

of our day. The only assignable cause of the extinction of these creatures lies in the fact that these islands are known to have been laid waste by fire. The shells have resisted destruction but how many more animals must have

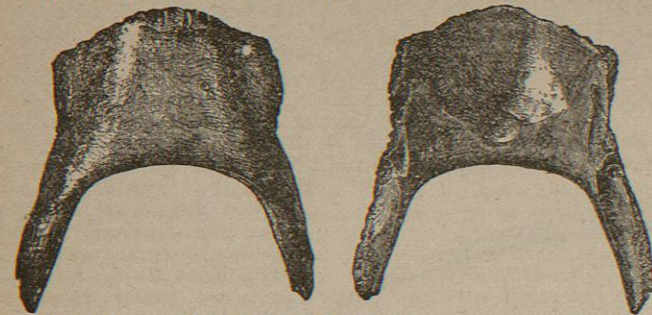


FIG. 46.—Distal portion of mandible of *Lophopsittacus*, lower and upper view. From specimen in the British Museum. These figures reproduced from *The Ibis*, 1866, by permission of the editor. Natural size.

perished without leaving a trace of their existence? Even at the present time, few parts of the world so overrun by people of European descent are from a naturalist's point of view so little known as the West-India Islands. Still



FIG. 47.—Extinct Starling of Réunion (*Fregilupus varius*), adapted from figures by Daubenton, Levaillant, and others. Reduced.

less is known of their state a century ago; and it would be a long and wearisome task to collect from old voyages the meagre, scattered, and often inaccurate information they contain as to the zoology of these islands. One example may, perhaps, be sufficient. Ledru accompanied an expedition sent out in 1796 by the French Government to the West Indies. In his work he gives a list of the birds he found in the islands of St Thomas and St Croix (*Voyage aux Isles de Tenerife, &c.*, Paris, 1810, ii. p. 29). He enumerates fourteen kinds of birds as having occurred to him then. Of these there is now no trace of eight of the number; and, if he is to be believed, it must be supposed that within fifty or sixty years of his having been assured of their existence, they have become extinct.<sup>1</sup> And yet

<sup>1</sup> One of the survivors (a Parrakeet, *Conurus xantholaemus*) was a

the period just mentioned was long subsequent to that in which the primeval woods of the islands were burnt. What, then, must not have been the changes which the forest-fires produced?

If this be not enough we may cite the case of the French islands of Guadeloupe and Martinique, in which, according to M. Guyon (*Comptes Rendus*, lxxiii. p. 589), there were once found six species of *Psittaci*, all now exterminated; and it may possibly be that the Maccaws stated by Mr Gosse (*B. Jamaica*, p. 260) and Mr Marsh (*Proc. Acad. N.S. Philad.*, 1863, p. 283) to have formerly frequented certain parts of Jamaica, but not apparently noticed there for some twenty-five or thirty years, have fallen victims to colonization and its consequences.

Mention has already been made of the Gare-fowl (*Alca impennis*), whose bones have been found in the kitchen-middens of Denmark, and more lately in similar deposits in Caithness. This species, nearly allied to our common Razor-bill (*A. torda*), but flightless and about twice as big, seems to have become extinct since 1844, in which year

the last two examples known to have lived were taken on a rocky islet—one of a group called Fuglaskér, or Fowl-skerry, off the south-west point of Iceland. Ten years before, one had been caught alive at the entrance of Waterford harbour; and in 1821 or 1822 one was taken near St Kilda, to which lonely island, as appears from old authors, the bird had been accustomed to resort in the breeding season. In 1812 a pair were killed at Papa-Westray, which was also a breeding station of the species, and the stuffed skin of one of them is preserved in the British Museum, while that of the Waterford specimen may be seen in the museum of Trinity College, Dublin. In the Færoes the species was formerly common, but it certainly ceased from appearing there about the beginning of the present century. In the Iceland seas there are three localities called after the bird's name, but on only one of them has it been observed for many years, having probably been as long extirpated in the rest as in the Færoes. On the locality where it continued latest, there is ample evidence to show that it once was plentiful. There was a large skerry—the Geirfuglaskér proper—on which, in 1813, the crew of a Færoese vessel made a descent and slaughtered a large number of Gare-fowls; but this, like the rest of the group, was a place very difficult of access, and, in 1821, Faber, the well-known faunist of Iceland, failed to land upon it, though some of his companions reached the Geirfugladrágr, a smaller islet lying further to seaward. In 1830 the large skerry, through a submarine volcanic eruption, disappeared beneath the waves, and immediately after a colony of Gare-fowls was discovered on another rock lying nearer the mainland, and known as Eldey.<sup>2</sup> In the course of the next fourteen years, not fewer probably than sixty birds were killed on this newly-chosen station, and a nearly corresponding number of eggs were brought off; but the colony gradually dwindled until, as above said, in 1844 the last two were taken (*Ibis*, 1861, p. 374).

