The World of Life.—By Alfred Russel Wallace.—London: Chapman & Hall, Ltd., 1910.

For more than half a century the name of Alfred Russel Wallace has been associated with that of Charles Darwin as one of the first exponents of the theory of Natural Selection, and during that time Dr Wallace has contributed many important works to the literature of biology. As a biological explorer and field-naturalist he stands unrivalled, and his great work on *The Geographical Distribution of Animals* has long been regarded as a classic. His more popular books have made him known to a very wide circle of readers, and he is naturally regarded as a high authority, whose opinion must be listened to with respect. His new book on *The World of Life* is essentially a popular one, and will doubtless be read by a great many people who may be disposed to accept it as an expression of the latest views of the scientific world on the subjects with which it deals. Nevertheless we venture to think that it is, in some respects, an eminently unscientific work, in which the author far outsteps the legitimate bounds of scientific speculation.

It is, in fact, the old story—the story which Darwin and his school have done so much to discredit, but which persistently crops up again in some new guise. Man is the centre of the universe, and for the sake of man the world exists, and all the innumerable kinds of plants and animals have been created—not specially and separately created, however, as in the older

variants of the myth, but guided throughout the whole course of their evolution by an army of divine or semi-divine intelligences, under the direction of a Supreme Being, towards the great consummation. The earth is man's school, where he undergoes the necessary preparation for his future, spiritual life, in which his education will be continued. Throughout all the long ages of the earth's history, for untold millions of years, this single aim has been kept in view, and guardian angels have been ever on the watch lest the scheme should miscarry by some wrong turn in the particular line of evolution which culminated in man himself. Other organisms have arisen and passed away—myriads upon myriads—to prepare the earth for man, and to provide the means for his intellectual and moral training.

Dr Wallace's views remind us of the well-known schoolboy's remark about the wonderful benevolence and forethought of the Creator in making the rivers run through the towns. The doctrine of the scientific evolutionist, that man is what he is because he and his ancestors have, through countless ages, been able slowly to adapt themselves to a constantly changing environment, is rendered utterly unscientific by the assumption that the environment was prepared beforehand in accordance with the anticipated needs of the human race.

Apparently we are to believe that the scheme existed in the mind of the Creator before ever the evolution of the universe commenced, like the plan of a great building in an architect's office. If so, how are we to account for the plan itself? Did that also owe its existence to a long course of evolution in the mind of the Supreme Being? and if so, where are we to stop? Such a view appears to be closely akin to the old idea of the "preformationists," who held that the egg contains within itself a complete miniature of the future animal, the development of which consists merely in growth and unfolding ("evolution" in their sense); an idea which was reduced to absurdity by the logical deduction that inasmuch as each miniature must contain more eggs, and these in turn more miniatures, any one egg must contain the miniatures of all future generations one within the other, like a nest of pill-boxes.

We fail to see how Dr Wallace's remarkable theory helps us in our futile attempts to comprehend the incomprehensible. Such a view still leaves us face to face with the old difficulty of reconciling the belief in the omnipotence and benevolence of the Creator with our own experience of pain and evil in the world, for we do not think matters are much improved by the notion that it was all foreseen and arranged beforehand with a view to the education of man. Perhaps, after all, man is not of so much importance in the universe as it pleases him to suppose.

The whole question is, it appears to us, at present at any rate, beyond the reach of scientific treatment, and if we open the door too widely to speculation, there would seem to be a strong probability that science will fly out of the window. We can quite understand, however, that an ardent spiritualist like Dr Wallace, who does not hesitate to introduce the

teaching of "modern spiritualism" into the book before us, may feel himself bound to endeavour to justify his views by scientific evidence. He must excuse us if we do not find that evidence convincing.

As an example of Dr Wallace's methods we may take the passage concerning the different kinds of wood, "whose qualities of strength, lightness, ease of cutting and planing, smoothness of surface, beauty, and durability are so exactly suited to the needs of civilised man that it is almost doubtful if he could have reached civilisation without them. The considerable range in their hardness, in their durability when exposed to the action of water or of the soil, in their weight and in their elasticity, render them serviceable to him in a thousand ways which are totally removed from any use made of them by the lower animals. Few of these qualities seem essential to themselves as vegetable growths. They might have been much smaller, which would have greatly reduced their uses; or so much harder as to be almost unworkable; or so liable to fracture as to be dangerous; or subject to rapid decay by the action of air, or of water, or of sunshine, so as to be suitable for temporary purposes only. With any of these defects they might have served the purposes of the animal world quite as well as they do now; and their actual properties, all varying about a mean value, which serves the infinitely varied purposes to which we daily and hourly apply them, may certainly be adduced as an indication that they were endowed with such properties in view of the coming race which could alone utilise them, and to whose needs they minister in such an infinite variety of ways."

