool. Soc.*, 1860.)

Fossil remains of rheas, some of which belong to existing species, are met with in the caverns of Brazil and the superficial deposits of other districts of South America.

Habits.

In general habits, rheas, although somewhat more gregarious, are very similar to ostriches, and as thoroughly adapted for a life on the South American pampas as are the latter for existence in the South African veldt and karroo. As a rule, each cock rhea associates with from five to seven hens, which he carefully guards from the attentions of other members of his kindred; although after the breeding-season such family-parties collect together in flocks, which may reach a total of sixty or more head. Possessed of a speed but little inferior to the ostrich, the rhea is further protected by the exactness with which the general pale bluish grey hue of its plumage assimilates to the distant haze, thus rendering it invisible even at a moderate distance. Its large form seems, indeed, as Mr. W. H. Hudson remarks, to melt mysteriously out of sight into the surrounding blue, so that the hunter strains his eyes in vain to distinguish it. A truly noble bird when standing among the tall grasses of its native pampas, the cock rhea summons his scattered consorts by a hollow booming cry, probably not unlike that of the ostrich, accompanied by a kind of sighing or hissing sound. When running from their pursuers, both sexes have the curious habit of raising one wing above the back in a sail-like fashion. In hot weather these birds will take readily to the water, not only standing in it with their bodies submerged, but also swimming boldly, though slowly, with their necks bent slightly forward and scarcely showing any portion of their

bodies. In regard to the breeding-habits of the rheas, Darwin writes that "when we were at Bahia Blanca in the months of September and October, the eggs, in extraordinary numbers, were found all over the country. They lie either scattered and single, in which case they are never hatched, and are called by the Spaniards *huachos*; or they are collected together into a shallow excavation, which forms the nest. Out of the four nests which I saw, three contained twenty-two eggs each, and the fourth twenty-seven. In one day's hunting on horseback sixty-four eggs were found; forty-four of these were in two nests, and the remaining twenty scattered *huachos*. The Gauchos unanimously affirm, and there is no reason to doubt their statement, that the male bird alone hatches the eggs, and for some time afterwards accompanies the young. The cock when on the nest lies very close; I have myself almost ridden over one. It is asserted that at such times they are occasionally fierce, and even dangerous, and that they have been known to attack a man on horseback, trying to kick and leap on him." The truth of the statement that the cock undertakes the whole work of incubation has been demonstrated not only by observations made upon wild birds, but on captive specimens, which in England have bred freely. In the common rhea the period of incubation lasts from thirty to thirty-one days; and while in the south the usual number of eggs in a nest is from fifteen to twenty, in the north as many as thirty-two have been observed.

Hunting. The rhea, like the guanaco, is hunted with the bolas, one method being for a number of mounted men armed with these implements to enclose, with the aid of the female portion of the tribe, a considerable tract of country, and thus slaughter all the game contained within the circle; while the second, and more sporting plan, is for a single horseman to pursue the bird. In the latter case a horse of great endurance, and endowed with a fair turn of speed, is absolutely essential; while it is further requisite that it should have learnt to follow all the twistings and doublings of the birds. The supreme skill and judgment in casting the bolas at the right moment, and with the requisite strength and accuracy of aim, necessary to ensure bringing the game to bay, can in general be acquired only by those who have been accustomed to the use of the weapon from their childhood. The rheas have been hunted with the bolas for about two centuries, during which period they have learnt to start off at speed on catching sight of a mounted man; but till some five-and-twenty years ago, up to which date they were never shot, they displayed supreme disregard for a person on foot.

THE CASSOWARIES AND EMEUS.

Family *CASUARIIDÆ*.

Two important features serve at once to distinguish the cassowaries and their near allies the emeus from the ostriches and rheas; the first of these being that the feathers have after-shafts of such large size as to make them practically double; while the second peculiarity is to be found in the eggs, which, instead of being light-coloured and smooth, are dark green in colour and granulated in texture. From the observations of Mr. W. Bennett on domestic emeus, it further appears

that in this group the females are larger than the males. Then, again, the wing is extremely rudimentary, so much so, indeed, that it may be invisible externally; the humerus being very short. In addition to certain peculiarities connected with the structure of the bones of the palate, the skeleton is further distinguished by retention of rudiments of the furcula. In the presence of three toes to each foot, both emeus and cassowaries resemble rheas. By many ornithologists the two genera under consideration are regarded as the representatives of as many distinct families, although in our opinion the amount of difference between them is sufficiently expressed by referring them to two subfamilies of a single family.

