

The integument of Birds is, for the most part, devoid of glands; but many Birds have a peculiar sebaceous gland developed in the integument which covers the coccyx. This *uropygial gland* secretes an oily fluid, which the Bird spreads over its feathers by the operation of "preening." The excretion passes out by one or two apertures, commonly situated upon an elevation, which may or may not be provided with a special circlet of feathers.

In various Birds (e.g., the Turkey) the integument about the head and neck develops highly vascular and sometimes erectile processes (*combs, wattles*).

Within the extremely narrow space of an article like the present, the merest abstract of most of our present ornithological knowledge can be given. A mere list of the published works on the subject would fill most of the space allotted to the writer. We will conclude by giving Professor Huxley's masterly comparison of the Bird class and that of the Reptiles below with the Mammalia above them (see *Proc. Zool. Soc.*, April 11, 1867). The writer has modified some assertions from later papers by the same author:—

"That the association of Birds with Reptiles into one primary group of the *Vertebrata*, the SAUROPSIDA, is not a mere fancy, but that the necessity of such a step is as plain and demonstrable as any position of taxonomy can be, appears to me to be proved by an enumeration of the principal points in which *Aves* and *Reptilia* agree with one another and differ from the Mammalia.

- "1. They are devoid of hair.
- "2. The centra of their vertebrae have no epiphyses.
- "3. Their skulls have single occipital condyles.
- "4. The prootic bone either remains distinct throughout life, or unites with the epiotic and opisthotic after these have become unkylosed with the supra-occipital and exoccipital.
- "5. The *malleus* is not subservient to the function of hearing, [is one of the] *ossicula auditus*.
- "6. The mandible is connected with the skull by the intermedialion of a quadrate bone [which represents the upper bulbous part, with the 'manubrium' of the *malleus* of Mammalia].
- "7. Each ramus of the mandible is composed of a number of separate ossifications, which may amount to as many as six in all. (Of these the *articulare* represents the [antero-inferior part of the] *malleus* of Mammalia).
- "8. The apparent 'ankle-joint' is situated not between the *tibia* and the *astragalus*, as in the Mammalia, but between the proximal and distal divisions of the tarsus.¹
- "9. The brain is devoid of any *corpus callosum*.
- "10. The heart is usually provided with two aortic arches; if only one remains, it is the right.
- "11. The red blood-corpuscles are oval and nucleated.
- "12. The cavities of the thorax and abdomen are never separated by a complete diaphragm.
- "13. The allantois, which is highly vascular, is very large, and envelops the embryo; but no villi for placental connection with the parent are developed upon it.
- "14. There are no mammary glands."

(W. K. P.)

FOSSIL BIRDS.

Footprints, or casts of footprints, at the time of their discovery and long afterwards supposed to be those of Birds, were found about the year 1835 in the Triassic formation of the valley of the Connecticut in New England, and were described by Messrs Deane and Marsh. Subsequently Professor Hitchcock and Mr Warren contributed to the elucidation of these tracks, which were ascribed to various genera of the Class that received the names of *Amblyornis*, *Argozoum*, *Brontozoum*, *Grallator*, *Ornithopus*, *Platypterna*, *Tridentipes*, and others. No portion of any of the animals to which these traces are due seems to have been met with,²

¹ See Gegenbaur, *Archiv für Anatomie* (1863), and *Untersuchungen zur vergleichenden Anatomie* (1864).

² The only known bones from this deposit were exhibited by Professor W. B. Rogers at the meeting of the British Association in Bath (*Rep. Br. Ass. 1864, Trans. Sect.*, p. 66).

and the best American palæontologists are now inclined to attribute them rather to Dinosaurian Reptiles than to Birds. Whatever may be thought of the rest, it appears most likely that the creatures designated as *Platypterna* and *Tridentipes* were certainly not ornithic. *Brontozoum* must have been a colossal animal, its footprint measuring about 16½ inches in length and its stride some 8 feet.

An enormous space of time separates these reputed Ornithichnites, as they are called, from the first undoubted fossil Bird. This was discovered in 1861 by Andreas Wagner in the lithographic slate of Solenhofen in Bavaria, belonging to the Oolitic series, and is commonly known by the name of *Archæopteryx*,³ though that of *Gryphosaurus*



Fig. 33.—Slab containing remains of *Archæopteryx*, from the original in the British Museum. Reduced.

