

WALLACE'S TROPICAL NATURE.*

FEW scientific writers surpass or equal Mr. Wallace in the power of stating the results of persevering and well-directed scientific inquiry in a form not only intelligible, but really interesting, to the general public. He has now published a general sketch of tropical nature, pointing out how and why it differs from the nature of the other two zones. Nowhere amid the many descriptions of the tropics that have been given is to be found a summary of the past history and the actual phenomena of the tropics which gives that which is distinctive of the phases of nature in them more clearly, shortly, and impressively. Most persons who have not passed through a National School, and all who have, are aware that the climate of the equatorial regions is always much the same; but few readers of Mr. Wallace's book will feel that they have anticipated any large part of the consequences which, as he shows, flow from this simple fact. The climate is hot, to begin with, because it is unvarying. The sun in June is higher in London than in Java, and the sunlight lasts five hours longer; but then in Java and in other tropical regions the sun, such as it is, is always going on. Tropical heat is the joint product of the constant high temperature of the soil and of the ocean; of the great amount of aqueous vapour in the hemisphere; of the great extent of the intertropical regions; and of the latent heat given out during the formation of rain and dew. As Mr. Wallace says, uniformity and abundance rather than any characteristic manifestations are the prevailing features of all the climatic phenomena of the equatorial zone. The next important fact to note about this zone is that it is, throughout the circumference of the globe, a region of forests edged first with woody country and then with deserts. In these gigantic forests man feels himself an intruder. He has a sense of solemnity and weirdness rather than of beauty. He finds high over all the foliage of the larger trees almost excluding the light of the sun; then under this foliage a growth of minor trees forty or fifty feet high, and then an undergrowth of dwarf palms, and tree-ferns. Sometimes the ground is covered with flowers, which, however, are not conspicuous, and the climbing plants which twist themselves up and down as they follow the fortunes of a standing or a fallen tree cannot flower until they get to the light. In fact, as general vegetation becomes more luxuriant, flowers form a less and less prominent feature of the landscape. In the great virgin forests flowers are rarely seen. By far the greater number of equatorial forest trees have small and unobtrusive flowers. On natural exposures, such as steep mountain sides, the banks of rivers, or the ledges of precipices, or in artificial clearings, flowers are to be found, but not in the ordinary equatorial scenery. On the other hand, the vegetation of the tropics is extraordinarily various. Trees of the same kind are not found together. A naturalist, as Mr. Wallace informs us, may walk for miles without seeing a second specimen of a tree he has just been examining. Here, again, the equality of the climate tells. The species that have been developed find a habitat here and there, and, as the climate is in favour of all, they all grow. The effect of this profusion of natural growth is, Mr. Wallace has found, at first to overawe and bewilder the traveller, and it is only when he has overcome his first feelings of awe that he can attend to the endless phenomena of vegetable and animal life that surround him.

But this animal life does not present itself in its enormous variety without search. The butterflies, the large bees and wasps, the humming-birds and the sun-birds, where they are found at all, force themselves on the attention of the traveller, as do also the frogs and lizards; and the ants are everywhere in annoying profusion. There are too in most trees parrots and monkeys; but the more wonderful creatures are only seen by those who look for them, or who spend hours of watching until chance sends them across the path of the watcher. Unless a newcomer is gifted with such enthusiasm and so large a store of patience as Mr. Wallace possesses, he is sure to find tropical life at once very uncomfortable and very disappointing. But when patience is exercised it is rewarded. The equatorial regions have been the same through vast periods of geological time. It is not merely that they are the same now throughout each year and in one year after another, but they have been the same through countless ages. They have not been visited by the glacial catastrophes which have changed the conditions of life in the temperate zones. And what has once reached them thrives free from the vicissitudes of climate. The differences of type which countless causes are always producing have not been checked by the type becoming extinct through cold. This is, in the opinion of Mr. Wallace, the reason why, for instance, there are so many more kinds of butterflies in the equatorial zone

zones where the fauna is limited and of a low order, and how this has happened is explained by Mr. Wallace in his concluding chapter. He there treats of the indications of geographical changes afforded by the distribution of animals. The general arrangement of the earth's surface has been the same for so long that no account need be taken of possible earlier differences. The land has been united in the north and has pushed southward in the great promontories represented by Cape Horn, the Cape of Good Hope, and Tasmania. Where deep seas are now found there have always been deep seas, but there have been constant variations in the shallow seas. Sometimes the bed has risen and there has been land, sometimes it has sunk and there has been water. Where we find a limited fauna, and that of a low type, as in Madagascar or the Philippine Islands, we know that the spot was cut off from the mainland at an early date. The lemurs of Madagascar and the kangaroos of Australia show the point which the development of animal life had reached on the earth generally when the sea came and prevented fresh immigration. Two difficulties, however, stand in the way of this theory. Why, it may be asked, if development is the fruit of general causes, should it not have had many independent centres? The only reply is that naturalists consider this was not the case, and we suppose we must bow to the authority of experts. Mr. Wallace treats it as an axiomatic truth that development has not had different centres. All lemurs, for example, must have come from the same stock. The induction on which this conclusion is based is one founded on so vast a number of instances, known only to great naturalists, that no one but a great naturalist can pretend to have an opinion upon it. Secondly, we find animal life in islands separated from all other land by large tracts of very deep sea. How, if the configuration of the earth has remained the same, and the animal life has not been locally developed, did it get there? Mr. Darwin has long ago treated this point with his usual exhaustive lucidity. The animal life that is found there is precisely the animal life that could have got there in spite of the deep sea. The birds that can fly far are found; those that cannot fly far are not found. The ova of frogs and toads may be supposed to float in the water, and snakes may have travelled on wandering trees. But one puzzle still remains a puzzle, in spite of all the industry and thought that Mr. Wallace has brought to bear on the subject. Lizards are found on these secluded islands, and how lizards have made the journey naturalists cannot at present guess. Mr. Wallace has no suggestion to make, and he has far too keen a sense of what science demands to hazard a guess where he has no real evidence on which his guess may be based.