Cassowaries.

The cassowaries form an extensive genus containing at least nine well-defined species, and confined to Australia, New Guinea, Ceram, and some of the neighbouring islands. They are specially characterised by the bare head being surmounted by a helmet-like prominence, formed by an upward extension of the bones of the skull, and covered with naked skin, by the bare neck, which may or may not be ornamented with pendent wattles, and likewise by the great length of the claw of the second or inner toe. The body is covered with dark-coloured feathers, of a peculiarly loose and coarse structure, which are glossy, and appear more like hairs than the plumage of an ordinary bird; while the wing is represented externally merely by some four or five black quills devoid of barbs, which thus presents the appearance of very coarse bristles. Although the whole of the nine species of cassowaries are included by ornithologists in a single genus, this may be subdivided into three minor groups, distinguished by the form of the helmet, and the number of the wattles on the neck, or their absence. In the first group, as typically represented by the Ceram cassowary (*Casuaris galeatus*), which appears to be confined to the island from which it takes its name, and was the first of these extraordinary birds made known to science, the helmet is flattened from side to side, or compressed, while the wattles on the neck are either two or double, the other representatives of this group are the Australian cassowary (*C. australis*), of Northern Australia, of which the skull is represented in the figure on p. 565; and Beccari's cassowary (*C. beccarii*) and the two-wattled cassowary (*C. bicarunculatus*) of the Aru Islands. Of the second group, the sole representative is the single-wattled cassowary (*C. uniappendiculatus*), from the island of Salwatti and the adjacent coast of New Guinea, which, while agreeing with the members of the preceding group in the form of the helmet, differs by having but one undivided wattle. Lastly, we have the third group characterised by the circumstance that the helmet is flattened from above, or depressed, while wattles are absent; this group being exclusively Papuan, and represented by the Papuan cassowary (*C. papuanus*) of Northern New Guinea, Westermann's cassowary (*C. westermanni*) from the island of Jobi, the painted cassowary (*C. picticollis*) confined to the southern half of New Guinea, and Bennett's cassowary (*C. bennetti*) from New Britain. Fossil remains of an extinct cassowary have been obtained from the superficial deposits of Australia; and, in its whole distribution, the genus corresponds very closely with the Australasian pouched mammals, none of its representatives occurring to the westward of the deep channel separating Celebes and Lombok from Borneo and Java, and known as Wallace's line.

In appearance, owing to the brilliant hues of blue, green, and red on the naked

skin of the head and neck, coupled with the glossy sheen of the blue-black plumage, cassowaries are perhaps the handsomest of all the *Ratitæ*. The largest species of all, and the one in which the horn-coloured helmet attains the greatest development, is the Australian cassowary, which, when erect, stands considerably over five feet in height. Among its distinctive features is the fine cobalt-blue tint of the throat and fore-neck, and the red terminal flaps of the deeply divided wattle; the Ceram



AUSTRALIAN CASSOWARY.

species having the throat and fore-neck dull purple. Of the species without wattles, Bennett's cassowary—the muruk of the natives—has the neck entirely blue; while in Westermann's cassowary the fore-part of the neck is blue and the hinder portion red; the reverse of this characterising the painted-necked species. Nestlings have the plumage mottled, while at a later stage the colour is tawny.

Habits.

In being forest-haunting birds, cassowaries differ essentially from the ostriches and rheas; and appear to be generally shy and but seldom seen in their native haunts. Unfortunately, however, we are still in want of good accounts of the habits of these birds in their wild state. Those brought to Europe (where they will lay freely) are characterised by their extreme tameness and docility; but this, it is said, is largely due to their being mostly, if not invariably, specimens which have been reared from early chickenhood in captivity by the natives, among whom these birds are treated almost like domestic fowls.

