

WALLACE'S DARWINISM.

Darwinism: An Exposition of the Theory of Natural Selection, with some of its Applications. By ALFRED RUSSELL WALLACE, LL.D., F.L.S., &c.; with Map and (37) Illustrations. Pp. xvi. and 494. Macmillan & Co., London. 1889.

ONE cannot open this last addition to the literature of evolution without being impressed with the vast change of opinion since Darwin, thirty years ago, began to convert a tabooed heresy into reputable current coin; but one cannot read the book without feeling how slowly the variation in reality progresses. On the one hand, the preface reminds us of the fact that the doctrine of organic evolution is fast falling from the rank of a revelation to the level of a commonplace, for "descent with modification is now universally accepted as the order of nature in the organic world." On the other hand, the book, in spite of itself, makes us feel how little is certainly known as to the working out of this order, as to the mechanism of the great nature-loom. That evolution is the modal explanation of our whole living world is now as stable a doctrine as any item included in an evolution can well be. We all think of the present as the child of the past; and we especially contemplate the fauna and flora of the globe as a vast creeper-like growth, none the less a unity that many branches are now dead and rotten, or that a few of the flowers are so glorious that they seem at first sight lifted out of continuity with their humble roots. But while we are thus evolutionists, and products of evolution too, in believing that the world of life has grown from a simpler world before it, we are not by any means all Darwinists in believing that the gardener's chronicle can be summed up in the words, "Natural selection and the preservation of favoured races in the struggle for life." It is to be deplored that even careful writers fail to distinguish be-

tween the theory of evolution which Darwin only, though indeed very largely, helped to demonstrate, and the theory of natural selection which he put forth as his personal interpretation of Nature's working. Many naturalists, of course, swallowed both at once, but there have always been a few who rejected the gnat of selection while digesting the camel of evolution. In so doing they acted reasonably, for, in spite of appearances, the gnat is really more momentous than the camel. The difference between believing that the living world we know arose ready-made, and believing that it grew from an almighty seed of protoplasm, is less than the difference between regarding the world as the expression of a loving thought and reading it as the outcome of a universal method favouring selfishness. The conception of an evolving world grows quite naturally out of the earlier idea of a created cosmos, and both are consistent with man's noblest thoughts and feelings; but a world evolving itself after the fashion of a gladiator's show with a plethora of fighters, is hardly a spectacle which we can contemplate with either emotional or intellectual contentment. We turn, therefore, with expectation to this revised balance-sheet of facts and opinions to see what light the thirty years of enquiry, and the author's mature wisdom, have cast on the wonder of a world in which Darwin confesses to have found "too much misery." It would be ungracious not to recall at the outset the almost unique position of the author. Contemporary with Darwin, not only in years, but in emphasising the truth of evolutionist conceptions, and in recognising the fact of natural selection, Mr Wallace is now justly called the Nestor of Biology. No one will be slow to appreciate the splendid unselfishness with which he has for thirty years sunk himself in the Darwinian theory, or the scientific disinterestedness which leads him, from the very title of the work to its close, to lay almost too little stress on the important part he has played in evolving the doctrine. A naturalist *par excellence* in the old sense, replete with a world-wide experience of animal life, at once specialist and generaliser, a humanist thinker and a social striver, not least a student of science who realises the spiritual aspect of the world—the conclusions of his ripe age command our highest respect.

After the conventional chapter of history, Mr Wallace proceeds at once to discuss the struggle for existence, starting, that is to say, with the highest physiology of species, rather than with the fundamental problem of the origin of variations. This change in the usual order of treatment is no mere bait to the reader, but serves as an acknowledgment that, even in zoology, the study of social relations may be as instructive before, as after the analysis of the individual. The reader must not, however, forget that the final explanation must work upwards from the changes within the living matter of the individual to the highest expression of these in the most complex relations of animal society. The third chapter, which describes the variability of species in a state of nature, illustrating these by diagrams in such a way that the student can himself estimate their importance, affords a valuable addition to Darwin's examples of organic change, which were so largely restricted to the somewhat unnatural conditions of domestication. To those who have followed the progress of ætiology, the fourteenth chapter, which discusses recent theories as to the conditions of variation and as to the inheritance of acquired characters, will be of peculiar interest; while the concluding chapter will be welcome to those who agree with Wallace in believing that natural selection is insufficient to account for the human intelligence which thought out such a theory. Notwithstanding this important caveat, the bulk of the book is devoted to the exposition of "pure Darwinism," *i.e.*, to illustrating "the overwhelming importance of natural selection over all other agencies in the production of new species."