was given by its original describer to the at present unique specimen now in the British Museum. Unfortunately deficient in some very important parts—such as the head and nearly all the sternal apparatus—it has others in excellent preservation. It was about the size of a Rook (*Corvus frugilegus*), and along with the greater portion of the skeleton, impressions of many of its feathers, particularly the quills, are plainly visible. Its most obvious peculiarity is the presence of a long Lizard-like tail, composed of twenty vertebrae; but from each of these springs a pair of well-developed rectrices. A scarcely less remarkable feature is that afforded by the extremity of the wings, where it would appear that there was a free digit answering to the *pollex*. The many Reptilian characters of his wonderful creature cannot be noticed in this treatise, though their value must be fully admitted; but since the appearance of Professor Owen's description of the specimen (*Phil. Trans.* 1863, p. 33), nobody has hesitated to receive it as a true Bird, though one which exhibits an extraordinary dissimilarity from all other known members of the Class. To make any suggestion as to the more immediate affinities and habits of *Archæopteryx* were vain. It at present

³ Herr Hermann von Meyer had previously described a fossil feather from the same formation, to the owner of which he gave this name. Its specific, generic, not to say ordinal, identity with the creature whose remains were subsequently found is of course problematical, but the received laws of nomenclature fully justify the common usage.

stands alone, and all that can be said in the latter respect is, that the form of its feet indicates a bird given to a more or less arboreal life. It is not easy to imagine the use in



Fig. 39.—Portion of the slab containing remains of *Archæopteryx*, showing the extremity of the tail, with a pair of feathers springing from each vertebra. Natural Size.

the bearer's economy of its singular tail, which one would think must have been a clumsy appendage, and this notion is perhaps justified by the certainty that similar tails had gone out of fashion when the next birds known to have existed flourished.

These are from the Cretaceous formation, and as in that freshwater-deposits are few in number, it is not surprising that true ornithic remains are in them exceedingly rare. Many fossils that were formerly thought to have been the remains of Birds have since been determined as belonging to Reptiles (Pterodactyls),—among them the *Cimoliornis diomedea*, from the Chalk of Maidstone, which Dr Bowerbank has not hesitated to refer to his *Pterodactylus giganteus*. But in 1858 Barrett discovered, in the Upper Greensand of Cambridge, remains described by Mr Seeley in 1866 (*Ann. and Mag. Nat. Hist.* ser. 3, xviii. p. 100) under the name of *Pelagornis barretti*,—which, we must bear in mind, has nothing to do with the genus *Pelagornis* established by M. Lartet (*Comptes Rendus*, 1857, p. 740),—and these remains, renamed *Enaliornis* in 1869 by Mr Seeley (*Index to Rep. on Second. Reptiles, &c.*), seem to be those of a real Bird, having some resemblance to a Penguin. Belonging to the same epoch also Bird-fossils have been found by Professor Marsh in the United States of America, and they have been referred to at least six genera—*Apatornis*, *Graculavus* (4 spp.), *Hesperornis*, *Ichthyornis*, *Laornis*, *Palæotringa* (3 spp.), and *Telmatornis* (2 spp.). The first and fourth of these were about as large as a Pigeon, or larger, are from the Cretaceous shale of Kansas, and differ from all known Birds in having biconcave vertebrae and, possibly, teeth, whence the latter has been made the type of a distinct Subclass, to which the name of *Odontornithes* is applied. The second belongs to the *Steganopodes*; the third seems to have been related to the *Colymbidae*. The affinities of the

fifth have not yet been determined; it was nearly as large as a Swan, and its remains were discovered in the Middle Marl of New Jersey. The sixth was apparently one of the *Limicolæ*; and the seventh was probably allied to the *Rallidae*.

The Eocene period furnished a still greater number of ornitholites. First, perhaps, in bulk is that known as *Gastornis parisiensis*, found by M. Gaston Planté, and soon after by M. Hébert, in a conglomerate beneath the Plastic Clay of Bas-Meudon. Much difference of opinion obtains as to the affinities of this Bird, which was at least as large as an Ostrich; but M. Alphonse Milne-Edwards,¹ after reviewing the evidence of others and studying the specimens obtained, considers it (*Dict. Univ. d'Hist. Nat.* ed. 2, May 1869) most nearly allied to the *Anatidae*, from which, however, it differs in so many important characters that it cannot be included among them according to any taxonomic scheme as yet proposed. One may presume, he adds, that it was incapable of flight, though able to swim. Other birds of huge stature lived at a time not much later. Dr Bowerbank has referred the fragment of a tibia from Sheppey, which was a little smaller than that of an Emeu, to a genus *Lithornis*. On this Mr Seeley has founded his *Megalornis*, the *Lithornis* to which Professor Owen, in 1841, had applied the former name, being regarded as resembling a Vulture. This naturalist has also described the fragmentary cranium of a large Bird, combining Dinornithic and Struthious characters, from the same locality, under the name of *Dasornis* (*Tr. Zool. Soc.* vii. p. 145), and he has further added from Sheppey (*Quart. Journ. Geol. Soc.* xxix. p. 511) a yet more remarkable form to those previously known from Britain, in the *Odontopteryx toliapicus*—