In Greenland, for the last three hundred years, the Gare-fowl has only been known as an occasional straggler, but it would appear that in 1574 a party of Icelanders found it so plentiful at a spot on the east coast—since identified

few years ago restricted to a single hill-top in St Thomas, and so reduced in numbers that the present writer was ridiculed by many of the inhabitants for believing that such a bird ever existed in the island. Found, however, it was at last, but it must be regarded as verging upon extinction.

<sup>2</sup> Whether on the subsidence of the large skerry another portion of the birds which frequented it colonized the outermost islet is not known, for this spot does not seem to have been visited by any human being since Faber's time, more than fifty years ago.

with Danell's or Graah's Islands—that they loaded one of their boats with their captives. All recent explorations of this inhospitable coast prove the utter vanity of the notion that the Gare-fowl is able there to find an asylum.

But it was in the seas of Newfoundland that this species, known to the settlers and fishermen as the "Penguin,"—a corruption of the words "pin-wing,"—was most abundant, as a reference to Hakluyt's and similar collections of voyages will prove. In 1536, or forty years after the discovery of the country, we find an island taking its name from the bird, and others are even now so called. English and French mariners alike resorted to these spots, driving the helpless and hapless birds on sails or planks into a boat, "as many as shall lade her," and salting them for provision. The French crews, indeed, trusted so much to this supply of victual, as to take, it is said, but "small store of flesh with them." This practice, we learn from Cartwright (*Journal, &c.*, iii. p. 55), was carried on even in 1785, and he then foresaw the speedy extirpation of the birds, which at that time had only one island left to breed upon. In 1819, Anspach reported their entire disappearance, but it is possible that some few yet lingered. On Funk Island, their last resort, rude enclosures of stones are, or recently were, still to be seen, in which the "Pin-wings" were impounded before slaughter; and a large quantity of their bones, and even natural mummies, preserved partly by the antiseptic property of the peat and partly by the icy subsoil, have been discovered. One of the last has furnished the chief materials from which the osteology of the species has been described (*Trans. Zool. Soc.* v. p. 317). Some 70 specimens of the bird's skin, about as many eggs, and nearly half-a-dozen more or less perfect skeletons, with detached bones of perhaps an hundred individuals, are preserved in collections; but even if there be any truth in the various reports of the appearance of the species since 1844 (some of which seem to rest on fairly good testimony), so that it may still survive, it is obvious that its rediscovery will most likely seal its fate.

Far less commonly known, but apparently quite as certain, is the doom of a large Duck which even fifty years

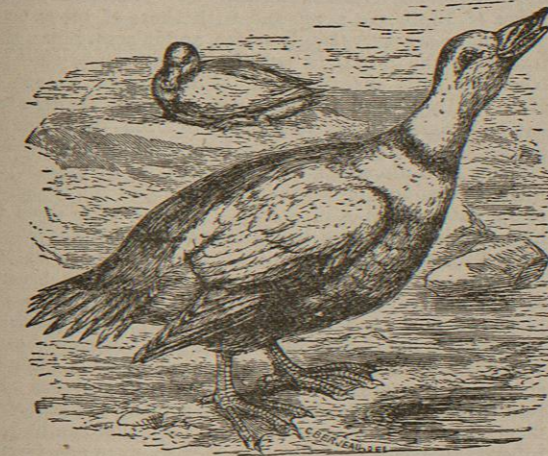


FIG. 48.—Pied Duck (*Somateria labradorica*), male and female. From specimens in the British Museum. Reduced.

ago was commonly found in summer about the mouth of the St Lawrence and the coast of Labrador, migrating in winter to the shores of Nova Scotia, New Brunswick, New England, and perhaps further southward. For many years

past, according to the best-informed American ornithologists, not a single example has been met with in any of the markets of the United States, where formerly it was not at all uncommon at the proper season, and the last known to the writer to have lived was killed by Col. Wedderburn in Halifax harbour in the autumn of 1852.<sup>1</sup> This bird, the *Anas labradorica* of the older ornithologists, was nearly allied to the Eiders (*Somateria*), and like them used to breed on rocky islets, where it was safe from the depredations of foxes and other carnivorous quadrupeds. This safety was however unavailing when man began yearly to visit its breeding-haunts, and, not content with plundering its nests, mercilessly to shoot the birds. Most of such islets are, of course, easily ransacked and depopulated. Having no asylum to turn to, for the shores of the mainland were infested by the four-footed enemies just mentioned, and (unlike some of its congeners) it had not a high northern range, its fate is easily understood. No estimate has yet been made of the number of specimens existing in museums, but it is believed to be not very great.