Emphasised in the present work are two conclusions with which Mr Wallace's authority has long been associated,—the first relating to the ascent of man, the second concerning the evolving value of sexual selection. That there are in the human organism over a hundred rudiments and variations which indicate relationship with a lower mammalian type that the embryonic development of man runs for a while on rails laid down in the progress of pre-existent forms; that in the general structure and fundamental functions both of body and brain, man closely resembles certain monkeys; these and other facts furnish "overwhelming and conclusive evidence of

man's descent from some ancestral form common to him and the anthropoid apes." But furthermore, "as to the cause and method of such descent and modification, we may admit, at all events provisionally, that the laws of variation and natural selection, acting through the struggle for existence and the continual need of more perfect adaptation to the physical and biological environments, may have brought about, first that perfection of bodily structure in which he is so far above (*sic*) all other animals, and in co-ordination with it the larger and more developed brain, by means of which he has been able to utilise that structure in the more and more complete subjection of the whole animal and vegetable kingdoms to his service." At this point, however, Mr Wallace parts company with Darwin, and also, many will think, with consistency. Natural selection so far, but no further; the higher characteristics of man are due to a special evolution hardly distinguishable from creation. The mathematical, musical, and artistic faculties, for instance, are so sudden and sporadic in their occurrence, and so "totally inconsistent with the action of natural selection," that the author finds their only explanation in the hypothesis of "a spiritual essence or nature, capable of progressive development under favourable conditions."

It will at once strike an impartial reader as curiously inconsistent to find at the close of a work devoted to showing "the overwhelming importance of natural selection," a confession that "there are at least three stages in the development of the organic world when some new cause or power must necessarily have come into action,"—at the beginning of life, at the introduction of sensation or consciousness, and in the origin of the noblest human characteristics. "A change in essential nature (due, probably, to causes of a higher order than those of the material universe) took place at these several stages of progress, which, probably, depend upon different degrees of spiritual influx." Mr Wallace, in fact, introduces the conception of grace into his theory of evolution, and tries to persuade us that the interposition of such a new cause in no way interferes with the continuity of development. If the known factors of evolution are insufficient to account for some of the big lifts in nature, it is quite obvious that we

have not completed our ætiology, but it does not follow that we are bound to eke this out with an hypothesis of spiritual influx. The insinuator of such a factor must first make very sure that he has duly recognised all the known so-called "natural" agencies in evolution,—a compliment which we are not inclined to pay to the Natural Selectionists. "That the love of truth, the delight in beauty, the passion for justice, and the thrill of exultation with which we hear of any act of courageous self-sacrifice, are the workings within us of a higher nature which has not been developed by means of the struggle for material existence," is a conclusion with which most will heartily agree, but to pass from this to postulate a spiritual influx is not fair even to the Natural Selectionist, far less to those who maintain a wider ætiology than the strict Darwinian formula. But, finally, it seems at the best a crude spiritualism which regards the higher nature of man as something "superadded to the animal," and splits the universe into a "world of matter," and an occasionally obtrusive "world of spirit."

In regard to sexual selection, Wallace has always maintained a conclusion opposed to that of Darwin. If we take for illustration birds and butterflies, where the males are often as gay and gorgeous as the females are plain and inconspicuous; according to Darwin, the gayness of the males has been evolved by sexual selection on the part of the females; according to Wallace, the soberness of the female is due to natural selection which has eliminated those that persisted to the death in being gay. Conspicuousness of the females during egg-laying or incubation would be dangerous and fatal; the original brightness is forfeited as a ransom for the life of the species, and only sober-coloured females persist. In the present work, Wallace proceeds even further than before in his destructive criticism of Darwin's sexual selection, and thus, though the latter was in accuracy only a special case of natural selection, the shoulders of the original uncrutched theory are made by Wallace to bear the whole burden of the world. In his criticism, however, as has been elsewhere pointed out, Wallace makes an admission which cannot but be welcome to opponents of natural selection. He speaks of male ornament

as "due to the general laws of growth and development," or again as "the natural product and direct outcome" of super-abundant health and vigour! In so doing, he surely suggests a way of looking at organisms which leaves for sexual and also for natural selection very little room. When a character is the natural outcrop of the constitution, the action of selection is no longer that of a scythe which skips an occasional stalk in the harvest field, but rather that of pruning shears trimming the growth of the tree of life.