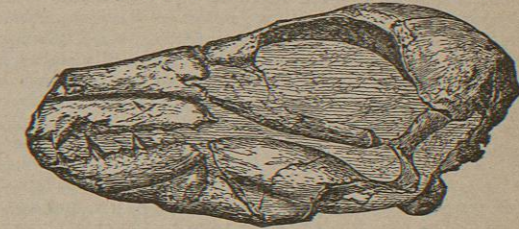


Fig. 40.—Remains of head of *Odontopteryx*, from the original in the British Museum; side view; natural size.

a creature having its jaws armed with osseous denticulations; and in this respect unlike Professor Marsh's *Ichthyornis*,

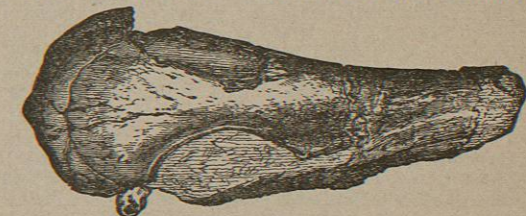


Fig. 41.—Remains of head of *Odontopteryx*, seen from above.

concluding that it was a warm-blooded, feathered, and winged biped, web-footed, and a fish-eater. From Sheppey,

¹ The writer cannot name this distinguished naturalist without acknowledging the very many tokens of friendship received at his hands in connection with the present subject, while the summary of fossil ornithology here given is in a great measure due to the article cited in the text a few lines further on. Further details are taken from his magnificent *Recherches Anatomiques et Paléontologiques pour servir à l'histoire des Oiseaux Fossiles de la France*, Paris, 1867-71. The writer has also to express his thanks to Mr Seeley for valuable assistance in this portion of the article.

too, were long ago detected portions of a Kingfisher (*Halcyon*), and a bird allied to the Gulls or Terns (*Larida*), while a continuation of the same formation at Highgate has supplied a sternum which has been referred to the Herons (*Ardeida*). The freshwater beds at Hempstead, in the Isle of Wight, have furnished remains called by Mr Seeley (*Ann. and Mag. Nat. Hist.* ser. 3, xviii. p. 109) *Ptenornis*—a form of doubtful affinity; and that palæontologist has described from those of Hordwell a tibia, apparently Struthious, under the name of *Macronis*. In the schist of Plattenberg at Glarus a nearly complete skeleton, perhaps belonging to the *Passeres*, was discovered, and called by Von Meyer *Protornis* (since renamed by Professor Gervais *Osteornis*), and other undetermined fragments of birds' bones, with impressions of their feathers, have been found in several beds of about the same age in France.

The fossils of the Paris Basin and its coeval deposits deserve, however, fuller notice. First brought to light at Montmartre towards the end of the last century, many of the remains fell under the notice of Cuvier, and were by him determined in a manner more or less exact. Following his investigations, the labours of MM. Gervais, Blanchard, and Desnoyers considerably added to our knowledge of these ornitholites, till finally M. Alphonse Milne-Edwards, having carefully gone over all the specimens discovered, refers them to the genera *Aguopterus*, *Cormoranus* (i.e., *Phalacrocorax*), *Coturnix* (2 spp.), *Falco*, *Gypsornis*, *Leptosomus* (a form now only known from Madagascar), *Limosa*, *Palæocircus*, *Palæortyx*, *Pelidna*, *Rallus*, *Sitta*, and *Tringa* (?). Of these are extinct the first, which seems to have been in some measure allied to the Flamingoes (*Phœnicoptéridæ*); the fifth, a Ralline form; and the eighth and ninth, belonging to the diurnal Birds-of-prey and the *Gallinæ* respectively. The footprints of at least seven more species of birds have also been recognised in the same beds, so famed for the remains of *Anoplotherium*, *Palæotherium*, and their contemporaries, which were resuscitated by the great Cuvier. The marl-beds of Aix in Provence, belonging to this epoch, have yielded fossil eggs and feathers, but as yet no bones of birds; and to the same period most probably also be assigned the lacustrine calcareous deposits of Armissan, in Languedoc, whence M. Gervais has recovered the remains of a *Tetrao*. Near Apt, also in Provence, some traces of birds seem to have been found, but their bad condition has hindered their determination. In the marls of Ronzon, in Auvergne, several ornitholites have been found by M. Aymard, who refers them to the genera *Camascelus*, *Dolicho-pteris*, *Elornis* (3 spp.), and *Teracus*. Of these the first was declared to be allied to the Plovers (*Charadriidæ*), the second to the Gulls, the third to the Flamingoes, and the fourth to be a Falconine; but M. A. Milne-Edwards considers the first and second to be probably identical. From the same beds M. Gervais has eggs and imprints of feathers, as well as a pelvis, referred by him to *Mergus*, but regarded by M. A. Milne-Edwards as a *Sula*; while Dr Fraas has found remains of a Harrier and a Cormorant on the top of the Swabian Alp. Finally, in North America Professor Marsh has described the remains of no less than five species of birds, varying in size from a Flamingo to a small Woodcock, but all referred by him to a genus *Aletornis*, from the Eocene deposits of Wyoming (*Am. Journ. Sc.* ser. 3, iv. p. 256).