Another bird which has become extinct within the last few years is one of a group of Parrots (*Nestor*) peculiar to



FIG. 49.—Phillip-Island Parrot (*Nestor productus*). From specimen in the British Museum. Reduced.

the New-Zealand Subregion, and though some of its congeners still exist in the less-frequented and alpine parts of that country, this species (*N. productus*) seems to have been confined to Phillip Island. The last known to have lived, according to information supplied to the writer by Mr Gould, was seen by that gentleman in a cage in London about the year 1851. Not much more than a dozen specimens are believed to exist in collections.

#### BIRDS PARTIALLY EXTERMINATED.

From Birds which have recently become altogether extinct we naturally turn to those that have of late been extirpated in certain countries though still surviving elsewhere. Several such instances are furnished by the British Islands. First there is the Crane (*Grus communis*) which in Turner's time (1555) was described as breeding in our fens. Then the Spoonbill (*Platalea leucorodia*), said by Sir Thomas Browne

<sup>1</sup> It is needless to observe that no one at that time had any notion of its approaching extinction.

(1688) to breed in Suffolk, as it formerly had done in Norfolk. The Capercally (*Tetrao urogallus*) we know to have frequented the indigenous pine-forests of Ireland and Scotland. In the former it had most likely become extinct soon after 1760, and in the latter not much later. Not a single specimen of the British stock of this bird is known to exist in any museum, but the species has been successfully introduced from Sweden into Scotland during the last forty years, and is now certainly increasing in numbers. The Bustard (*Otis tarda*), which once tenanted the downs and open country of England from Dorset to the East Riding of Yorkshire, vanished from Norfolk, its last stronghold as a British Bird, in 1838. From other counties it had before disappeared. It is well worthy of note that all the four species just mentioned were protected to a certain degree by Acts of Parliament, but these laws only gave immunity to their eggs and none to the parent-birds during the breeding season, thus shewing how futile is the former when compared with the latter, since there are very many species whose nests from time out of mind have been and are yearly pillaged without any disastrous consequences arising from the practice.<sup>1</sup>

It would be impossible here to name the many Birds which, once numerous in the British Islands, have now so much diminished as to be rightly considered scarce, or to recount the various causes to which their diminution is due. The persecution of Birds-of-prey seems to have begun with the keepers of poultry, to whom the Kite (*Milvus icinus*) and the Hen-Harrier (*Circus cyaneus*) were a sore trouble,<sup>2</sup> but it has been actively followed up by game-preservers, and this to their own cost, as the ravages of the Grouse-disease testify.<sup>3</sup> To the reclaiming of waste lands, the enclosure of open spaces, and the greater care bestowed on timber trees (by removing those that being decayed are much infested with insects) must, however, be attributed the extermination or rarification of far more species than the direct action of man has been able to effect.<sup>4</sup> Still what we lose in one direction we gain in another, and while Birds-of-prey and Wild-fowl are being banished, the smaller denizens of the woodlands, gardens, and arable fields are unquestionably more numerous than ever.<sup>5</sup> The change is, of course, not satisfactory to the naturalist or to the lover of wild scenery, but to some extent it seems inevitable; yet well directed laws for the protection of those birds which suffer worst in the unequal contest may delay their impending fate, and preserve to our posterity the most pleasing features of many a landscape and the grateful opportunities of studying many a curious and interesting species. Thanks, perhaps, to the stronger constitution of most Palearctic Birds, the votaries of what is called "acclimatization" have obtained little success in these islands, for the

<sup>1</sup> The singular wisdom of the old command (Deut. xxii. 6)—the most ancient "game-law" (using the term in its widest sense) in existence—has here a curious exemplification.

<sup>2</sup> The Bohemian Schaschek, who visited England about 1461, says he had nowhere seen so many Kites as around London Bridge (*Bibl. Lit. Ver. Stuttgart*, vii. p. 40). And the statement is confirmed by Belon (*Obs. ad. fin. Clus. Exot.* p. 108), who says that they were scarcely more numerous in Cairo than in London, feeding on the garbage of the streets and even of the Thames. From the same writer (*Hist. Nat. Oyseaux*, p. 131) it would seem that at that time (1555) they, and Ravens also, were protected by law in the City! The Hen-Harrier's name is enough to shew what was thought of it in days when it abounded.

<sup>3</sup> In Transbaikalia, the Bearded Vulture (*Gypaetus barbatus*), which was formerly common, has of late been completely exterminated, through persecution prompted by the desire to obtain its feathers, which are highly valued.—Von Middendorff, *Sibir. Reise*, iv. p. 851.

