

REVIEWS.

A STORY OF EVOLUTION.

THE name of ALFRED RUSSEL WALLACE will always be remembered in the history of science, owing to his association with the chief incident in the world's history during the second half of the nineteenth century. It is no new thing to find that a glimpse of the same great generalization has been won by two minds almost at the same moment, but that it should have occurred in the case of a generalization which has so profoundly affected the course of thought as the Darwinian hypothesis, cannot fail to strike the imagination of any who realize that man doth not live by bread alone. After all, it is the things of the mind that count, and it is easier to imagine the twentieth century without electricity than without the theory of evolution.

Mr. Wallace, already a voluminous writer, has recently added to the long range of his volumes two, *My Life: A Record of Events and Opinions*, which exceed in bulk any of his previous productions. It would be ungracious to grumble too much at their size, for their chapters are so well arranged, the reader is supplied with so many signposts and warning boards, that it is easy to skip—and the judicious will be inclined to skip—a good many of the earlier chapters of the first volume and not a few of the later chapters in the second. For on many subjects Mr. Wallace is an antibody. He is anti-vaccination, anti-State endowment of education, anti-land laws, and so on. To compensate he is pro-spiritualism and pro-phrenology, so that he carries as cargo about as large a dead weight of fancies and fallacies as it is possible to float withal. But none can help admiring and respecting him, not merely because it is obvious that he quite honestly believes in the validity of the evidence by which he has been deluded, but because as soon as he begins to think and write about his own subject he becomes forcible, convincing, and lucid. Early in life he grasped a great principle, and it has been a sure guide to his footsteps through the labyrinth in which so many systematists have lost their way. It is a real intellectual treat to follow him here, and we can easily forgive while we regret the rest.

The book, as we have hinted, is most terribly spun out, and a keener sense of humour might have saved us many weary pages. It is difficult, too, to feel much interest in Mr. Wallace's conjectures as to his ancestry, in the fortunes of his father, or in his own school days.

After leaving school, Mr. Wallace worked with an elder brother as a land surveyor, and the many opportunities of leisure that this calling afforded him in various parts of England and South Wales seem to have confirmed a disposition to a practical study of natural history which had shown itself still earlier in life. Eventually, after a short experience as a schoolmaster, he resolved to make a venture as a collector, and, having arranged with Mr. S. Stevens, an enthusiastic student of British coleoptera and lepidoptera, to act as his agent, he set sail for the Amazon in April, 1848, in company with Mr. H. W. Bates, who spent many years there, and has recorded his experiences in a fascinating volume, *Naturalist on the Amazons*.

Mr. Wallace spent four years on the Amazon, the Rio Negro, and their tributaries, and sent home many collections which made his name well known to entomologists and ornithologists. He had the misfortune, however, to lose the whole of the private collection he had formed owing to the destruction by fire when at sea of the ship on which he was returning home. He spent nearly two years at home reviewing his collections, and the papers he wrote upon them gave him a considerable reputation among naturalists. Early in 1854, encouraged and assisted by Sir Roderick Murchison, he went to the East, and spent the next eight years in the Malay Archipelago, visiting Borneo, the Celebes, the Moluccas, and other islands; it was this experience which enabled him to write his work on *Island Life*, perhaps the most important of his contributions to science.

Before this he had read *The Vestiges of Creation*, a work which produced a great effect on his mind, as on that of many thoughtful students of Nature at that time. It is, of course, well known that the theory of natural selection occurred to Wallace independently, but it may be interesting to quote the account he here gives of how the hypothesis first presented

itself to him as the true explanation of a problem which had been long present to his mind:

"At the time in question I was suffering from a sharp attack of intermittent fever, and every day during the cold and succeeding hot fits had to lie down for several hours, during which time I had nothing to do but to think over any subjects then particularly interesting me. One day something brought to my recollection Malthus's *Principles of Population*, which I had read about twelve years before. I thought of his clear exposition of 'the positive checks to increase'—disease, accidents, war, and famine—which keep down the population of savage races to so much lower an average than that of more civilized peoples. It then occurred to me that these causes, or their equivalents, are continually acting in the case of animals also; and as animals usually breed much more rapidly than does mankind the destruction every year from these causes must be enormous in order to keep down the numbers of each species, since they evidently do not increase regularly from year to year, as otherwise the world would long ago have been densely crowded with those that breed most quickly. Vaguely thinking over the enormous and constant destruction which this implied, it occurred to me to ask the question, Why do some die and some live? And the answer was clearly, that on the whole the best fitted live. From the effects of disease the most healthy escaped: from enemies, the strongest, the swiftest, or the most cunning; from famine, the best hunters or those with the best digestion; and so on. Then it suddenly flashed upon me that this self-acting process would necessarily improve the race, because in every generation the inferior would inevitably be killed off and the superior would remain—that is, the fittest would survive. Then at once I seemed to see the whole effect of this, that when changes of land and sea, or of climate, or of food supply, or of enemies occurred—and we know that such changes have always been taking place—and, considering the amount of individual variation that my experience as a collector had shown me to exist, then it followed that all the changes necessary for the adaptation of the species to the changing conditions would be brought about; and as great changes in the environment are always slow, there would be ample time for the change to be effected by the survival of the fittest in every generation. In this way every part of an animal's organization could be modified exactly as required, and in the very process of this modification the unmodified would die out, and thus the definite characters and the clear isolation of each new species would be explained. The more I thought over it the more I became convinced that I had at length found the long-sought-for law of Nature that solved the problem of the origin of species. For the next hour I thought over the deficiencies in the theories of Lamarck and of the author of the *Vestiges*, and I saw that my new theory supplemented these views, and obviated every important difficulty. I waited anxiously for the termination of my fit so that I might at once make notes for a paper on the subject. The same evening I did this pretty fully, and on the two succeeding evenings wrote it out carefully in order to send it to Darwin by the next post, which would leave in a day or two.