The Miocene formation has yielded by far the greatest



FIG. 42.—Remains of head of *Quantopteryx*, seen from behind.

number of ornitholites, especially in France, and for want of space they can be barely named here. From lacustrine deposits in Bourbonnais and Auvergne, the remains of nearly fifty species of birds have been distinguished. Besides *Palæortyx*, already mentioned (3 spp.), *Palæolodus* (5 spp.), *Pelargopsis*, *Ibidopodia*, *Elornis*, *Hydrornis*, and *Colymboides* are extinct genera to which these fossils are referred. *Palæolodus* is perhaps the most remarkable of them—a generalized form, unquestionably allied to the Flamingoes, but presenting some characters of the *Limicolæ*, and at least one feature now only found in *Podiceps* and *Colymbus*. *Pelargopsis* and *Ibidopodia* were Stork-like, while *Elornis* seems to have been Scolopacine; *Hydrornis* must be placed near the Gulls, and *Colymboides* among the Divers. The rest can be referred to the existing genera—*Aquila*, *Milvus*, *Bubo*, *Psittacus* (a very noteworthy fact, since no Parrots are now to be found in the Palæartic Region) *Picus*, *Motacilla*, *Passer*, *Columba*, *Rallus*, *Phœnicopterus*, *Grus*, *Ibis*, *Totanus*, *Tringa*, *Larus*, *Phalacrocorax*, *Sula*, *Pelecanus*, and *Anas*. A very considerable number of forms identical with these have been recovered from the neighbourhood of Mentz, while many ornitholites, whether fossil bones, foot-prints, or impressions of feathers, are supplied by freshwater formations near Berne, and in Provence and Languedoc, belonging to this epoch. The bone-beds of Sanson, in Gascony, are also very productive. Here we have as extinct forms *Homolopus*, allied to the *Picidæ*, *Necornis*, which seems to belong to the *Musophagidæ*—a family now limited to Africa—and *Palæopodix* (3 spp.), a Gallinacean; while among existing genera we have represented *Aquila*, *Haliaetus*, *Strix*, *Corvus*, *Phasianus* (2 spp.)—a genus generally supposed to have been introduced into Europe in historic times—*Rallus*, *Numenius*, *Ardea*, and *Anas*. Passing thence to Greece, the remains of birds have been found at Pikerini in Attica—a *Phasianus*, a *Gallus*—somewhat larger than *G. sonnerati* (the presumed ancestor of our Barn-door-fowl), and a large *Grus*. In the Tertiary deposits of the lower ranges of the Himalaya, the interesting discovery of an apparently true *Struthio* (Ostrich) has been made, with an *Argala*, and possibly a large species of *Phaeton*. From Steinheim, also, but perhaps of a somewhat later period, the remains of eight species of birds (belonging to the genera *Ibis*, *Ardea*, *Palæolodus*, *Anas*, and *Pelecanus*) have been determined by Dr Fraas, three of which seem to be specifically identical with those first discovered in France. In the Miocene of North America, Professor Marsh has detected bones of *Meleagris*, *Sula*, *Puffinus*, and *Uria*, all existing genera, but the first is especially suggestive, since it is now one of the most characteristic forms of the New World. From the Lower Tertiary of the same continent he has also described a *Bubo* and an extinct genus *Uintornis*, probably related to the *Picidæ* (*Am. Journ. Sc.* ser. 3, iv. p. 259).

The Pliocene epoch is far less rich than the preceding in ornitholites, and what have been found are less well determined. In France, the existence of a Bird-of-prey and several Water-birds has been indicated, but a species of *Gallus* from Auvergne seems to be the only form established. At Ehningen, in Baden, remains have been found, and referred to *Scolopax* and *Anas* (probably also to *Anser*), while from Radoboj, in Croatia, the almost entire foot of a bird has been assigned to *Fringilla* by Hermann von Meyer, who has further detected in Germany a fossil humerus, on which he finds a genus *Ardeacites*, allied to the Herons. From the Pliocene of North America Professor Marsh has described remains of an *Aquila*, a *Grus*, and a *Phalacrocorax*.