<sup>4</sup> The extermination from Europe of the Francolin (*Francolinus vulgaris*) has been treated at some length by Lord Lilford (*Ibis*, 1862, p. 352) without his being able to assign any cause for the fact.

<sup>5</sup> Report from the Select Committee on Wild Birds' Protection, &c. House of Commons, 1873. Appendix, pp. 188-193.

exotic species which it has been attempting to introduce have, almost without exception, failed to establish themselves. The efforts made in some British colonies—particularly in Australasia—are unfortunately too likely not to be successful; and, when their own peculiar fauna has been half extirpated, our fellow-subjects at the antipodes will probably have good reason to lament the extraordinary sentiment that has led them to introduce from other countries birds which, in the absence of their natural checks, will be nothing else than a positive nuisance; for so reckless is the manner in which they have been imported, that species possessing few or exceedingly doubtful recommendations to begin with have been carried over in abundance, and some of these cannot fail to become permanent settlers, equally with those for the transportation of which the would-be "acclimatizers" might find themselves excused. All, however, in the battle of life will contribute first to the subdual and by degrees to the disappearance of the original inhabitants, which had hitherto constituted a fauna, from a scientific point of view, perhaps the most interesting on the face of the globe.

#### GEOGRAPHICAL DISTRIBUTION OF BIRDS.

It is admitted by nearly all naturalists that the study of the extinct organisms of any country leads the investigator to a proper appreciation of its existing flora or fauna; while, on the other hand, a due consideration of the plants or animals which may predominate within its bounds cannot fail to throw more or less light on the changes it has in the course of ages undergone. That is to say that the Distribution of forms in Time is a subject so much connected with the Distribution of forms in Space, that the one can hardly be separated from the other. Granting this as a general truth, it must yet be acknowledged as a special fact, which some of the preceding paragraphs will perhaps have foreshadowed, that in fossil Ornithology we have as yet but scanty means of arriving at any precise results which will justify bold generalization in the matter of aviarian distribution. Remains of extinct forms of Birds are, compared with those of other classes of Vertebrates, exceedingly scarce, and in accordance, therefore, with the prevalent practice of naturalists they have been but little investigated. If we except France and New Zealand—and in the latter no fossil ornithic relics can be assigned to any very ancient epochs—little has been done. The discovery in the former of somewhat early remains of Birds, allied to those which we at present only know as denizens of a tropical region, and the recognition of far later remains of species identical with those that now flourish in arctic lands, merely corroborates what is from numerous sources within the knowledge of every geologist—the vicissitudes, namely, of which that part of Europe has had experience. Though in this quarter of the globe we now have no indigenous Struthious Birds, the former existence of Struthious Birds even in England proves very little, because we know that some of such birds (the species of South-American *Rhea*, for instance) can maintain themselves in lands which are subject to a climate as fitful, if not as severe, as our own. All that can be justly inferred thence is that Struthious Birds were not formerly confined to their present limits, and possibly that such birds once pervaded the greater part of the earth's surface. The *Archæopteryx* and *Odontopteryx* from their singularity prove nothing in respect of Geographical Distribution. Perhaps in the whole range of zoology there is no class from the fossil remains of which we learn less as regards the physical history of our planet than we do from the Birds. We, therefore, have to turn to the other side of the question of Distribution, and try to find out whether the

Searcht  
Ornith  
fossil

The six  
great  
Regions.

evidence, which is from one point of view so evidently deficient, may not be supplied by inquiry into existing avifauna and this, in other words, signifies that a knowledge of the Geographical Distribution of living Birds becomes a matter of prime necessity to every one who could intelligently exercise the calling of an ornithologist.

Thus driven to a kind of extremity, the student of Birds, however, cannot but regard with the most lively satisfaction the circumstance that to one of his brethren is due the merit of having first truly pointed out the great Zoogeographical Regions of the globe—a fact not a little surprising when we reflect that the outlines of Distribution laid down in 1857 by Mr Sclater<sup>1</sup> had reference only to the most vagrant Class of animals in creation; yet these outlines have, not merely in the main, but to a very great extent in detail, met with the approval of nearly all those zoologists who have since studied the subject in its bearing upon the particular Classes in the knowledge of which they themselves stand pre-eminent.