"I wrote a letter to him in which I said that I hoped the idea would be as new to him as it was to me, and that it would supply the missing factor to explain the origin of species. I asked him if he thought it sufficiently important to show it to Sir Charles Lyell, who had thought so highly of my former paper.

"The subsequent history of this article is fully given in the *Life and Letters*, vol. ii, and I was, of course, very much surprised to find that the same idea had occurred to Darwin, and that he had already nearly completed a large work fully developing it. The paper is reprinted in my *Natural Selection and Tropical Nature*, and in reading it now it must be remembered that it was but a hasty first sketch that I had no opportunity of revising before it was printed in the journal of the Linnean Society, and especially that at that time nobody had any idea of the constant variability of every common species in every part and organ, which has since been proved to exist. Almost all the popular objections to natural selections are due to ignorance of this fact, and to the erroneous assumption that what are called "favourable variations" occur only rarely, instead of being abundant, as they certainly are, in every generation, and quite large enough for the efficient action of "survival of the fittest" in the improvement of the race."

Fortunately in this instance we were spared one of those unfortunate wrangles as to priority which have defaced the history of science. Darwin generously recognized the

1 *My Life: A Record of Events and Opinions*. By Alfred Russel Wallace. With Facsimile Letters, Illustrations, and Portraits. Two volumes. London: Chapman and Hall, 1905. (Demy 8vo, pp. 413 and 468, 25s. net.)

originality of Wallace, and Wallace never ceased to praise the fullness and completeness of Darwin's demonstration. Writing to a friend in 1860, after receiving a copy of the *Origin of Species*, he says: "I have read it through five or six times, each time with increasing admiration. It will live as long as the *Principia* of Newton. It shows that Nature is, as I before remarked to you, a study that yields to none in grandeur and immensity. . . . The most intricate effects of the law of gravitation, the mutual disturbances of all the bodies of the solar system, are simplicity itself compared with the intricate relations and complicated struggle which have determined what forms of life shall exist and in what proportions. Mr. Darwin has given the world a *new science*, and his name should, in my opinion, stand above that of every philosopher of ancient or modern times. The force of admiration can no further go!" Again, writing to Mr. Bates in the same year, he said: "I know not how, or to whom, to express fully my admiration of Darwin's book. To him it would seem flattery, to others self-praise; but I do honestly believe that, with however much patience I had worked and experimented on the subject, I could never have approached the completeness of his book, its vast accumulation of evidence, its overwhelming argument, and its admirable tone and spirit. I really feel thankful that it has not been left to me to give the theory to the world. Mr. Darwin has created a new science and a new philosophy, and I believe that never has such a complete illustration of a new branch of human knowledge been due to the labours and researches of a single man. Never have such vast masses of widely-scattered and hitherto quite unconnected facts been combined into a system and brought to bear upon the establishment of such a grand, and new, and simple philosophy."

On returning to England in 1862, Wallace was sought out by Darwin, and friendly relations were maintained ever afterwards, although Wallace subsequently differed from Darwin on certain points. These were, as summarized by Mr. Wallace himself: First, with regard to the origin of man as an intellectual and moral being, Wallace holding that there is a difference in kind, intellectually and morally, between man and other animals, and that while his body was undoubtedly developed by the continuous modification of some ancestral animal form, some different agency analogous to that which first produced organic life and then originated consciousness came into play in order to develop the higher intellectual and spiritual nature of man. The second point was that Wallace did not accept that part of Darwin's argument for sexual selection which rested on the choice by the female of more musical or more ornamental male birds. The third point had reference to the distribution of arctic plants in the southern hemisphere and on isolated mountain tops within the tropics. Darwin's suggested explanation of the distribution was that it was due to a cooling of the tropical lowlands, during the glacial period, to such an extent as to allow north temperate and arctic plants to spread across the continents to the southern hemisphere, and, as the cold passed away, to ascend to the summits of isolated tropical mountains. Wallace held, from his study of the floras of oceanic islands, that the greater part of their flora was derived by aerial transmission of seeds either by birds or by gales, and extended this view to the transmission along mountain ranges. The fourth point was that Wallace was led to reject Darwin's theory of pangenesis and the transmission of acquired characters; in this he followed the general trend of modern opinion, which has been influenced by the views advanced by Dr. Weismann to reject the hypothesis that acquired characteristics can be transmitted.