The Australian species is reported to frequent rocky wooded districts, where as many as seven or eight may be seen together, keeping almost entirely to the more open portion of the scrub, and seldom venturing out into the plains. From July to September, at least, it is known to feed chiefly upon an egg-shaped blue berry; and its entire food is probably of a vegetable nature.

Regarding the



SKULL OF AUSTRALIAN CASSOWARY.
(From Sir. W. H. Flower, *Proc. Zool. Soc.*, 1871.)

muruk, Bennett was informed that the natives of New Britain capture these birds "when very young, soon after they are hatched, and rear them by hand, but can rarely or never capture the adult, from its being so shy and difficult of approach. They are exceedingly swift of foot, and possessed of great strength in their legs. On the least alarm they elevate the head, and, on seeing danger, dart among the thick bushes, thread localities where no human being can follow them, and disappear with incredible rapidity. The muruk, with its powerful legs and muscular thighs has an extraordinary power of leaping." This species utters a kind of chirping cry, susceptible of modulations according to the occasion. Unlike the emeu, which kicks outwards and backwards, cassowaries invariably kick forwards, at the same time elongating their bodies; in captivity they will not unfrequently perform a kind of war-dance around any object that attracts their attention,

accompanied by vigorous kickings and many bendings of the neck. In spite of their speed, and the rapidity with which they move their limbs, cassowaries do not run, after the manner of an ostrich, but may be rather said to trot.

As regards their breeding-habits in a wild state very little has been ascertained; although it would appear that at this season they associate only in pairs. From native reports concerning the rare Ceram cassowary, Mr. Wallace wrote that the female laid from three to five eggs, which were brooded by each sex in turn; but from observations made on menagerie specimens, it appears that all the work of hatching devolves upon the cock, the period of incubation being about seven weeks. Although cassowaries will lay freely, it is but seldom that the eggs are hatched in captivity. In colour, the latter are dark green, with the surface of the shell beautifully granulated, or shagreened. The young cassowaries, in which the position of the helmet is indicated by a flat horny plate, are carefully tended and fed by the cock bird until able to shift for themselves.

The Emeus.

Originally applied indifferently to the members of both the preceding and the present genus, the name emeu (which is itself a derivative from the Portuguese word *emea*, meaning apparently a crane, and then any large bird) is now by common consent restricted to the latter. Agreeing with the cassowaries in the features mentioned on p. 562, the emeus—of which the two species are restricted to Australia and some of the adjacent islands—are distinguished by the absence of a helmet, the complete feathering of the head and neck, and the normal length of the claw of the second toe; the claws of all three toes being much shorter than in the allied genus. They are further characterised by the beak being depressed and broad, instead of narrow, compressed, and keeled; as they are by the absence of the bare black quills in the still more rudimentary wing. Standing next in point of size among living birds to the ostrich, the common emeu (*Dromaeus novae-hollandiae*) of Eastern Australia, has the general hue of the plumage light brown, mottled in some parts with grey; the individual feathers being of a uniform blackish grey, except near the tips, where they are black, with a broad subterminal band of rufous. This species which, from incessant pursuit, has been well-nigh exterminated even on the mainland, formerly also existed in Tasmania and the islands of Bass Straits, where it has completely disappeared. In Western Australia it is replaced by the spotted emeu (*D. irroratus*), a bird of more slender build, having the feathers barred with white and dark grey, and terminating in a black spot with a rufous margin. While the two sexes of the adult are nearly similar, the young of the common emeu have the ground-colour of the plumage greyish white, with two stripes of black down the back, and two others on each side, both being divided by a narrow median streak of white, these stripes being continued on to the head, where they break up into spots, while there are also others on the fore-neck and breast, which terminate on the thighs. Like the cassowaries, the emeus are represented by an extinct species from the superficial deposits of Australia.

Habits.

