

THE STORY OF THE ISLES OF THE SEA, TOLD BY THE FOWLS OF THE AIR.

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IV.—THE PACIFIC OCEAN.

THE story of the Isles of the Pacific receives not less illustration from the examination of their birds than does that of the Isles of the Indian Ocean. Vast as is the area of the Pacific, there is, with one exception, that of the Galapagos, a homogeneity in the general character of its bird-life, and a distinctness withal in the different groups, which separate them clearly from each other, and still more widely from the islands of the Indian Ocean. Nor, although this line of demarcation between the two oceans be apparently arbitrary, yet, so far as regards the forms of insular life, is it other than exact, accurate, and sharply defined. If we glance at a map of the vast insular region to the south-east of Asia, there is nowhere any visible geographical break from Malacca to Tasmania. One close chain of islands links Australia to Asia.

But let us examine the teeming bird-life of that exuberant region, and ornithology supplies us with a dividing line, which seems to indicate a geologic separation of infinite antiquity. A string of islands runs east of Java to New Guinea, never more than a few miles apart, apparently all of a similar character. There is no special feature to distinguish one channel from another. Yet between two of these islands, the observant eye of Mr. A. R. Wallace, who stands at the head of all naturalists in scientific exploration, has detected the line which separates India and Australia. The channel between the small islands of Bali and Lombok is not more than fifteen miles wide, but west of it all life is, speaking generally, Indian in its character; east of it, all is Australian. From the Himalayas to Bali, there is no break, only a gradual local variation in the animals, birds, reptiles, insects, and molluscs. In Lombok the naturalist finds himself in a new world. This line of demarcation, now familiar to all students of the subject as "Wallace's line," can be traced with more or less precision separating two entirely distinct portions of the earth's surface. From Bali it runs northwards through the straits of Macassar, dividing Borneo from Celebes, then trending eastward, it passes between the Philippine Islands on the north, and Sanguir to the south, and further onward embraces the Pelew Islands

and the Ladrões in the Australian area, leaving Japan in the old world, or Palæarctic region; and of course embracing the Sandwich Islands in the Pacific area, which (speaking as a naturalist) does not comprise the Loo-choo Islands nor the Aleutian. South-westward from Bali the line runs down beyond the west of Australia, where there are no islands till we reach the Mascarenes, and then, sweeping southward, it includes New Zealand, the Chatham Islands, and all the Oceanic groups in the South Pacific, excepting the Galapagos, which are American in their affinities.

But what are the features which determine "Wallace's line"? To speak of the great families of birds only, on the one side, the Indian, are the vultures, the pheasants, the barbets, the bulbuls, and the true finches, with all their innumerable species. In fact, of the pheasant, barbets, and bulbuls, the Indian region may be said to be the home. Not one of them is found on the other side of the line. Then the thrushes and the warblers (*sylviadæ*), so endless in variety, and so numerous in individuals in the old world—of these but a few straggling species cross the line. Most striking of all, the woodpeckers, of which there are over three hundred species, are absolutely unknown in the Australian region, excepting that some four or five species just cross the boundary, and are found here and there in Lombok, Celebes, and Moluccas, but not one in Australia or the Pacific. So much for the great bird-families conspicuous for their absence.

Still more remarkable are the new and unwonted forms to which we are introduced across the line. They differ infinitely more from the feathered inhabitants of any other part of the world, than the birds of the rest of the world do among themselves. The honeysuckers, a family of birds remarkable for its structural peculiarities, having a brush at the end of its tongue, with which it sweeps up the nectar of flowers, and abounding in genera and species (no less than one hundred and thirty species are already known), is never found out of this Pacific area (if we except one species which does cross from Lombok to Bali), but is represented by numerous varieties in every, even the remotest, corner

of that vast space. Other great families are only feebly developed outside the Australian region, but are most characteristic in it. Such are the moreporks (*Podargus*), the flower-peckers (*Dicaeum*), the caterpillar eaters (*Campephaga*), the swallow flycatchers (*Artamus*), and especially the thick-headed shrikes (*Pachycephala*). Of birds of universal distribution, the kingfishers and the pigeons are here found in a variety of species and a gorgeousness of plumage elsewhere unrivalled. But none of these are so strangely diverse from all others as are the ostrich-like emeus of Australia, the wingless rails, the resplendent rifle-birds, the gorgeous birds of paradise of Papua, bower-birds, lyre-birds, and most of all, the weird-like kiwi or *Apteryx* and the recently exterminated colossal moas (*Dinornis*) of New Zealand.