Without infringing upon what must be deemed the generalities of biological Distribution, it is proper to observe that Mr Sclater's success is to be attributed to the method in which his investigations were carried on—a method in which he had but few predecessors. Instead of looking at the earth's surface from the point of view which the geographer would take of it (a point of view which had hitherto been adopted by most writers), mapping out the world according to degrees of latitude and longitude, determining its respective portions of land and water entirely regardless of the products of either element, or adhering to its political divisions—time-honoured as they were,—he endeavoured to solve the question simply as a zoologist should, by taking up the branch of the subject with which he was best acquainted, and by pointing out and defining the several Regions of the globe in conformity with the various aspects of ornithic life which they present. But herein there was at once a grave difficulty to be encountered. Birds being of all animals most particularly adapted for extended and rapid locomotion, it became necessary for him to eliminate from his consideration those groups, be they large or small, which are of more or less universal occurrence,<sup>2</sup> and to ground his results on what was at that time commonly known as the order *Insectores* or *Passeres*, comprehending the orders now generally differentiated as *Passeres (verae)*, *Picariæ*, and *Psittaci*.

On this basis then Mr Sclater was enabled to set forth that the surface of the globe exhibited six great Regions, each in a marked manner differing from all the rest, though the difference was not always equally important. These Regions he termed respectively the Palearctic, Ethiopian, Indian, Australian, Nearctic, and Neotropical; and though it is on all accounts better to preserve the names he bestowed on them, it does not seem convenient to follow the order in which he placed them. Thus the Australian Region appears not only to differ more from the others than they do among themselves, but its differences are of a kind which, when its fauna is considered as a whole, suggest a striking peculiarity, namely, that many of the forms of animal life therein found are the direct and not very much modified descendants of types which may very likely at an early period of our planet's history have predominated over every land, but of types which have since

<sup>1</sup> *Journal of the Proceedings of the Linnean Society, Zoology*, ii. pp. 130-145. It is much to be regretted that the author of this most valuable essay has never sanctioned its republication in another and improved form. Many of its details, and some of its principles even, are now known to be incorrect, but for the time at which it appeared it was a marvellous production.

<sup>2</sup> Not but that even in the most widely-spread groups are contained others—sub-families, genera, or species strictly limited to certain localities. Some of these will be noticed further on.

been elsewhere in great part replaced by more highly developed structures. The lower rank in the scale of its most characteristic animals seems to be indisputable, and, therefore, with the Australian Region it appears most proper to begin.<sup>3</sup>

I. THE AUSTRALIAN REGION is most trenchantly divided from the Indian, which, from a geographical and possibly from a geological point of view, seems to be conterminous with it, by the narrow but deep channel which separates the small islands of Bali and Lombok, and will be found to determine the boundary between two entirely distinct portions of the earth's surface. Midway along this channel we may draw a line in our imagination, and continue it in a north-north-easterly direction up the Strait of Macassar, dividing the much larger islands of Celebes and Borneo. A considerable interchange of animal forms in the two islands last named is indeed to be observed, and even a slight intermingling of the productions of the two former seems now to be going on; but the inoculation is so much less in degree than that which obtains between any other two Regions, while the characteristic, not to say peculiar, zoological types which occupy either side of this line are so divergent, that it may be fairly considered a harder and faster line than any that can elsewhere be found. Between Bali and Lombok, as above stated, it has been shewn by Mr Wallace to be all but perfect, and in his honour this boundary, as real in the abstract as though it existed in the concrete, has been most justly named after the naturalist and traveller who first saw and recognized its importance—"Wallace's Line."<sup>4</sup> As above indicated, this line becomes less definitive as it proceeds further northward; and though we know it to pass between the Philippine Islands and Sanguir, and again between the former and the Palau group, its further progress in that direction cannot as yet be set down with precision, though it probably runs to the westward of the Ladrões. But hereabouts we lose sight of it, until we arrive at the Sandwich Islands, to the northward of which it must pass, since for reasons presently to be given at greater length that archipelago must be confined within the Australian Region. Southward from Lombok the boundary of the Region rounds the western coast of Australia, and then strikes off in a south-easterly direction to encompass New Zealand and its dependencies. Arrived here it must be drawn so as to include all of what is commonly known as Polynesia, though the characters of the intermittent chain of islets lying parallel to and just to the southward of the Tropic of Capricorn, and a few scattered reefs to the northward of the equator (between long. 108° and 115° W.), are at present insufficiently determined. After encircling, however, the Low Archipelago and the Marquesas, the boundary trends to the north-west, and includes, as before stated, the Sandwich Islands; but thence its precise direction cannot now be traced, owing to the obscurity which veils the numerous islets of the North Pacific Ocean, which

<sup>3</sup> The writer has to acknowledge with hearty thanks the very singular mark of confidence conferred on him by his eminent friend Mr A. R. Wallace, who has allowed him to peruse in manuscript the greater part of a work on the Geographical Distribution of Animals, the early publication of which can hardly fail to place this most interesting subject in the position it undeniably deserves, but a position to which it has never yet attained through the absence of any treatise of like character. The value of the favour thus bestowed upon him the writer cannot overestimate.