At one time abundant on the mainland of Australia, in the neighbourhood of Botany Bay and Port Jackson, where it formed as characteristic a feature in the landscape as the kangaroos and wallabies, the emeu is now only to be met with in the far interior, where it is yearly becoming scarcer

Unlike the cassowaries, emeus are inhabitants of the plains and open forest country, where, although strictly monogamous during the breeding-season, they associate in small parties. Their food consists of fruits, roots, grass, and other herbage; their chief feeding-time being the cool of the early morning. Possessed of great keenness of vision, and swift of foot, emeus rival the kangaroos in speed, and afford an exciting chase with dogs. Such hunts do not end till the birds are thoroughly exhausted, when, if seized by the neck, in order to avoid kicks from their powerful



EMEU AND CHICKS ($\frac{1}{17}$ nat. size).

legs, they are soon pulled down. As with the other members of the subclass, the task of incubation falls to the share of the cock, by whom the eggs, which vary in number from nine to thirteen, are brooded, according to observations made on specimens by Sir E. G. Loder, for a period of from fifty-four to sixty-four days. The nest is but a poor affair, consisting merely of a shallow hollow, scooped in the sandy soil. In colour, the eggs vary from a dark bottle-green to a light bluish green; their length being just short of 5 inches, and their transverse diameter $3\frac{1}{4}$ inches. During the breeding-season, at least, the hen-emeu utters a peculiar, loud booming sound, which is produced through the intervention of a pouch

communicating with the windpipe, on the front of which it opens by a small aperture; this structure being confined to the female sex. From its larger size, the hen-emeu is very liable to be mistaken for the cock. Writing of the difference in the habits and appearance of the two sexes, Mr. Bennett observes, of a pair in his possession, "one is considerably larger than the other, stouter in limb, and more robust in every feature; it has a slight top-knot, and goes strutting about, especially in damp weather, with its breast feathers fully out, like a pouter-pigeon, or rather some huge turkey-cock. It is usually the more courageous and pugilistic. It makes a deep, hollow, guttural boom, when under any gentle excitement of



EMEÜ RESTING.

pride or pleasure, especially on damp evenings, or in the still hours of the night, sounding like a small gong or distant muffled drum. The other is more agile and graceful in all its movements, corresponding with its slender frame, more docile and inquisitive, fleet of foot, and with no voice beyond a suppressed hiss when angry, and a sort of grunt when distressed." The former, although at first regarded as the cock, turned out to be the female. In their wild state emeüs take readily to the water, and have on more than one occasion been observed swimming a wide river. Beneath the skin these birds have a thick layer of fat, yielding a pale amber-coloured oil, free from either taste or smell. Very easily tamed, and in a domesticated state thriving well in Europe, where it breeds freely, the emeu is noticeable for a curious and somewhat mischievous disposition. It will, for instance, invariably endeavour to inspect every strange object brought into its vicinity,

while if a visitor shows any symptoms of fear when brought into a paddock or park containing one or more of these birds, and attempts to escape by flight, he will be certain to be pursued. On one occasion, at Sydney, a man thus hunted by a tame emeu, was much astonished at having his hat removed by the bird. In such chases, emeus appear to be actuated more by a spirit of mischief than anything else; but when they are brought to bay, and to kicking out with their muscular legs, they are formidable adversaries. In kicking, the blow is delivered outwards and backwards.

Allied Extinct
Birds.

It is not a little remarkable that during the Pliocene period there existed in Northern India a three-toed Ratite bird apparently closely allied to the emeus and cassowaries; thus showing that in former times the group had a wider distribution than at present. This bird was not larger than an emeu; but during the later portion of the Tertiary epoch Australia possessed some much larger species, which have been named *Dromornis*, and apparently indicate an extinct family, more or less closely allied to the present one.

THE KIWIS.

Family *APTERYGIDÆ*.