What is the story of the isles which all this tells? Why, without any sudden change of climate, with no perceptible difference in geologic character, should that line of Wallace prove a great barrier, which these birds pass neither one way nor the other? It cannot be want of power of flight, for all, excepting the brevipennant or wingless species, cross infinitely wider expanses of water elsewhere. It tells us, surely, that the Australian region is no mere prolongation of Eastern Asia, but that, while there has been, whatever may have been from time to time the oscillations, upheavals, or depressions of the earth's surface, more or less communication between the whole Indian region as far as Bali, from a period infinitely more remote, the sea has ever flowed between that island and Lombok, and no upheaval has ever united them; that the fissure between them is one that has probably existed ever since the crust of the earth first solidified. If, as in the course of these papers we shall endeavour to show, the bird-life of these islands is really the most antique on the face of the earth, it seems difficult indeed to avoid this conclusion, or not to admit that here ornithology actually demonstrates a great geological fact, which neither the composition of the rocks nor any palæontological traces could have suggested.

When we proceed to classify and group the birds of these islands, scattered over one-third of the earth's surface, we find differences so great and so marked that we are led to suggest that the Pacific region is but a comprehensive term for various areas not less distinct than the other natural regions of the globe. We may fairly count six such

distinct areas of insular bird-life, varying from the oldest to the most recent, structurally considered, of the island bird faunas. Standing out distinctly from all others, the most peculiar and the oldest in the world, is the most recent of England's great colonies, New Zealand, with the Chatham and Auckland Isles, Lord Howe's, Norfolk, and Philip Islands. Second, but zoologically far more modern, is Australia, with its satellite, Tasmania. Third in antiquity we may place the Papuan region, New Guinea, with Timor, Celebes, Moluccas, and their numerous dependant islands. Fourth appear to rank the Sandwich Islands. Fifth, by far the widest in area, the Polynesian Archipelago, with countless islets, scattered over ninety degrees of longitude and forty of latitude, from the Pelew Islands to Easter Island. Lastly we have the most modern of all, the Galapagos, which might, perhaps, be more justly treated as an outlier of South America, but the exceptional natural history of which casts much light on the variation and specialisation of species.

The Galapagos Islands, lying just under the equator, six hundred miles westward of South America, are a striking contrast in their general character and appearance to other tropical islands. Spread over a space of two hundred miles from north to south, and one hundred and eighty from east to west, they are wholly volcanic. On many of them the volcanoes are still active, and one crater attains a height of four thousand seven hundred feet. The streams of lava have sometimes so heated the water as to compel ships to run from their anchorage, where they found a sea temperature of 150° and the atmosphere 147° . Notwithstanding these occasional irregularities, the temperature is usually moderate for an equatorial region, for the Galapagos are struck by the polar current from the south. From the same cause, probably, there is a total absence of the coralline insects, so universal elsewhere round the Pacific Islands.

But even this is scarcely enough to account for the strange barrenness, the meagreness of vegetation, its stunted growth, for the most part wretched little weeds, more becoming an arctic than an equatorial flora, and for the abnormal absence of brilliant colours, both in animal and vegetable life. The largest island of the group, Albemarle, eighty miles in length and in one part fifty miles wide, is, excepting on its southern side, miserably barren, covered with immense streams of black naked lava, and studded with craters. The island of

Narborough seems even more repulsive, its only signs of life being a few mangrove-trees near the shore. Mr. Darwin has remarked that probably there is not within the whole range of the tropics another region so sterile. Yet there is no lack of moisture. Although rain falls plentifully but at one season, the clouds generally hang low and the hills are well clothed with verdure.

Again, had we any reason to believe the islands to be geologically recent, it might be supposed that stragglers from the neighbouring continent had not yet had time to settle and extend themselves. But the whole appearance of the rocks forbids this. There are few volcanic regions whose cliffs indicate a greater antiquity, in the different strata of lava currents to be traced in their sections, and the evident length of time which must have elapsed between the various torrents. From the whole structure of the islands, from the depth of the oceanic depression between them and South America, it is impossible to hold that they have ever had any closer connection with South America than they have at present. They rise from an area of depression beyond that great axis of elevation, the Andes chain, which has probably been such an axis ever since the earth solidified and assumed its present shape—the complement, in fact, of the Pacific area of depression.

