SCIENCE

Island Life; or, the Phenomena and Causes of Insular Faunas and Floras, including a Revision and Attempted Solution of the Problem of Geological Climates. By Alfred Russel Wallace. (Macmillan & Co.)

The new science of zoological geography almost owes its existence to Mr. Wallace, and this his latest volume is a fresh and valuable contribution to the study for which he has already effected so much. Its title, indeed, like that of its predecessor, 'Tropical Nature,' is somewhat too unambitious and unassuming in the case of a work which covers so large a field, for only a little more than one-half the volume is devoted to the restricted question of insular Faunas and Floras, while the first two hundred pages are occupied with the discussion of the great problems of zoological and botanical distribution in their more general aspects. But it is easy to pardon so pleasant and genial a writer for giving a little more than he holds forth on his title-page, and the present volume, though in some respects intended as a popularization of Mr. Wallace's previous works on the distribution of animals, yet contains an immense amount of new and important matter for the man of science, as well as much delightful reading for the less instructed public. It is, in fact, the final outcome of his author's most mature thought and research on the special subject which he has made most peculiarly his own.

Mr. Wallace begins by pointing out a few of the most striking problems of distribution, which call for a solution even on the most casual survey. Why should the Fauna of remote Japan be so strikingly like that of Britain, while the Fauna of New Zealand is so totally unlike that of neighbouring Australia? Why should two islands of the Malay Archipelago, separated by a strait only fifteen miles wide, differ more from one another in their forms of life than England and Yezo? Why should the animals of sunny Florida resemble those of frozen Canada more closely than they resemble those of neighbouring and tropical Cuba? Why should tapirs be found in Brazil and in Sumatra, while they occur in no intermediate country? To answer these questions requires a wide knowledge of physical conditions, as well as of local Faunas and Floras over the whole world, and perhaps the case of islands offers the best field for their solution and illustration within easy limits. After thus stating the scope of his inquiry, Mr. Wallace goes on to define the six great zoological regions with which his previous works have already made us familiar—the Palaearctic region, including northern and eastern Asia, the whole of Europe, and northern Africa; the Ethiopian, lying in Africa south of the Sahara; the Oriental, in India and the Malayan Archipelago; the Australian, whose name at once describes its limits; and the Nearctic and Neotropical, in North and South America respectively. Taking evolution as the key to distribution, he points out that discontinuity is a proof of antiquity. Hence we find few if any discontinuous species, because if sufficient time has elapsed to get rid of intermediate individuals the species will probably have varied at either end from diversity of circumstances and want of mutual intercourse. Discontinuous genera are more common, and discontinuous families frequently occur.

In dealing with the geographical and geological changes which have affected distribution, Mr. Wallace introduces much fresh matter. Arguing in favour of his old thesis, the relative permanence of continents throughout geological time, he points out, from the dredgings of the Challenger, that shore deposits, containing material denuded from the land and deposited as sediment, are almost always confined to a distance of fifty or a hundred miles from the coast. Beyond these limits the only deposits are organic, consisting of small calcareous or siliceous shells. Accordingly all stratified rocks which include sand or pebbles must have been formed in the neighbourhood of existing continents, and often in the beds of shallow inland seas. Now the stratified rocks in the very centre of the great continents are all of this class, being either sandstones, limestones, conglomerates, or shales. As Prof. Geikie maintains, the stratified rocks of the earth comprise no formations which can be legitimately regarded as deep-sea deposits. Thus, instead of believing, with the older geologists, that every now and then the basin of an ocean like the Pacific is lifted up to form a plateau like that of Central Asia, we must suppose that each part of each continent has at various times formed part of a sea or of the ocean, but at the same time has been not far from land. The present state of the Baltic, the Mediterranean, and the Caspian will best illustrate these conditions. As to the chalk, so long claimed as a deep-sea formation, Mr. Wallace shows with much care that it resembles rather shoal-water deposits of Globigerina than the similar ones found at great depths,—an opinion corroborated by Mr. J. Murray from the results of dredgings, and by Dr. Gwyn Jeffreys from the character of the chalk fossils, which he
declares to be shallow, not deep, sea forms. Hence Mr. Wallace concludes that during the Cretaceous period the site of Europe was not occupied by the bed of a profound ocean, but that, on the contrary, only those portions of the continent were slightly submerged by local depression in which we now find Cretaceous deposits. Occupied by a vast expanse of water with a few scattered islands, it was just as much a part of the great northern continent as it is at the present day. The immense number of freshwater and shore deposits in all stratified formations, with remains of land animals and plants, he holds to be in like manner proofs of the comparative permanence of continents. The assumption that the existence of a great northern continent as it is at the present day, or of the whole period covered by the fossiliferous formations, from the Cambrian upward, is no more than 28,000,000 years.

The second and larger portion of the work, dealing with insular Faunas and Floras, contains less that at once novel and important, though it is worked out with the author's accustomed insight and wide grasp of fact. The authors of the Galapagos Islands, though less distant from South America, are yet practically more accessible than the great oceanic islands. Moreover, it is shown that their zoology and botany are essentially European or American in type, and that the oceanic islands, such as Bourbon, Mauritius, and Rodrigues, are purely oceanic in their Fauna and Flora.

Mr. Wallace thus reverses the parts ordinarily assigned to geographical and astrochronological factors in the problem of geological climates, and his arguments seem for the most part satisfactory and convincing. More doubtful, we think, is his treatment of the geographical features of the world, which he reduces within the last thirty years. It is well to remember that the geographical ranges of the present day are due in part to the glacial periods which have left their impress upon the whole surface of the northern hemisphere.

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