As the ostriches are the most specialised of the living members of the subclass, so the kiwis of New Zealand may be regarded as those of its members which occupy the most generalised position in the group. The specialisation of the ostriches is shown, among other features, by the gigantic stature of those birds, by the reduction in the number of the toes, and in the total absence of any trace of a bony bridge at the lower end of the tibia. The kiwis, on the other hand, exhibit their more generalised nature by their comparatively small size,—it being obvious that if the Ratites are derived from flying-birds, the intermediate forms must have been small,—by the presence of four complete toes, and by remnants of the bony bridge at the lower end of the tibia. Whether the long beak of the kiwis is also a generalised feature may be doubtful. If these birds have any close affinity with the tinamus, it cannot be thus regarded; but if, as some think, they are allied to the rails, then it may be looked upon in this light. The kiwis, then, differ from all the other living members of the subclass by their small size, the presence of four toes to the foot, and the long and slender beak. They are further characterised by the females being much superior in size to the males; and also by the complete absence of after-shafts to the feathers; while the skeleton lacks any trace of the furcula. The bones of the wing—especially the humerus—are very small and slender; and externally the whole wing is completely concealed by the plumage of the back. In general appearance the entire plumage is markedly hair-like, the individual feathers being pointed, and composed of separate filaments towards the end of the shaft, of which the basal half is downy. In build, the kiwis are very robust, the thighs and legs being very muscular and strong, while the toes are furnished with strong claws. While in old birds the scales investing the metatarsus have overlapping edges, and form a perfectly smooth surface, in the young they are soft, detached, and reticulated.

The general colour of the plumage is mottled grey and brown, the feathers having in some cases light-coloured shafts, and in others dark cross-bars. In addition to great individual variations of size, kiwis are remarkable for their very large eggs, which are of a creamy-white colour, and out of all proportion to the dimensions of the birds by which they are laid. In having the nostrils placed at the tip of the beak, the kiwis are unique.

At the present day kiwis are represented by three or four species, of which the first made known to science was the South Island kiwi (*Apteryx australis*). This species is of large size and stout build, with a very long beak; the general colour of the plumage being lighter, and the individual feathers of a sandier and more greyish brown tinge than in the next form. In the North Island kiwi (*A. mantelli*) the general colour of the plumage of the upper-parts is dark rufous streaked with blackish brown, while the under-parts are pale greyish brown; the streaky appearance of the upper surface being caused by each feather having the middle line pale rufous brown, darker towards the tip, and the long hair-like filaments black. The total length of the male, following the curvature of the back, is about 23 inches, and that of the female 27½ inches. Of the other two species, the little grey kiwi (*A. oweni*), of the South Island, is characterised by its small size—the length of the male being only 17½ inches,—its moderately long beak, and more slender legs; the general hue of the plumage of the upper-parts being light yellowish brown, mottled and obscurely barred with wavy blackish brown markings, while beneath it is paler, becoming fulvous on the abdomen, where there are faint brown bars. Some doubt exists as to the right to distinction of the large grey kiwi (*A. haasti*), which Mr. H. O. Forbes, who believed that it occurred only in the South Island, thought might be merely a hybrid between the South Island kiwi and the little grey kiwi. According, however, to Mr. Rothschild, it exists also in the North Island, where the two latter do not occur. It is a large and thick-billed species, of darker coloration than the little grey kiwi, the dark bars on the plumage being nearly black, and the fulvous markings tinged with chestnut. Fossilised remains of the existing species occur with those of the moas, while one is supposed to be extinct, and has been named *Pseudapteryx*. In habits the kiwis are purely nocturnal; and, at the time when they were still abundant, were commonly found in parties of from six to twelve, their shrill nocturnal cries resounding far and wide throughout the mountainous parts of the country they frequent. No better account of their general mode of life is extant than one from the pen of Sir W. J. Buller, who, after mentioning that the kiwi is in some measure compensated for the absence of wings by its swiftness of foot, proceeds to observe that “when running it makes wide strides and carries the body in an oblique position, with the neck stretched to its full extent and inclined forwards. In the twilight it moves about cautiously and as noiselessly as a rat, to which, indeed, at this time it bears some outward resemblance. In a quiescent posture, the body generally assumes a perfectly rotund appearance; and the bird sometimes, but only rarely, supports itself by resting the point of its bill on the ground. It often yawns when disturbed in the daytime, gaping its mandibles in a very grotesque manner. When provoked, it erects the body, and, raising the foot to the breast, strikes downwards with considerable force and rapidity, thus using its sharp and

powerful claws as weapons of defence. . . . When hunting for its food the bird makes a continual sniffing sound through the nostrils, which are placed at the extremity of the upper mandible. Whether it is guided as much by touch as by smell I cannot safely say; but it appears to me that both senses are called into action. That the sense of touch is highly developed seems quite certain, because