Yet these dreary and unattractive cinder heaps are, both in their plants and their animals, a little world by itself. They have nothing in common with any other Pacific island. In examining their living inhabitants we have the satisfaction of believing that, unlike the case of the Mascarenes, though man has begun the work of destruction, he has in no case, as yet, accomplished that of extermination. Though the trees be stunted, the plants mean, and the birds sombre, they are not the relics of a more abundant flora and fauna. The forbidding appearance of the land discouraged any early attempts at colonisation, though the group was known about the middle of the sixteenth century. But they were found a very convenient rendezvous and watering place by the English buccaneers, who would seem to have been almost their only visitors for about a century and a half. In this capacity Dampier visited and described them in 1684.

The most valued and famous product of the islands were then, as still, the gigantic tortoises or land turtles, once found in incredible plenty, but now rapidly becoming extinct, partly from the wholesale destruc-

tion for sea store during two centuries, first by buccaneers and then by whalers. In many of the isles not a tortoise is left, but in others there are still a few of these huge Chelonians, weighing sometimes two hundred and fifty pounds, and some of them requiring the united efforts of six or eight men to lift them. As they creep along at the rate of six yards a minute or four miles a day, taking no notice of the human intruder beyond drawing in their heads with a low hiss, they recall some ungainly monster of the old reptilian age, which has escaped destruction in this hidden nook, and survives to tell of what sort were once the lords of creation. It is curious that, while it is threatened with extermination in its native haunts, this tortoise has been transplanted by whalers to various other parts of the globe, and is now found in India and elsewhere.

As in Mauritius, it is not so much the active agency of man, but the turning loose of pigs, which forebodes the early extermination of the native fauna. Here, as elsewhere, pigs have become wild, and thousands upon thousands of the eggs and young of the great tortoise are annually devoured by them. Pigs, asses, goats, and cattle have all been turned out, and, taking to the hills and woods of the more fertile islands, have multiplied exceedingly. There seems to be but one native quadruped, a little rodent, peculiar, but allied to the South American forms. Man, however, has signally failed in his attempts to settle *himself*. A Peruvian convict settlement was planted more than forty years ago, but it has dwindled to one or two families, who subsist by supplying whalers. This the naturalist has no cause to regret, for it has preserved for his study almost the last insular fauna surviving in its entirety. This, strange to say, was never noticed till the visit of Mr. Darwin in 1835. That visit has made the Galapagos classic soil. Here were first suggested to him those problems on the derivative origin of species, and their evolution, the various attempted solutions of which have revolutionised, within a very few years, the whole science of natural history.

The birds, with whom we have to do, for the tortoises are a digression, are what most clearly revealed to the philosopher the story of the isles of the sea. The visits of the buccaneers had been long forgotten, the calls of the whalers had evidently made no impression on these aborigines. The seamen had probably confined their hunting to the great tortoises, and, unlike a French sportsman, had scorned to notice sparrows or

thrushes. These welcomed Mr. Darwin and his companions with a confidence which "his form with indifference scanned." So tame and unsuspecting were they, that they did not understand what was meant by stones being thrown at them, they allowed themselves to be struck down one after another by a boy with a stick, and on one occasion, "a mocking-bird alighted on the edge of a pitcher which I held in my hand, and began quietly to sip the water, and allowed me to lift it with the vessel from the ground." This is exactly the experience of the Dutch in Mauritius, of Leguat in Rodriguez, and of Captain John Smith among the shearwaters of Bermuda, when he "went about among them and felt them, to eschew the lean and choose the fat." Nor was this tameness a peculiarity of certain species. Hawks, owls, and pigeons showed the same absence of fear as finches or thrushes.

If we analyze the collections that have been made on the Galapagos, we shall find that out of thirty species of birds of prey and passerine birds, only one species is found elsewhere, and that is the American rice-bird, a well-known migrant, spread over the whole of North America, and of the southern continent as far as the equator. Besides these, the one pigeon and the one rail are peculiar, and stranger still, of three of the heron family two are peculiar; the only two species of gull, the only two species of petrel, and the one penguin (the most northerly species of the family), are all peculiar. This isolation of species of oceanic birds with the vast powers of flight of gulls and petrels, is, I believe, without parallel. The other birds that occur are ducks, plover, and sandpipers, of course all migrants and visitors, and found all along the west coast of America.