Mr. Wallace has one scientific novelty to advocate, for he rejects entirely the theory of sexual selection as a cause of variation of type, which was one of the most prominent parts of Mr. Darwin's account of the scheme of nature. Why are males, and especially male birds, so beautiful, and why has their beauty gone on increasing? Because, Mr. Darwin answered, the females keep picking out the prettiest males. No, answers Mr. Wallace; it is because colour is a sign of vigour, and the most vigorous birds are selected by the female, or conquer their rivals in her favour. This difference of opinion leads Mr. Wallace into a very elaborate dissertation on two points, What is the source of colour, and what is its use? He remarks that the causes of colour in the animal world are molecular and chemical change of the substance of their integuments, or the action on it of heat, light, and moisture, and also "the interference of light in superposed transparent lamellæ, or excessively fine surface-striae." These elementary conditions for the production of colour are found everywhere in the surface structure of animals, so that its presence must be looked on as normal, its absence as exceptional. An animal is, in short, bound to be of some colour, and of what colour is it to be? Colours are fixed or modified in animals by natural selection for various purposes—obscure or imitative colours for concealment; gaudy colours for a warning that the animal is not good to eat, and so is not worth killing; special markings for easy recognition, or to divert attention from vital parts. Colours, again, are influenced by food, by the action of light, and by the peculiarities of the soil, and they are intensified by the extension or modification of the integument, and by the surplus of vital energy, as at breeding-time. As to the use of colour, it has already been explained in a great measure by tracing the varieties of colour to such causes as the purposes of concealment, warning, and recognition. But we have not any reason to suppose, in Mr. Wallace's opinion, that animals have any enjoyment in colour. A dog, for example, is perfectly indifferent whether it is a peacock or a peahen that walks by him. Man alone can derive pleasure from colour, and in this sense the use of colour is a use for man only. This leads Mr. Wallace to discuss whether the enjoyment of colour and the perception of its differences are recent attainments of humanity. The more ancient literature the less is said of colour, and the vaguer are the terms expressing it. Mr. Gladstone's study of the Homeric poems led him to suppose that archaic man had a positive perception only of degrees of light and darkness, and that in Homer's time he had advanced to the imperfect discrimination of red and yellow, but no further. Mr. Wallace, however, objects that we cannot safely attribute the discrimination of colour to civilized man alone, since both flowers and fruit have become diversely coloured in adaptation to the visual powers of insects, birds, and mammalia. It was therefore the nomenclature, not the perception, of various colours that was wanting in barbaric man. But he seems to think that primitive man had no need of the exact discrimination of colours which is now perhaps useful and certainly delightful to us;

and he leaves us with the impression that, in his opinion, man in Homer's time must have had a wide perception of the differences of colour, but that the refined pleasure of keen discrimination is a product of civilization.

Mr. Wallace says that it is with some pain that in one part of his work he finds himself obliged to approach the subject of the antiquity of man. It is not a pain that his readers will share, for it is a subject on which nothing is interesting but the real truth, and Mr. Wallace always convinces us that he is looking for the truth and for the truth only. What he has to say amounts to this. The conclusion that man is somehow descended in point of bodily structure from a lower animal is to him irresistible, as it is to Mr. Mivart, who, as is well known, thinks there is nothing in this inconsistent with the teaching of the Catholic Church. But, if this is accepted, what we know points, as Mr. Wallace thinks, to an evolution widely different from that in which an animal very like an ape and a little like a man has been developed step by step into an animal so intellectual as Mr. Wallace himself. We have evidence that man has existed for an unknown number of thousands of years on the earth; but not only is there no trace of any animal rather like man, although of a lower type, but we start with men who, for all we can see, were quite up to the average man of to-day. The skull which of all known skulls is the oldest is "a fair average human skull." Research over new areas also shows that civilization has begun and thriven and then faded away in regions where we have no kind of notion of its history. Perhaps the most remarkable instance is that of one of the most remote islands of the Pacific, Easter Island, two thousand miles from South America, two thousand from the Marquesas, and more than one thousand from the Gambia Islands, where there are found hundreds of gigantic stone images, now mostly in ruins. These images are often forty feet high, and have crowns on their heads. The existence of such vast works implies a large population, abundance of food, and an established government. Yet the island is less than Jersey, and was too small for such a government. The island may therefore have been probably a dependency of a Pacific Empire. These facts are not at all new; but what is new is to find that Mr. Wallace has nothing newer, that he thinks they must provisionally be taken as the best indication we have of the history of the race. He seems indeed to incline for many reasons to the opinion that the development of the human race has been different altogether in character from that of animals generally; that the beginning of man was not by the creation of a new form, but by the special sudden change of an old form. But what we most realize in any case is that, as to the history of our race, we as yet know very little. We must be content to learn slowly. As Mr. Wallace very sensibly says, "However great may have been the intellectual triumphs of the nineteenth century, we can hardly think so highly of its achievements as to imagine that in less than twenty years we have passed from complete ignorance to almost perfect knowledge on two such vast and complex subjects as the origin of species and the antiquity of man."