KIWI FEEDING.

the bird, although it may not be audibly sniffing, will always first touch an object with the point of its bill, whether in the act of feeding or of surveying the ground; and when shut up in a cage or confined in a room, it may be heard, all through the night, tapping softly at the walls. The sniffing sound is heard only when the kiwi is in the act of feeding or hunting for food; but I have sometimes observed the bird touching the ground close to or immediately round a worm which it had

dropped without being able to find it. . . . It is interesting to watch the bird, in a state of freedom, foraging for worms, which constitute its principal food; it moves about with a slow action of the body; and the long, flexible beak is driven into the soft ground, generally home to the very root, and is either immediately withdrawn with a worm held at the extreme tip of the mandibles, or it is gently moved to and fro, by an action of the head and neck, the body of the bird being perfectly steady. It is amusing to watch the extreme care and deliberation with which the bird draws the worm from its hiding-place, coaxing it out as it were by degrees, instead of pulling roughly or breaking it." On getting the worm fairly out of the ground, the bird throws up its head with a jerk, and swallows its prey whole. The stomachs of specimens that have been dissected contain pebbles, remains of beetles, and the kernels of berries. In captivity, kiwis are dull, listless creatures during the day; lying closely huddled together, and slumbering so soundly that no noise will arouse them. If stirred up with a stick, or suddenly wakened, they make a few drowsy movements, and soon relapse into sleep. From observations made on specimens in captivity, it appears that the female kiwi (unlike the other members of the subclass) lays but one or two eggs annually, which are deposited in a hollow in the ground, and incubated by her partner. When there are two, the eggs, which are placed lengthways side by side, are of such a size as to protrude from the sides of the narrow body of the sitting bird. During the breeding-season, the kiwi is silent. An egg of the North Island kiwi measured a little over 5 inches in length by 3 in breadth.



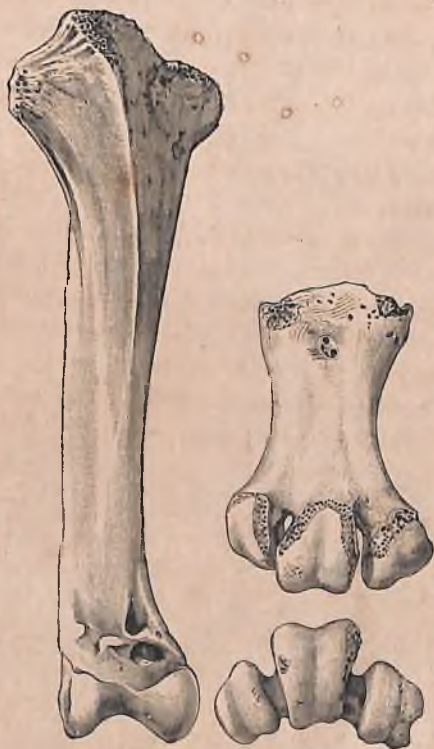
SKELETON OF SHORT-LEGGED MOA.

EXTINCT FAMILIES.

Moas.

The fate impending over the kiwis has long since overtaken their gigantic extinct cousins the moas (*Dinornithidae*), which had already disappeared from New Zealand when those islands were first colonised from Europe, although there is good reason to believe that they lived on till within the last five hundred or four hundred years, if not to a considerably later date. These birds, of which not only the bones, but in some cases the dried integuments, feathers, and eggshells, as well as the pebbles they were in the habit of swallowing, have been preserved in the superficial deposits of New Zealand, attained a wonderful development in those distant islands, where they were secure from persecution till man appeared on the scene. Not only did the larger members of the group far exceed the ostrich in size, but they were extra-