It is time, however, to pass from what students of Mr Wallace's previous works would have expected to find reinforced, to some of his newer conclusions. A proof that natural selection can in certain cases increase the sterility of crosses, a full discussion of the colour-relations of animals, fresh facts on the wind-carriage of seeds, are the subjects of most interesting chapters to which we can only allude. Nor can we do more than record Mr Wallace's conclusion on two much debated questions—the utility of all *specific* characters, and the inheritance of what is individually acquired. To those who know something of the apparent triviality of many specific characters it may seem a large thesis to maintain that they are all more or less directly useful, and that the more when we recognise that many variations are in origin apparently pathological. And though it would seem that the more we know of animals, the more are unsuspected utilities revealed, we cannot but slightly discount the value of Mr Wallace's wide experience, when we see how necessary his minor thesis is to his general theory. For it is plain that only useful characters can be fostered by natural selection.

Of greater practical moment is the question of the inheritance of acquired characters, which Mr Wallace answers with an emphatic negative. We and our fathers have believed that characteristics acquired by an organism in the exercise of its functions, or impressed upon it as dints from the external hammers of environment, were transmissible to the offspring, and such a postulate is essential to those who believe in the evolutionary value of the above factors. The case, however, is at present non-proven. No one doubts that both function and environment leave their marks upon the individual organ-

ism, but there is a suspicious lack of evidence that such functional modifications or environmental dints can be transmitted, like those changes for good or ill which are implicit in the germ from the first, or have, in other words, a constitutional origin. We cannot here give the reasons which have led Weismann to revive an old scepticism, and altogether to deny the inheritance of acquired characters, nor give our own reasons for preferring the less extreme position of our greatest authority on the subject, Mr Galton, who allows their occasional transmissibility, but it is important both for theory and practice to recognise that the majority of living naturalists, and Wallace among the rest, side with Weismann in the present debate. If individually acquired characters are never transmitted, which we are far from allowing, then the moulding influence of function and the hammering of the environment have little interest except for the individual organisms, and the ground is taken from under the feet of Lamarckians, Spencerians, and others, who maintain the evolving value of the above-mentioned factors.

Spontaneous variations and a selection of struggle among the changeful organisms is thus the formula of pure Darwinism; or more accurately, variations arise from the germinal intermingling of two diverse kinds of living matter in fertilisation, and from the material so supplied the fostering and eliminating action of natural selection works out the result. But even if acquired characters are not transmitted, there remains another alternative than that of laying on the shoulders of natural selection a burden which seems to many out of proportion to its strength. The alternative is embodied in what sarcasm may call a Topsisian theory of evolution. Geddes and Eimer have lately sought to show that changes in the organism occur not at random nor indefinitely towards all points of the compass, but definitely and in a few directions. Species have *grown* into their niches, not so much the elect of a lost world, nor yet batted by the force of surroundings, but bowled by the fate of their own constitution. The sluggish organism becomes more sluggish still, and its gouty calcareous deposits and its stores of reserve products are natural enough; or the active animal becomes more active still, *fevering* into

some higher form, and the waste products of its rapid life shine forth as colour, and give the organism a literal beauty for ashes. We have not space to illustrate this theory, but it is evident that if organisms and organs can be accounted for as the results of continued and cumulative variation in some one direction of activity or passivity, of spending or saving, of reproductive or nutritive preponderance, and are interpretable as the outcrops of a dominant constitution, then the scope of natural selection is not so great as pure Darwinism demands.