<sup>4</sup> This name was first given by Professor Huxley (*Proc. Zool. Soc.* 1868, p. 313), but as it is hardly a geographical term, it will accordingly make no appearance on any save a so-called "physical" map. The value of the discovery above mentioned, of which no one had ever dreamt till it was made by Mr Wallace, seems to justify proper notice from cartographers, and it might be well, therefore, to dignify the channel between Bali and Lombok—named on some maps Lombok Strait—by the appellation of "Wallace's Strait."

lie between that group and the coast of Asia. All that can be said for certain is, that it does not comprise the Aleutian Islands, the empire of Japan, or the Loochoos.

Though the characteristic Mammals of the Australian Region are in every way highly remarkable, entirely comprehending as they do one of the three Subclasses (*Ornithodelphia*) and nearly all of a second (*Didelphia*), by far the largest portion of the area it covers is weak if not absolutely wanting in Mammalian life, and the zoological features which mark the Region as a whole are perhaps better exhibited by its Birds than by any other Class of its fauna. This being the case, it may be excusable in this place to dwell longer upon this Region than upon the rest. True it is that we have no Subclass of birds, like the *Ornithodelphia* among Mammals, which is restricted to the Region; but, on the other hand, the instance of the *Didelphia*, to which allusion has just now been made, is here almost exactly paralleled by that of the Struthious Birds—the *Ratitæ*, to call them by the name now very generally applied to them by the zoologists who recognize them as forming one of the two primary divisions or Subclasses, we may term them, of the Class *Aves*. All the existing *Ratitæ* (with the exception of the species of two forms, the Ostriches of Africa and South America, belonging to the genera *Struthio* and *Rhea*, and comprising at most but five species) are found within the Australian Region and nowhere else. But further, the *Ratitæ* of the Region are more widely distributed throughout its area than are the *Didelphia*, since the former extend from Ceram, in lat. 4° S. and long. 130° E., to New Zealand in lat. 45° S. and long. 175° E., if not a little further, while the *Didelphia* stop short at lat. 44° S. and long. 155° E.<sup>2</sup> But if we take the birds alone, and compare the two Subclasses into which the existing or recent members of the Class are divided, we find the Australian Region remarkable for its ornithic singularity. The smaller of these two Subclasses, the *Ratitæ*, contains six very natural groups—which might well be called Orders—including, according to the most exaggerated computation of their number, less than 40 species, while the larger Subclass, the *Carinata*, though perhaps not including more truly natural groups, comprehends some 10,000 species. Now, out of the six groups of this smaller Subclass, four are absolutely restricted to the Australian Region, and these four groups contain all but, at the highest estimate, as above stated, five of the species known to belong to the Subclass; thus we should be able to regard the 35 species of recent *Ratitæ* of the Region (a number which is clearly far too large) as the proportional equivalent of an avifauna of more than 8000 species (8750).

Leaving, however, such a calculation as this, which indeed cannot as yet be more than an approximation to the truth, we must consider first the remaining ornithic features of the Region as a whole, and then those of its parts. With respect to each of those subjects, it will be evident to every one that a further division is at once incumbent upon us. The prevalent zoological features of any Region are of two kinds—negative and positive. It is therefore just as much the business of the zoogeographer, who wishes to arrive at the truth, to ascertain what groups of animals are wanting in any particular locality (altogether independently of its extent) as to determine those which are forthcoming there.

<sup>1</sup> Of course, as regards polymorphism, no comparison can be made between the *Ratitæ* and the *Didelphia*, the latter presenting a very great variety and the former a very great sameness of structure and habit, though if it be true, as seems to be most likely the case, that *Dinornis* and its allies were absolutely devoid of wings, we should in them have a divergence from the normal ornithic type which is altogether unique in the whole Class, and for its singularity might well be set off against the multifariousness exhibited by the *Didelphia*.