ordinarily numerous in species, as they were also in individuals; such a marvellous exuberance of gigantic bird-life being unknown elsewhere on the face of the globe in such a small area. As regards size, the largest moas could have been but little short of 12 feet in height, the tibia being considerably over a yard in length; while the smallest were not larger than a turkey. And in reference to their numbers, it may be mentioned that there are some twenty species, arranged in about six genera; and the surface of many parts of the country, as well as bogs and swamps, literally swarmed with their bones. Some of the moas had four toes to the foot, and others but three, all differed from the kiwis in having a bony bridge over the groove for the extensor tendons of the tibia (as shown in the accompanying figure), and are therefore evidently the least specialised members of the subclass we have yet referred to, seeing that this bridge is present in the majority of the Carinate birds, and has thus been lost in the existing Ratites. While agreeing in some parts of their organisation with the kiwis, the moas are distinguished by the short beaks, and the presence of after-shafts to the feathers; and in the larger forms, at any rate, not only was the wing, but likewise the whole shoulder-girdle wanting. There is, however, reason to believe that some of the pigmy moas—which from their size were evidently the most generalised members of the group—retained some of the bones connected with the wing. The moas were represented by several very distinct structural modifications; the largest being the long-legged or true moas (*Dinornis*), characterised by their long and comparatively slender leg-bones, as shown on p. 295 of the preceding volume, and also by their large and depressed skulls. In marked contrast to these were the short-legged or elephant-footed moas (*Pachyornis*), in which the limb-bones, as shown in the accompanying figure, were remarkable for their short and massive form; the metatarsus being most especially noteworthy in this respect. In these birds the skull was vaulted and the beak narrow and sharp; but in the somewhat smaller and less stoutly-limbed broad-billed moas (*Emeus*) it was broad, blunt, and rounded. The other species, in all of which the beak was sharp and narrow, are of relatively small stature, and include the smallest representatives of the family, some of which were less than a yard in height. The eggs of the moas were of a pale green colour, and probably formed a favourite food of the Maories, by whom these birds were evidently exterminated.



RIGHT TIBIA AND METATARSUS OF SHORT-
LEGGED MOA ($\frac{1}{3}$ nat. size).

Æpyornis. For a long period the marshes of Madagascar have yielded the eggshells of enormous extinct birds, in search of which the natives are accustomed to probe with iron rods; the largest of these eggs having a longer circumference of upwards of thirty-six inches, and a girth of thirty inches. For the monster birds that laid these eggs (which, by the way, may well have given origin to the far-famed roc of Arabian romance) the name of *Æpyornis* was proposed; and in the course of time naturalists were rewarded by the discovery of its bones. Some of these recently disinterred indicate a bird of larger build than the most gigantic moa; the metatarsus being especially remarkable for its massiveness. Certain of these birds appear to have had four toes; and they all differ from the moas in the absence of a bony bridge at the lower end of the tibia. They form the family *Æpyornithidae*.

TOOTHED AND LIZARD-TAILED BIRDS.

Toothed Birds. There remain for brief consideration certain extinct birds, from formations of earlier age than the Tertiary, which differ from the whole of those of the present day either in the possession of teeth in the jaws, or of these, coupled with the retention of a long lizard-like tail, and certain other features in the skeleton indicative of affinity with reptiles.

Of the toothed birds (*Odontornithes*), as distinct from the lizard-tailed birds which are likewise provided with teeth, there are two very well-marked modifications, both of which have been obtained from strata in the United States, corresponding approximately in age with the Chalk and associated formations of Europe, and hence frequently spoken of as Cretaceous birds. In their general organisation these birds approximate so closely to the ordinary Carinate birds of the present day, that they may well be included in the same subclass, of which they will constitute a separate series characterised by the possession of teeth, and likewise by the circumstance that the two halves of the lower jaw remain completely separate in front, instead of having a solid bony union. Of these toothed birds the one type is known as *Ichthyornis*, and comprises somewhat gull-like birds characterised by having a numerous series of teeth implanted in distinct sockets, and also by the vertebræ or joints of the back-bone articulating with one another by means of cup-like surfaces, whereas in the neck (and generally also in the back) of all existing birds, such surfaces are saddle-shaped. Although the osteology of *Ichthyornis* has many resemblances to that of the gulls, this being especially shown in the skull, which is regarded by Dr. Schufeldt as coming very close to that of the skimmer, the skeleton differs, among other points, by the circumstance that there is no projecting process on the outer side of the lower end of the humerus. Hence, although it is quite within the bounds of probability that these birds may be ancestral types of the modern gulls, it is by no means certain that they should be included in the same group.