The Postpliocene of the same continent has rewarded

† Die Fauna von Steinheim, Stuttgart, 1871.

the same palæontologist with two more species of *Meleagris*, another *Grus*, and an *Uria*. In Europe, beds of that epoch have not furnished very many ornitholites, while such as are known have been insufficiently studied. A *Gallus*, however, seems to have been found at Paris by M. Gervais, and other portions of the same bird have been recognized from the caves of Aquitaine by M. A. Milne-Edwards. Near Quedlinburg, remains referred to Crows, Sparrows, Swallows, a Bustard, and a Gull, have been recognized, as well as an apparent Vulturine from Magdeburg. Hermann von Meyer has indicated from the valley of the Lahn, Crows, Thrushes, Partridges, and Ducks, as well as a *Numida* from Salzburg. A small Owl, too, has been found at Kostritz. In England, remains of a Swan and a Cormorant have occurred in the diluvial beds of Grays in Essex, and an Owl of middle size in the Norwich Crag, which may, however, be of Pliocene age; while in France the celebrated gravels of St Acheul have supplied a bone believed by M. A. Milne-Edwards to belong to the Grey Lag-Goose (*Anser cinereus*), to which species, also, an egg found in brick earth at Fisherton, near Salisbury, has been referred by Mr Blackmoor, who in the same bed found another egg, supposed to have been that of *Anas boschas* (*Edinb. N. Phil. Journ.* N.S. xix. p. 74).

A great number of Birds' bones have been discovered in caves, and among them some bearing marks of human workmanship. In France we have first a large and extinct species of Crane (*Grus primigenia*), but more interesting than that are the very numerous relics of two species, the comitants even now of the Reindeer, which were abundant in that country at the period when this beast flourished there, and have followed it in its northward retreat. These are the Snowy Owl (*Nyctea scandiaca*), and the Willow Grouse (*Lagopus albus*). But here it seems unnecessary further to particularize the genera, much less the species, hitherto discovered in the caves of Europe generally, though doubtless they deserve far greater attention than they have yet received. One exception, however, must be made in the case of *Cygnus falconeri*, a gigantic Swan from the Zebug cavern in Malta (*Trans. Zool. Soc.* vi. plate 30). The caves of South America yielded to the laborious explorations of Lund no less than thirty-four species of Birds, of which the greater part are identical with those now existing in the same country; but some have become extinct, and of these the most notable are a large *Crax* and a large *Rhea*.

SUBFOSSIL BIRDS.

The next ancient Birds' bones known to us in the northern hemisphere are probably those of the Danish kitchen-middens. These reveal the existence (very likely, the abundance) of two species, long since banished from the spots where their remains are found—the Capercally (*Tetrao urogallus*), and the Great Auk or Gare-fowl (*Alca impennis*). Just as the *Lagopus albus* in the south of France indicates a subarctic or subalpine country with its normal fauna and flora, so does the former of these shew the coexistence with it of pine-forests in Denmark, though on other evidence it is plain that such forests cannot have existed there for many centuries. The latter, of which more must be said hereafter, does not perhaps prove more than that the surrounding seas, though cold, were free from ice in summer time.

The Birds' bones hitherto recovered from the ruins of the lake-dwellings in Switzerland are all of species which now occur more or less commonly in the same neighbourhoods, and are therefore of comparatively little interest.

On the other hand, the Fens of East Anglia have yielded proofs of a form now extinct not only in England, but even in Northern Europe. This is the Pelican, of which two

humeri, one from Norfolk and the other most likely from the Isle of Ely, are preserved in the museums of the University of Cambridge. Whether the species be identical with either of those which now inhabit some parts of Southern Europe is undetermined; but it was undoubtedly a true *Pelecanus*, and apparently only differed from *P. onocrotalus* in its somewhat larger size.

At an uncertain but (geologically speaking) recent epoch in Madagascar, there flourished huge birds of Struthious affinities. The first positive evidence of their former existence was made known in 1851 by M. Is. Geoffroy St.-Hilaire, who gave the name of *Epyornis maximus* to the species which had laid an enormous egg, sent to Paris a short time before; and the discovery of some bones of corresponding magnitude soon after proved to all but the prejudiced the kinship of the producer of this wonderful specimen, which not unnaturally recalls the mythical Roc that figures so largely in Arabian tales. Three, if not four, well-marked species of this genus have now been characterized from remains found in the drifted sands of the southern part of that island.