Of course, in the former case it would be absurd to regard as a physical feature of any great value the absence from a district of groups which do not occur except in its immediate neighbourhood; but when we find that certain groups, though abounding in some part of the vicinity, either suddenly cease from appearing or appear only in very reduced numbers, and occasionally in abnormal forms, the fact obviously has an important bearing. Now, as has been above stated, mere geographical considerations, taken from the situation and configuration of the islands of the so-called Indian or Malay Archipelago, would indicate that they extended in an unbroken series from the shores of the Strait of Malacca to the southern coast of New Guinea, which confronts that of North Australia in Torres Strait, or even further to the eastward. Indeed, the very name Australasia, often applied to this part of the world, would induce the belief that all the countless islands, be they large or small—and some of them are among the largest on the globe—were but a southern prolongation of the mainland of Asia. But it has been already stated that so far from this being the case a very definite barrier is interposed. A strait, some 15 miles or so in width, and separating the two fertile but otherwise insignificant islands of Bali and Lombok, makes such a frontier as can hardly be shewn to exist elsewhere. The former of these two islands belongs to the Indian Region, the latter to the Australian, and between them there is absolutely no true transition—that is, no species are common to both which cannot be easily accounted for by the various accidents and migrations that in the course of time must have tended to mingle the productions of islands so close to one another. The faunas of the two are as absolutely distinct as those of South America and Africa, and it is only because they are separated by a narrow strait instead of the broad Atlantic that they have become so slightly connected by the interchange of a few species and genera.

Now, first, of the forms of Birds which are prevalent throughout the Indian Region, but are entirely wanting in the Australian, we have at once the Bulbuls (*Ixidae*), very characteristic of most parts of Africa and Asia, with the allied group of *Phyllornithidae*, which is peculiar to the Indian Region; the widely-spread families of Barbets (*Megacnemidae*) and Vultures (*Vulturidae*); and the Pheasants (*Phasianidae*), which attain so great a development in various parts of the Asiatic continent and islands that there must their home be regarded as fixed, though some species are found very far removed from the focus of the family.<sup>2</sup> Some naturalists would add the Finches (*Fringillidae*), but the real position of the so-called "Finches" of Australia must at present be considered extremely doubtful, and it may prove that they are the direct descendants of the more generalized group whence sprang both the true *Fringillidae* and the *Ploceidae*, if, indeed, these can justifiably be kept apart. Then, of forms which are but weakly represented, we have the otherwise abundant Thrushes (*Turdidae*), and, above all, the Woodpeckers (*Picidae*), of which some 4 species, or at most 5,<sup>4</sup> out of more than 300, just cross

<sup>2</sup> The separation of this family from the *Tetraonidae* (Partridges and Grouse), though hitherto almost universally recognized, seems to be a very questionable proceeding, and, so far as the present writer is aware, is one that can only be maintained by structural characters, which though patent in their extreme forms, appear to vanish in those which are intermediate (cf. *Proc. Zool. Soc.* 1868, pp. 300, 301); but for the purposes of this treatise it is of little consequence, since the *Tetraonidae* are but very feebly represented in the Australian Region.

<sup>3</sup> It is almost certain that no satisfactory limits can be laid down between this family and the Warblers (*Sylviidae*), but, as in the case mentioned in the last note, the result would hardly be affected by combining the two families, since the *Sylviidae* have comparatively few members in the Region now under notice.

<sup>4</sup> There are said to be *Dendrocygna anatis* in Lombok, *Muelleripicus fulvus* and *Yungipicus temmincki* in Celebes, *F. moluccensis* in the

the boundary and occur in Lombok, Celebes, or the Moluccas, but are absolutely unknown elsewhere in the Region.

Turning to the families which by their presence characterize the Australian Region, we find those which are peculiar to it to be perhaps, if not more numerous, yet more remarkable than the peculiar families of any other Region. Nearly 20 such might here be enumerated. One, the Honeysuckers (*Meliphagidae*), is most characteristic, and, abounding in genera and species, extends to almost every part of the region, yet only a single species oversteps its limits, crossing the sea from Lombok to Bali.<sup>2</sup> Other peculiar families are much more confined, and, since by their means (as will presently appear) the various subdivisions of the Region may be more clearly marked out, further notice of them may be for the present deferred. But the positive characteristics of the Region as a whole are not its peculiar forms alone; there are at least 4 families which, being feebly represented elsewhere, here attain the maximum of development. Such are the Thickheaded Shrikes (*Pachycephalidae*), the Caterpillareaters (*Campephagidae*), the Flowerpeckers (*Dicaeidae*), and the Swallow-Flycatchers (*Artamidae*). Besides these, 3 or perhaps 4 groups, though widely distributed throughout the world, arrive in the Australian Region at their culmination, presenting an abundance of most varied forms. These are the Weaver-birds (*Ploceidae*), and the Moreporks (*Podargidae*), if they can be properly separated from the *Fringillidae* and the *Caprimulgidae* respectively, but especially the Kingfishers (*Alcedinidae*) and the Pigeons (*Columbidae*), the species belonging to the two last obtaining in this Region a degree of prominence and beauty which is elsewhere unequalled.