It is difficult to treat this argument seriously. We might well inquire what have either man or the lower animals got to do with the matter? No one knows better than Dr Wallace that large size, hardness, strength, and durability are essential qualities in the trunks and branches of forest trees. Indeed, he himself tells us, only a few pages further on, in speaking of the germination of the seed, that a shoot is sent "into the atmosphere, from which the whole plant with all its tissues and vessels are formed, enabling it to rise up into the air so as to obtain exposure to light, to lift up tons' weight of material in the form of limbs, branches, and foliage of forest trees, often to a hundred feet or more above the surface." It is doubtful if there is a single character amongst those enumerated which is not demonstrably useful to the tree itself, or at least correlated with some useful character. All have arisen in the course of evolution because they are advantageous to the tree, and natural selection would very soon have eliminated any individuals in which they had failed.

Dr Wallace's argument concerning the evolution of pain, by which he endeavours to prove that nature is not cruel, appears to us to be no less fallacious. He considers that the sole purpose of the earlier forms of life was to be eaten by somewhat higher forms, that they possessed the minimum of sensation required for the purposes of their short existence, and that anything approaching to what we call pain was unknown to them. He thinks that being eaten may even have been slightly pleasurable to

them, "a sensation of warmth, a quiet loss of the little consciousness they had, and nothing more." "All animals which . . . . exist in vast numbers, and which are *necessarily* kept down to their average population by the agency of those that feed upon them . . . . probably suffer nothing at all when being devoured. For why should they? They exist to be devoured."

If this is so, how are we to explain the fact that so many of the lower animals possess special adaptations — protective resemblances, warning colours, unpalatability, defensive spines, and so on—which apparently serve the sole purpose of helping them to avoid being devoured? Surely they, like all living things, exist primarily for their own benefit, and are adapted to their environment accordingly. If not, where does natural selection come in?

As an anti-vivisectionist Dr Wallace fully realises the danger of his arguments concerning the absence or, in the case of the higher animals, the relative absence of pain, but apparently he objects to vivisection chiefly on the ground of its evil effect upon the moral nature of man. For man himself pain has a great educational value, and it is seriously suggested that the loss of his hairy coat served to render him more sensitive, in preparation for his further education by sad experience. This, indeed, savours of the methods of the human pedagogue!

It is a relief to turn to some of the less speculative portions of the book, in which the author deals with such problems as the distribution of species, temperate and tropical floras, heredity, variation, adaptation, and the geological record. All of these subjects he treats in his usual lucid style, and though these chapters contain little that is new, they will be read with keen interest by students of nature. He has made extensive use of quotation and illustration, and has been fortunate in being able to borrow many figures from the admirable British Museum Guides and other sources, which render the chapter on the Geological Record in particular very attractive. It is a pity that a number of inaccuracies should have found their way into the text. The ear-bones of whales are not usually called otoliths, a term which is applied to totally different structures in some of the lower animals. The coast-line of South America is surely much more than 1200 miles in length, as implied by a statement on page 178. Preyer's observation on the chemical composition of hæmoglobin, published, as Dr Wallace himself tells us, in 1866, can hardly be regarded as a "recent result," and the statement that protoplasm has been divided into three groups of chemical substances—proteids, carbohydrates and fats—although qualified later on by the remark that the two latter are products rather than the essential substance of living things, is open to serious criticism. Nor can we pass over in silence the off-hand manner in which the theories of "Mutation" and "Mendelism" are thrust on one side. They may be "ludicrously inadequate as substitutes for the Darwinian factors in the world-wide and ever-acting processes of the preservation and continuous adaptation of all living things," but they are of the highest importance in helping us to understand the complex problems of variation and heredity,

and it is upon variation and heredity that the whole theory of organic evolution, with the subsidiary theory of natural selection, is based. We cannot help thinking that Darwin himself would have extended a cordial welcome to the remarkable results obtained by Mendel and de Vries and their numerous followers.

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