The second last chapter of this work, in which Mr Wallace discusses the fundamental problems of ætiology, will not yield any very satisfying result to those who are restless for certainties, and who do *not* find a complete formula in natural selection minus or even plus spiritual influxes. Do we take the favourite modern answer that the fount of variation is to be found in the intermingling of two diverse kinds of living matter in fertilisation; the question at once arises, how do these "plasmas" become diverse, especially if changes impressed on a body cannot saturate down to the reproductive cells thereof? Do we find the source of variation in the instability of the complex protoplasm itself; then the query starts up whether such changes are strictly accidental and indefinite, as Darwin supposed, or whether they are in one or two directions towards constructive or disruptive preponderance, as Geddes maintains. If we recur to the influence of use and disuse, or to the moulding power of environment, then we are met by the denial that such functional and environmental variations are transmissible. Would we think of the great genealogical tree as we think of any living plant, and try to express the turns and twists of its branches and the flowers which they bear, according to the laws of organic growth and the internal struggle between nutrition and reproduction, then we are met by the retort that science is becoming metaphysical, since of the laws of growth we know as yet so comparatively little. But if in despair or with relief we turn again to natural selection, we shall find here also that to credit this method with working out the great ascent of life, makes large demands on our faith, not to say credulity, unless we are willing to postulate a "spiritual

influx" at half a dozen of the big lifts which occur as we ascend the scale. The criticisms of Spencer, St George Mivart, Cope, Samuel Butler, Geddes, Romanes, Eimer, and many others, vary widely among themselves, but they agree in suggesting very forcibly that Darwinists have outdone their master in exaggerating the import of natural selection, and that there is more in nature than red claw, Bismarckian policy, nineteenth century competition, and a universal method favouring selfishness. The struggle for existence is not indeed a continuous Waterloo, but it is not an amiable social contract. Tone it down as you will, the fact remains that Darwinism regards animals as going upstairs in a struggle for individual ends, often on the corpses of their fellows, often by a blood and iron competition, often by a strange mixture of luck and cunning, in which each looks out for himself, and extinction besets the hindmost. We are not interested in any philosophical justification of this natural or unnatural method, until we are sure that it is a fact; and to make sure of this is all the more momentous in days when biological generalisations are used in support of ethical and economic practice. We are not to be deluded by any after-dinner talk about the "beneficence" of this regime, for despite the fact that we are among the supposed results, we are not Jesuits enough to forget the pain and cruelty, the overcrowding and starvation, the hate and individualism, which are believed to be justified in us their children. We cannot rest satisfied with what has been called a scheme of salvation for the elect by the damnation of the vast majority. Mr Wallace tries to persuade us that the cruelty of nature is an anthropomorphism; that, like Balbus, animals do not fear death; that the rabbit positively enjoys running before the fox; that thrilling pain is its own anæsthetic; that there are pleasures in violent death, and excitement in starvation; but we are not persuaded. Even granting a measure of truth in what such an authority maintains, he surely fails to see that it is not so much the feeling as the intelligence of the thinker that is offended by the doctrine that the struggle for existence is the great law of progress.

t is surely one of the tasks of the Church to spiritualise

our cosmogony, and the dilemma before her at present is to choose between that view of nature which may be found most powerfully expressed in Huxley's programme in last year's February number of the *Nineteenth Century*, or that expressed by a few heretics, and notably by Professor Geddes (See *Variation and Selection*, "Encycl. Brit."), who finds in nature a materialised ethical process, in which each of the greater steps of progress is associated with an increased measure of subordination of individual competition to reproductive or social ends, and of interspecific competition to co-operative association. "The ideal of evolution is indeed," he assures us, "an Eden; and although competition can never be wholly eliminated, and progress must thus be asymptotic, it is much for our pure natural history to recognise that 'creation's final law' is not struggle but love."

That there is still much uncertainty about the factors of evolution is obvious enough, but there is no need on this account to doubt of the fact, nor warrant for pinning our faith to natural selection or any *one* theory, and no necessity for postulating spiritual influx in the plural. It is also too soon for agnosticism on a subject of which the evolution is so young. Even the present work, the conclusions of which we cannot accept, is to us hopeful, for we find in it a carefully gathered sheaf of ears which will greatly help some successors of Darwin and Wallace in furnishing men with bread.

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