Without going into greater detail, the Australian Region may be roughly said to be composed of four Subregions, to which the names of Papua (or New Guinea), Australia proper, New Zealand, and Polynesia may perhaps be attached. The boundaries of some of these Subregions are, as may be expected, not well defined; and, indeed, it is obvious that much must be done in the way of geographical exploration before the investigation of zoologists will mark out their limits with positive accuracy. Especially is this true in respect of the first of these Subregions, which in certain parts shows a complication of characters that for want of space could hardly here be explained, if, indeed, according to our present information, they can be explained at all.

(1.) *The Papuan Subregion*, the chief province of which is formed by New Guinea and its dependencies, comprises, besides the large and imperfectly-known island whence its name is derived, three other provinces, which may be named the Timorese, the Celebesian, and the Moluccan. The fauna of the Timor group seems to be made up of contributions from Java, belonging to the Indian region, the Moluccas, and Australia. Of nearly 100 genera and 160 species of Land-birds only, which are here found, an equal proportion appears to be related to the Birds of the Indian Region and to those of Australia proper—some 30 genera being distinctly traceable to each. The Indian influence is made evident by the presence of about 27 genera which have crossed the strait from Bali into Lombok. Of these, 12 are known to stop short at Flores, but the inter-

Moluccas, and *F. olarius* there or perhaps in the Sunda Islands. It is quite likely, however, that further investigation will add to the number.

<sup>1</sup> This term is here advisedly used in a restricted sense, excluding the genus *Zosterops* and its allies, which are often included under it by systematists.

<sup>2</sup> This is *Ptilotis umbata*, a species which is common from Timor to Lombok.

vening island of Sumbawa has not yet been ornithologically explored, and 13 of them reach Timor. In all there may be, disregarding birds of wide distribution, some 30 species of Indian origin, with nearly 20 thereto allied, but, on the other hand, more than 60 which are derived from Australia thus indicating a greater affinity to the latter country. There is one genus of Kingfishers (*Caridonax*) known only from Lombok and Flores, but no doubt represented in Sumbawa, and a genus of Pigeons (*Leucotreron*) is almost limited to this group.

The Celebesian province is known to be inhabited by more than 200 species, belonging to about 150 genera. Of the Land-birds, 9 genera and nearly 70 species are absolutely confined to the principal island, but 20 more are found also in the Sula and Sanguir islands, making nearly 90 species peculiar to this Subregion. Of those which are not peculiar, Lord Walden<sup>3</sup> estimates that about 55 are of Indian and 22 of Australian origin, the remainder being common to both Regions, and thus the Indian influence is very strong in this quarter, pointing to an immigration from the north and west. Of the less wide genera of Celebes, more than 20 are common to Borneo and Java, and nearly as many to Timor or the Moluccas—again showing a preponderance of Indian over Australian types; but, since the Bornean and Javan species consist of only about one-quarter of those which are characteristic of those islands, while the Moluccan and Timorese genera form nearly one-half, the proportion which has been drawn from the rest of the Australian Region is clearly greater than that which has flowed in from the Indian. The most important family of *Meliphagidae*, however, which, as before remarked, is so highly characteristic of the Australian Region, is here represented by a single species only (*Myzomela chloroptera*), and the fact requires due acknowledgment. On the other hand, some 8 Indian families which are very important in Borneo and Java are altogether absent, and the non-appearance of a still greater number of Moluccan forms is also worthy of note. The conclusion at which Mr Wallace arrives from these and some other circumstances is that Celebes, during the existing epoch, has never been united by extensive land with either side, but has received an influx of immigrants from each. Of the genera found in Celebes itself 9 are peculiar, 3 more occur in one other island only, and 1 (which is likely to be eventually discovered in Celebes) is as yet known but in the Sula group. Of these 13 genera peculiar to the Subregion, about one-third are modifications of Australian forms. The Sula Islands show a considerable blending of faunas; out of nearly 40 species of Land-birds, more than one-half are identical with or allied to those of Celebes; but 3 Moluccan genera, unknown to Celebes, occur here.

We have now to consider the Papuan province. The island of New Guinea, which is the centre of the whole Papuan Subregion, has been until lately almost entirely unexplored, and even at the present day its interior has been but scarcely and cursorily visited by civilized foreigners. Yet out of nearly 350 species of Land-birds, belonging to 125 genera, which are known to us from this country, 300 species are exclusively peculiar to it, and 36 genera are either peculiar or only just extending to North Australia. Of the remaining genera, 38 are peculiar to the province, 45 are characteristically Australian, 9 more especially belong to the Malay Archipelago generally, being as much Australian as Indian. Only 7 are typically Indian, but with a discontinuous distribution, while 25 have a wide range. The chief features of the province to be noted are the extraordinary development therein of the Cassowaries

<sup>3</sup> *Transactions of the Zoological Society*, viii. pp. 23-118.