Next we must turn to our antipodes. In New Zealand birds' bones of gigantic size seem to have been first heard of from native report by Mr W. Colenso in 1838, and next year Mr R. Taylor obtained "part of a fossil toe" (*Ann. Nat. Hist.* xiv. p. 82). In the same year, however, and before news of this discovery was published, Mr Rule placed in Professor Owen's hands the fragment of a bird's femur, which the latter exhibited and described at a meeting of the Zoological Society, 12th November 1839. Other examples soon came to England, and at a meeting of the same society, 24th January 1843, that learned anatomist applied the name of *Dinornis novæ-zelandiæ* to the newly-found monster (*Proc. Zool. Soc.* 1843, p. 8). A few months later he was able to pronounce that he had distinguished the remains of five species of the genus (*tom. cit.* p. 144); and the memoir subsequently published in the Society's *Transactions* proved to be the first of a series unrivalled in its kind and fortunately still in progress. Bones innumerable have since been obtained, together with portions of the skin, showing the scales of the tarsus and the feathers of the body, to some of which adhered the tendons and bits of dried muscle, stones from the crop, and eggs, a few of the last containing remains of the embryo. At least eleven good species seem to have been discovered; and these, according to one of the latest authorities, Dr Haast (*Addr. Phil. Inst. Canterb.* 5th March 1874, p. 6), may be grouped in two families—*Dinornithidæ* proper, having the back-toe obsolete, and comprising the restricted genus *Dinornis* (spp. 5) and *Mionornis* (spp. 2); and *Palapterygidæ*, possessing a hallux, and including the genera *Palapteryx* (spp. 2) and *Euryapteryx* (spp. 2). It used to be taken as proved that all these birds flourished within quite recent times, and sanguine naturalists have even hoped that explorations would shew that all of them were not extinct; but, though there is abundant evidence to prove that they were the contemporaries of man in New Zealand, Dr Haast most strongly urges that the race of man who hunted and fed upon the "Moa"—for such name was applied to its bones by the natives—lived long before the Maori settlement of the islands. Here there is no room for his arguments (*Trans. N. Zeal. Inst.*), and prudence will perhaps suggest a suspension of judgment on this point. In the same formation as those which hold the relics of these wonderful birds have been found, but far more seldom, remains of others not less interesting. First there is *Harpagornis*, a Bird-of-prey, of stature sufficient to have made the largest *Dinornis* its quarry. Then we have *Cnemidornis*, a gigantic Goose—possibly related to the genus *Cereopsis*, with *Aptornis* and *Notornis*—two Ralline forms,

the first allied to *Ocydromus*, and the last, which has survived to our own day, though most likely extirpated within the last fifteen years, much resembling *Porphyrio*.¹ In company with these fossil or sub-fossil remains are often associated bones of other forms, which now seem doomed to destruction but still exist. Finally must be mentioned *Dromæornis australis*, an extinct Struthious bird, which formerly inhabited Australia, and was allied to *Dromæus*, the well-known Emeu.

BIRDS RECENTLY EXTIRPATED.

From the consideration of Fossil Birds we are naturally led to treat of those which have been extirpated in modern times, and are made known to us by evidence of various kinds, and more or less old. The most remarkable of these is the Dodo (*Didus ineptus*), which, on the discovery of Mauritius by the Portuguese under Mascaregnas in the beginning of the 16th century, was found to inhabit that island. Voyagers have vied with each other in describing or depicting its uncouth appearance, and its name has almost passed into a byword expressive of all that is effete. Clumsy, flightless, and defenceless, it soon succumbed, not so much to the human invaders of its realm as to the domestic beasts which accompanied them, and there gaining their liberty, unchecked by much of the wholesome discipline of nature, ran riot, to the utter destruction (as will be seen) of no inconsiderable portion of the Mauritian fauna. The latest known testimony of the Dodo's existence is furnished by the copy of a journal (now in the British Museum) kept by one Benjamin Harry, mate of the ship "Berkley Castle," which shews that it survived until July 1681. It had its life most likely sometime longer, but of this there is no evidence forthcoming. For a century and a half all that was known of it was derived from the quaint and sometimes questionable accounts of early voyagers; certain pictures, mostly by Dutch artists—for the bird was not unfrequently sent alive to Europe, and the traffic of the East Indies was then chiefly in the hands of the Netherlanders—which pictures, however grotesque, were doubtless for the most part faithful portraits; and a few scattered relics—a foot in the British Museum, a head and foot at Oxford, a perfect skull at Copenhagen, and a fragmentary one at Prague. Still these (or indeed the Danish specimen alone) were enough to enable Professor Reinhardt to determine the affinity of the lost bird to the Pigeons, an alliance not before surmised, but one which scarcely anybody now disputes. In 1866, however, Mr George Clark of Mauritius discovered in the peat of a pool (the Mare aux Songes) in that island an abundance of Dodos' bones (*Ibis*, 1866, p. 141); and these, when transmitted to Europe, informed naturalists as to nearly every part of its osseous structure, which was soon after described in detail by Professor Owen (*Trans. Zool. Soc.* vi. p. 49).