With *Hesperornis* we are confronted with a totally different type, in which the teeth were implanted in an open groove, while the wings were rudimentary, and the keel of the breast-bone was wanting, although the vertebræ resembled those of existing birds in articulating together by saddle-shaped surfaces. In

general organisation *Hesperornis* approximated indeed very closely to the modern divers, with which it agrees in the general conformation of the skull and limb-bones, as well as of the pelvis. Whereas, however, the modern divers, have the long spike-like kneecap, or patella, united with the tibia, in the extinct bird these two bones remained distinct. In dimensions, *Hesperornis* was a bird of large size, attaining a height of rather more than a yard when in the upright position. That it was thoroughly aquatic in its habits is self-evident; while it may with considerable probability be regarded as a specialised and flightless offshoot from the ancestral stock of the modern divers; although this would not justify its inclusion in the same family as the latter. An apparently allied, although very imperfectly known type of bird (*Enaliornis*) is represented in England, where its remains have been obtained from a thin stratum lying at the base of the Chalk, known as the Cambridge greensand.

Lizard-Tailed Birds. Descending lower in the geological series, and reaching those strata lying below the chalk, such as the Portland limestone, and known as the Jurassic series, we meet in certain Bavarian rocks corresponding in age to those of Portland, with remains of birds departing much more widely from existing types than any hitherto mentioned. These birds, of which but a couple of imperfect skeletons, with impressions of the wing and tail-feathers, are known, are named *Archæopteryx*, and constitute a group—*Saururæ*, or lizard-tailed birds—regarded by some as of equivalent rank to the flying and flightless birds, but by others as of equal importance with the two together. In size these birds were about equal to rooks, with which they agree in being evidently adapted for perching on the boughs of trees. In addition to the possession of a small number of conical teeth in the short jaws, they are characterised by having a long, lizard-like, tapering tail (which gives the name to the group), and from each joint of this a pair of feathers take origin. In this respect they differ from all the birds hitherto noticed, in the whole of which the bones of the tail are shortened, the tail-feathers arising in a fan-shaped manner from its terminal joint. In addition to this, they are further characterised by the first three metacarpal bones of the wing, as well as those representing the corresponding fingers, being perfectly distinct from one another, and each terminal joint of the latter being furnished with a well-developed claw; all other birds having the metacarpal bones, as well as some of those of the fingers, welded together; while there are, at most, but two claws (in the young of the seriema). It may be mentioned here that although the three-clawed digits in the wing of the lizard-tailed birds are commonly regarded as representing the first, second, and third of the typical five-fingered limb, Mr. C. H. Hurst believes that they really represent the second, third, and fourth; and he is thus led to conclude that the same will hold good for the digits in the wing of an ordinary bird. Be this as it may, in having cup-shaped articular surfaces to the bodies of the vertebræ, the lizard-tailed bird resembles the later *Ichthyornis*; but it differs from all other members of the class in having the three bones constituting the pelvis perfectly distinct from one another (as in most reptiles), while in the leg the tibia and fibula are likewise separate. As regards the general structure of the wing and leg, these remarkable birds agree, however, with their modern allies: the foot having a complete cannon-bone, and but four toes, of which the first is

directed backwards. In the absence of hook-like (uncinate) processes to the ribs, *Archæopteryx* would appear to be more specialised than ordinary birds, seeing that these elements exist in many reptiles; while in the possession of a perfectly formed cannon-bone, it would appear to be on a higher level than the penguins.

Finally, it will not fail to be noticed that although some of these toothed birds exhibit certain specialised features suggesting that they are not the direct ancestors of modern birds, yet that, on the whole, they afford a most valuable contribution in favour of the doctrine of evolution, approximating more and more, as we descend in the geological scale, to reptiles, from which it may be confidently stated the Avian class has originated.



SKELETON OF LIZARD-TAILED BIRD.

