

SCIENCE.

Tropical Nature, and other Essays. By
Alfred R. Wallace. (Macmillan.)

ALL readers who are acquainted with Mr. Wallace's previous works will welcome the present volume, which consists of eight essays, divisible into two groups, but connected by a common object. The first four contain vivid descriptions of the principal aspects of "tropical Nature," while the remainder are more or less devoted to the theory of evolution, and to the explanations which it offers of the causes and origin of the said phenomena. No living naturalist, probably, is so thoroughly familiar with equatorial life as is Mr. Wallace, and

his descriptions will be equally agreeable to those to whom the glories of the tropics are personally known, and to the larger number of readers to whom they are only matters of second-hand report.

The work begins with a review of the climate and physical aspects of the equatorial zone, special stress being laid on its wonderful uniformity, both throughout the year and in regions so distant as South America and the Malayan Archipelago. Then follows a brief but characteristic sketch of the more important forms of tropical vegetation, and of the various groups of animals which are best represented in the primeval forests of the equator. In these chapters the author is obliged to destroy some of the illusions of non-travelled Europeans: as, for example, the popular notion that the flora of these latitudes presents a dazzling brilliancy of colour. On the contrary, he tells us that "as the general vegetation becomes more luxuriant, flowers present a less and less prominent feature," and that a conspicuous mass of blossom, when occasionally met with, forms only "an oasis of colour in a desert of verdure." Next to this, one of the most general characteristics of a tropical forest is the apparent absence of animal life; for, though an immense variety of forms are really present, they are so widely scattered and so shy in their habits as to require careful search. But a striking exception to this rule is presented by the butterflies, which are not only abundant and varied but conspicuous from their size, their gorgeous colouring, and their habits.

"Their aspect is altogether different from that presented by the butterflies of Europe and of most temperate countries. A considerable proportion of the species are very large, six to eight inches across the wings being not uncommon among the Papilionidae and Morphidae, while several species are even larger. This great expanse of wing is accompanied by a slow flight; and, as they usually keep near the ground and often rest, sometimes with closed and sometimes with expanded wings, these noble insects really look larger and are much more conspicuous objects than the majority of our native birds. The first sight of the great blue Morphos flapping slowly along in the forest roads near Para—of the large white-and-black semi-transparent Ideas floating airily about in the woods near Malacca—and of the golden-green Ornithopteras sailing on bird-like wing over the flowering shrubs which adorn the beach of the Ké and Aru Islands, can never be forgotten by anyone who has a feeling of admiration for the new and beautiful in nature."

In a brief notice of the less conspicuous equatorial vertebrates Mr. Wallace speaks of the blood-sucking bats of South America, and refers them to the genus *Phyllostoma*. Surely he is here in error, for all recent investigations, including the anatomical observations of Dr. Peters and Prof. Huxley, and especially the conclusive facts given by Herr Hensel, go to prove that the *Desmоди* and *Diphyllae* are the real culprits, and that they alone are capable of inflicting the wounds in question.

Passing over an extremely interesting chapter on the remarkable family of the humming-birds, we come to what is probably the most important essay in the volume, that "On the Colour of Animals in Connection with Sexual Selection." Here Mr.

Wallace finds himself obliged to differ considerably from the conclusions which his great colleague, Mr. Darwin, arrived at in his work on *The Descent of Man*. The latter, as is well known, is inclined to attribute the various colours of animals mainly to "conscious sexual selection"—in other words, to the preference shown for certain tints and markings in the courtship and mating of the species. Mr. Wallace, on the other hand, regards the variety of hues found in nature as being explicable by the general laws of "natural selection," without calling in the aid of conscious or voluntary choice. His argument is based on the theorem "that colour in nature is normal, and that its presence hardly requires to be accounted for so much as its absence." When it is remembered that all the rays of light must be equally reflected to produce white, and that conversely all must be equally absorbed to produce black, it is evident that complex organisms will rarely present these precise conditions, and that colour may therefore be regarded as a "normal product of organisation." The diverse tints and patterns thus presented by animals and plants are divided by our author into five groups—Protective, Warning, Sexual, Typical, and Attractive Colours, the last-named being peculiar to the vegetable kingdom. The first of these includes the hues which tend to harmonise a creature with its surroundings, and thus to enable it to escape its enemies. The second is the reverse of the first group, and consists of those brilliant colours which often adorn badly-smelling or evil-tasted animals—such as the butterflies of the families *Danaidae* and *Acraeidae*—and thus act as a danger-signal to warn birds, lizards, and monkeys that they are not eatable. Here it is that we meet with that wonderful phenomenon of "mimicry," by which perfectly edible butterflies of other families have gradually come to closely resemble their acrid or foetid neighbours, and thus to share in their immunity; but of this subject Mr. Wallace has treated so fully in his previous volume of *Contributions* that he has now little new to add. In the third group we have the numerous cases in which the sexes vary in colour, which the author accounts for by the repression of normally brilliant tints in the female through the need of protection, and by their natural increase in the most vigorous and consequently successful males. As already remarked he does not believe that there is any good evidence that the female prefers the most brightly-coloured male, holding that "it is his persistence and energy rather than his beauty that wins the day." And certainly he has a strong point in his favour in the class of insects, where the evidence is almost conclusive against there being any selection whatever on the part of the female. Lastly, Mr. Wallace regards the remaining varieties by markings, which he terms typical, as needing no special explanation, but as being due to "the normal production of colour in organic forms, when fully exposed to light and air, and undergoing great and rapid developmental modification." We have here only briefly and baldly traced the author's theory (which, by the way, was broached some time ago in *Macmillan's Magazine*), and can

only refer the reader to the original for the admirable series of observations by which it is supported and illustrated.

We must pass over the chapter on "The Colours of Plants and the Origin of the Colour-sense," with the remark that Mr. Wallace does not favour the strange theory of Geiger (which Mr. Gladstone has lately adopted) that the ancients were practically colour-blind. The seventh essay consists of the text of the author's address delivered in 1876 as President of Section D of the British Association; where, under the apt title of "By-paths in the Domain of Biology," he treated of some of the most interesting questions with regard to the effect of outward surroundings on organic life, and to the great mystery of the antiquity and origin of man. Mr. Wallace's views on the latter subject may be briefly said to be that it appears certain that man is descended from some lower form, but that present evidence seems to point to a totally distinct process of development, and one more rapid than that which has obtained among the lower animals.

In the final chapter we have the substance of a lecture delivered before the Royal Geographical Society on "The Distribution of Animals as indicating Geographical Change," embodying a digest of the principal results arrived at in the author's standard work on the subject which we had the pleasure of reviewing about two years ago. The whole of the present volume may be said to consist of the original work done by Mr. Wallace since that date; and we commend it to all who can appreciate careful observation, lucid description, and ingenious hypothesis.

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