All the fifty-seven species found here may be classed under thirty-nine genera, of which twenty-seven are almost world-wide, five are peculiar to the Galapagos, and seven belong also to continental America. It is here that we obtain our key to the zoological relationships of "this little world within itself," as Mr. Darwin aptly terms it. There is a remarkable absence of anything suggestive of relationship with the rest of the Pacific. There is no honeybird, no flower-pecker, no shrike, no kingfisher, no parrot. The one dove, peculiar though it be, has nought in common with the innumerable pigeons, in fairy-like plumage, of the South Sea Islands. It is unmistakably American in its type. The same is true of the herons. Then comes the little water-rail. Instead of the whilom

géant of Mauritius, or the huge *Notornis* of New Zealand, we find the most diminutive of its family, a bird barely four inches long, and a microcosm of the great rails (*Aramides*) of South America. An insular position here evidently does not foster development of size. The white owl too, though it has lost its whiteness, while the barn owl of Polynesia only differs from our own in the greater purity of its plumage, is smaller than any other variety of this cosmopolitan bird. Equally exceptional is the fact, that while the same gulls and petrels roam over the whole of the rest of the vast area of the Pacific, peculiar and sombre-coloured species are found confined to these island shores.

The "genera" or groups of species belonging exclusively to the Galapagos are absolutely unique; yet they have more affinity to the American than to any other groups of birds. They are some of them structurally related to the American *Cæreba*; others more like buntings. But whatever they be structurally, in colour and proportions all the genera are strangely alike. They are all brown, or brown-mottled, with the old males sometimes black. Of these peculiar genera there are known nineteen species. Some of these may perhaps blend into each other, or be the peculiar races of particular islands. But the examination has been so hasty, that it is very probable other species still remain unnoticed. Whatever the form of the bill, be it that of a grosbeak or a warbler, they have short wings, strong legs, and very dumpy tails. Yet their continental relatives are among the most gorgeously decked birds in the world, and generally with long tails. Again, as if to controvert the very natural hypothesis that the Galapagos were colonised from South America, there is a remarkable absence of the great families of birds which characterize that continent. Of the humming-bird, whose very cradle is the Andes, with its five hundred species, not a solitary straggler occurs in the Galapagos. Yet other islands nearer the coast, in climates far more inclement, are rich in these jewelled beauties. Juan Fernandez has three species of its own, and one extends even to Queen Charlotte Island and Nootka Sound. Of the tanagers, the tree-creepers (*Dendrocolaptes*), and the ant-hunters (*Formicaria*), the ornithological features of South America, not a specimen is found.

Whence, then, asked Mr. Darwin, are the Galapagos peopled? and why are they not only a world within themselves—for this is true, as we have seen, of other Oceanic islands

—but why, being so, do they differ from other tropical island worlds, in the absence of colour and the pigmy stature of their inhabitants? It has been shown that these had not to struggle for existence against enemies, the absence of which might be supposed to explain the giant stature of the pigeons, parrots, or rails of the Mascarenes. The formation of the islands forbids the hypothesis that they are the relics of a submerged continent; their fauna, therefore, must be derivative. We have seen it is not Polynesian; it can only, then, be American.

But it is not *South* American specially; it would seem rather to be derived from the western side of California. There is nothing, as in the islands of the Indian Ocean, or in New Zealand, to suggest the idea of the feeble remains of a bygone age of ornithic supremacy. Its "ornis" is essentially modern in type, while its gigantic tortoises and its huge, hideous black lizards, both land and water, attaining a height of four feet, prove that there is nothing in the nature of the region to prohibit the development of animals to an exceptional size.

The only solution, so far, seems to be that the reptiles are the earliest occupants of the soil—

that North, not South, America has supplied from time to time the progenitors of its bird inhabitants—that the Galapagos have been thrown up from the ocean depths long subsequent to the Andean ranges, but yet at so remote a period that the cold polar current, the humid atmosphere, and the barren soil have had time gradually to obliterate all traces of colour in plumage, except in the more recent arrivals (one of which, the rice-bird, has not had time to modify at all), and that scanty food has tended to stunt the development of individual size. The exceptional stoutness and strength of feet may be accounted for by the roughness of the soil. As to the universal abbreviation of the tail, we are not prepared with any conjecture on the cause of this sumptuary curtailment.

The story, then, of the Galapagos, as told by its birds, is, that it is geologically the most recent of the Oceanic groups of the Pacific, is connected with none other, and has been peopled from the north-east rather than from the opposite coast.

From the Galapagos we pass upwards and onwards, geographically, and almost, we may say, chronologically, to the Sandwich Islands.