But the Dodo is not the only member of its family that has vanished. The little island which has successively borne the name of Mascaregnas, England's Forest, Bourbon, and Réunion, and lies to the southward of Mauritius, had also an allied Bird, now dead and gone. Of this not a relic has been handled by any naturalist. The latest description of it, by Du Bois in 1674, is

¹ A second species now referred to *Notornis* is the *Gallinula alba* of Latham, which lived on Lord Howe's (and probably Norfolk) Island. No specimen is known to have been brought to Europe for more than eighty years, and only one is believed to exist—namely, in the museum at Vienna (*Ibis*, 1873, p. 44, plate 10). Recent enquiries, made at the present writer's request, have failed to furnish any result. The bird is doubtless extinct. (Cf. Rowley, *Ornithological Miscellany*, pp. 33-45.)

meagre in the extreme, and though two figures—one by Bontekoe (circa 1646), and another by Pierre Witthoos (ob. 1693) have been thought to represent it (*Trans. Zool. Soc.* vi. p. 373, plate 62), their identification is but conjectural. Yet the existence of such a bird is indubitable.

Far to the eastward of these two sister islands lies a

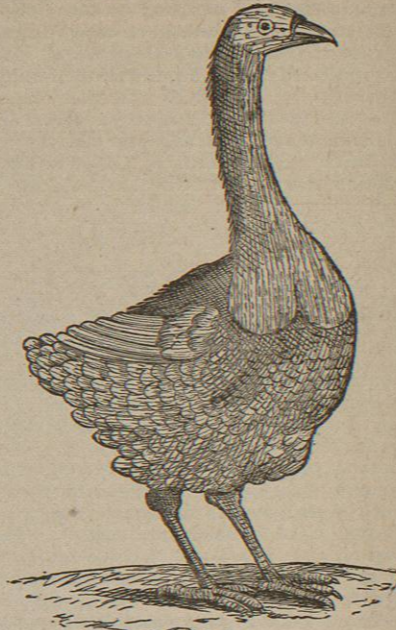


FIG. 43.—The Solitaire of Rodriguez (*Pezophaps solitaria*). From Leguat's figure.

third—Rodriguez. Here there formerly lived another Didine bird, sufficiently distinct from the Dodo of Mauri

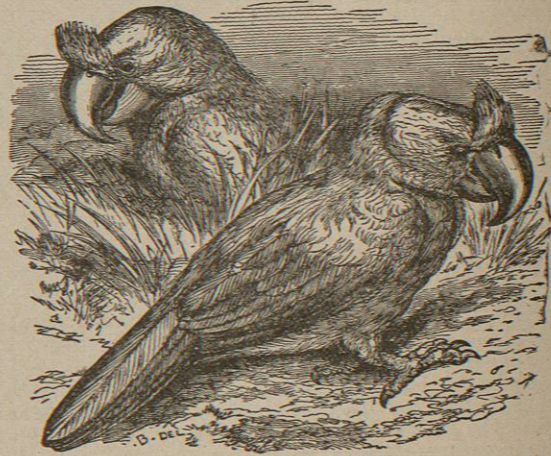


FIG. 44.—Extinct Crested Parrot of Mauritius (*Lophopithecus mauritianus*). From a tracing by M. A. Milne-Edwards of the original drawing in a MS. Journal kept during Wolphart Harmanzon's voyage to Mauritius (A.D. 1601-1602), penes H. Schlegel (*Proc. Zool. Soc.* 1875, p. 350). Reduced.

tius to form a genus of its own—*Pezophaps solitaria*, the

Solitaire of Leguat, a Huguenot exile who, passing some time in 1691-93 on that island, has left, with a very inferior figure, a charmingly naive account of its appearance and habits, the general truth of which has been amply substantiated by Mr Edward Newton's discovery in large numbers of its bones (*Phil. Trans.* 1869, p. 327); and a nearly complete skeleton of either sex may be seen in the museum of the University of Cambridge, by the side of the most perfect specimen existing of that of its bulkier relative, the Mauritian Dodo.

Nor does this group of Didine birds contain all the lost forms of the Mascarene islands. From Mauritius have

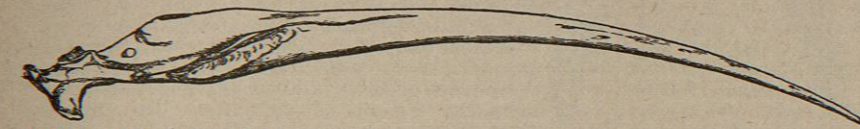
a somewhat abnormal Starling (*Fregilupus*) existed until some forty years ago (*Proc. Zool. Soc.* 1874, p. 474), and its skin and skeleton are among the treasures of three or four museums. Perhaps, also, there were other Ralline birds, but the evidence on this head is inconclusive. In Rodriguez, the greater part of its original avifauna has vanished. There was a small but peculiar Owl (*Athene murivora*), a big Parrot (*Necropsittacus rodericanus*), a Dove (*Erythrona*? sp. ign.), a large brevipennate Heron (*Ardea megalcephala*), and a singular Rail (*Miserythrus leguati*)—in some respects allied to the Mauritian *Aphanapteryx*—besides other birds of which we know from old voyagers,¹

though their remains have not yet been determined (as those of the species above mentioned have been) from the numerous caverns of the island. A second Parrot, or rather Parrakeet (*Palæornis exsul*), still exists, but in very small numbers, and the unique specimen known was obtained in the year 1871.

