

those statements could be reasonably disputed, and he argued that the geographical distribution of life afforded one of the clearest illustrations of the development theory. It was the only rational explanation of the distribution of existing genera; when in our continent we found animals existing that were preceded by other but closely allied genera in the past; when in another case there were found islands severed only by narrow or shallow seas from the mainland, and tenanted by animals only slightly different in type from those on the Continent; and when elsewhere there were found islands in all respects suited for the abode of animals, but only inhabited by bats or a few birds. He pointed out that in a country where the antecedents of the former existence of mammalia were excluded the phenomena of the present existence of allied mammalia did not occur, and consequently it must be the cause, or the indisputable part of the cause, of the phenomena. The theory of descent was necessary for the explanation of the existence of the mammals. In New Zealand there lived two species of duck with different habits. One—the Paradise duck—when it had young ones, on being alarmed feigned to be wounded in order to draw attention away. The other—the blue duck—never made such an attempt. The Paradise duck belonged to a genus distributed over Europe, Asia, and Australia, where predacious mammals existed against which it had to defend its young, but the blue duck, on the contrary, belonged to a genus found in no other part of the world except New Zealand. It had lived in New Zealand only, and had consequently never had to protect its young from attacks of mammals. That proved that the Paradise duck inherited its instinct from its progenitors who lived in countries inhabited by mammals; but as the species was only found in New Zealand it must be assumed that it had derived its descent with a modification from those of Europe and Asia. He gave some instances of the application of natural selection, and said the extreme paucity of insects in far outlying islands was looked upon as showing that a large and varied insect fauna found the conditions of its development only in the great continental masses of land in strict adaptation to, and dependence on, a varied fauna and flora of ever increasing richness and complexity. The flora of Kangaroo Island comprised 450 species of flowering plants and ferns, eleven of which were not found anywhere else in the world; the remainder were all continental. Of the eleven restricted or esoteric species, ten were closely related to continental ferns, whilst in the case of one only was the modification so great as to entitle it to generic distinction. Probably all were emigrants before isolation, whilst in the last fifty years considerable accessions had been received by transport through man's agency as in the case of wheat. As to the fauna there was the echidna; he believed there was an opossum and there was once a kangaroo, and emus had been spoken of by Flinders. The kangaroo and emu might have got there after isolation.

Of the birds he had little to say, and the reptilia had not been worked out. He next dealt with the natural means for the diffusion of species and the circumstances limit-



ing the geographic range, also enumerating some of the causes operating against the continued existence of a species, such as the enemies of various kinds seeking its destruction, altered climatic conditions and circumstances. The theory, no rain no flowers, no flowers no insects, no insects no birds, held good, and was amply illustrated in the arid regions. Temperature and moisture being necessary to vegetable and animal life and organisms, could have no power of surviving any change in the conditions except they were endowed with the means of accommodating themselves to it. The exercise of that power might be accompanied by a visible change in the form and structure of the individual, or it might not. Thus species were limited in their distribution by the environing physical conditions, and gave rise by natural selection to new forms beyond their own confines. In those operations Nature acted slowly on all organisms, but man did so more rapidly on the few he cultivated and domesticated. Diffusion unaccompanied by modification was usually arrested by the sea or a zone of uncongenial climate, lofty chains of mountains, or a tract inhabited by hostile and more powerful animals. In conclusion he showed how the existence of a dry zone was an impassable barrier to regions beyond where the conditions were favourable to the growth of a plant, but in its endeavour to widen the area of its distribution it extended towards the dry zone, and being brought in contact with new conditions either succumbed or adapted itself by modification.

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