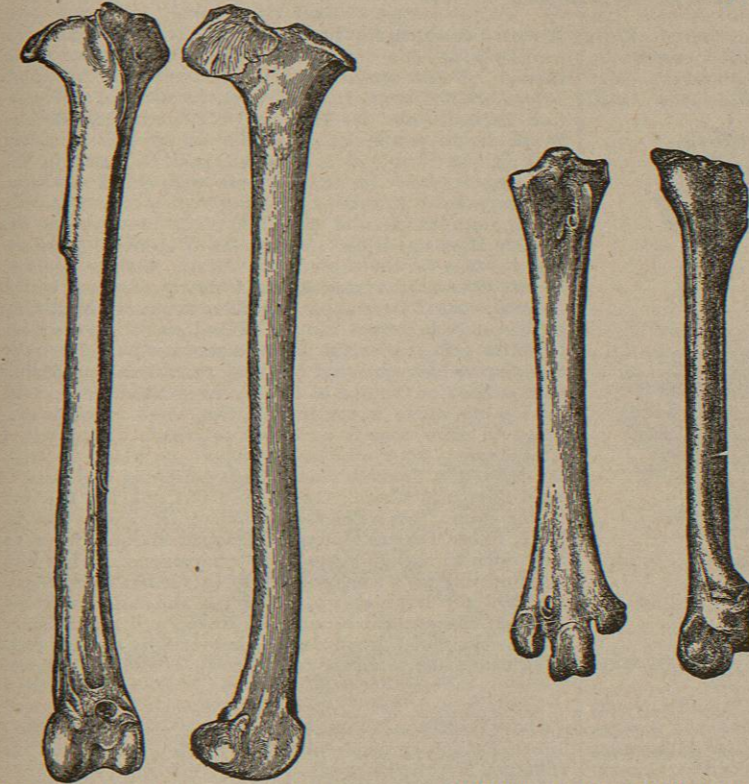
With the examples of these Mascarene Islands before us, it is not without reason that we suppose a like fate to have befallen many of the feathered inhabitants of other places exposed to similar ravages. We cannot read the accounts not merely of the earliest voyages to the Antilles, but even of those performed within the last hundred years, without being aware that the writers met with many Birds which are not now known to inhabit them. These lost species, there is some ground for believing, were mainly, if not wholly, peculiar to the locality, and after having made good their existence, maybe, for ages, fell easy and helpless victims to the forces which European civilization brought into play. Chief among these forces was fire. In all countries and at all times it has been the habit of colonists to burn the woods surrounding their settlements—partly to clear the ground for future crops, and partly (in tropical climates especially) to promote the salubrity of their stations. When fire was set to the forest and bush of a small island, the whole of which could be burnt at once, the

disastrous effect on its fauna can easily be conceived. Even the animals which happened to escape the conflagration itself would speedily starve, owing to the at least temporary destruction of the native flora whence, either directly or indirectly, they derived their wonted sustenance. Thus in certain of the Virgin Islands the "dead" shells of many species of terrestrial Gasteropods are everywhere found in astounding numbers, while not a living individual of several of the species has ever been met with by the conchologists

¹ *Proc. Zool. Soc.* 1875, pp. 39-42.



A. Mandible of *Aphanapteryx*, side view. From the original in the Museum of Zoology of the University of Cambridge.



B. Left Tibia of *Aphanapteryx*, hind and inside views. From the original at Cambridge.

C. Right Tarso-metatarsus of *Aphanapteryx*, front and inside views. From the original at Cambridge.

FIG. 45.—These figures reproduced from *The Ibis*, 1869, by permission of the Editor. Natural size.

disappeared at least two species of Parrot, a Dove, a large Coot, and a second Ralline bird, abnormal, flightless, and long-billed—*Aphanapteryx*. A painting of this last was found by Von Frauenfeld in the emperor's library at Vienna, and some of its bones, rescued by Mr Edward Newton from the peat of the Mare aux Songes, have been fully described by M. A. Milne-Edwards. Remains of the Coot and one of the extinct Parrots were found also in the same spot, while skins of the other Parrot and of the Dove still exist in a few museums. Réunion, also, once had other birds now lost, and so had Rodriguez. In the former,