

WALLACE'S DARWINISM.

Darwinism: An Exposition of the Theory of Natural Selection with some of its Applications. By Alfred Russel Wallace, LL.D., F.L.S., etc. Macmillan & Co. 1889. 8vo, pp. xiv, 494, with map and illustrations.

THE author of this work is notoriously one of the originators of the Darwinian theory, "the origin of species by means of natural selection and the preservation of favored races in the struggle for life." The theory is familiar to all, as are also the effects of its promulgation. At a time when the minds of investigators were filled with uncertainty as to the foundations of their science, it supplied just what was needed to overthrow the belief in special creations, and to arouse to intense activity both partisans and opponents. In their zeal and confidence, the supporters of the elastic doctrine appeared to sweep everything before them. Their enthusiasm permitted no limits to their claims. With a certain class, to suspect their proof or doubt their creed was sufficient to bring a scientist into disrepute. By Natural Selection they accounted for everything; organic evolution was nothing but selection to them. This was going much too far for many of the evolutionists with whose aid they had triumphed. From the beginning of the agitation there were conservatives who would no more accept the new theory on faith than that it was to displace; these demanded proof of every step. Some of them viewed selection as only one of the numerous factors in evolution; others could see in it no real cause. For the latter it meant but a statement of the existence of effects making up the species or organism, a complex of results of the greatest number and variety of causes. In other words, Natural Selection, like special creation, was simply a screen behind which were to be sought the solutions of the many and complicated problems of life, its causes and its modifications. Fully recognizing the immense amount of good directly done by the new hypothesis, and hoping for even more from a reaction, these dissenters, if we may call them such, have worked on confident in their position and strength. From time to time they

have come forward, through their researches, with calls for more consideration, and, with more or less reluctance, it has been accorded. A consequence is seen in the modification of the Darwinian theory, until, as accepted now, it differs greatly from what it was when Darwin laid down his pen. That an adverse current has set in is evident from the contents of the book before us; but the fact is not at all to be regretted, since it leads to increase of experimental knowledge and to more correct estimates of the value of the theory it threatens.

It is well that Mr. Wallace is in the field at the moment, able to strike in defence of his creed the strongest blow since those dealt by his illustrious partner, for there is no one among the disciples so well prepared for the undertaking. While it is difficult to imagine how the subject could have been brought forward more effectively than is done here, it is very doubtful if the book will stay the tide or change its direction in the least. In this review but few of the many points worthy attention can be noticed; besides, the bulk of the matter in the book was discussed upon its appearance in the works of Darwin, our author, and others. The purpose of the volume is to give a concise presentation of the theory and the evidence, and at the same time to counteract a recent tendency to subordinate selection to laws of variation, use and disuse, intelligence, and heredity.

It is not so very easy to determine from these chapters how much their author intends to cover by the terms "Darwinism" or "Natural Selection." In the preface the intention to deal even in outline with the vast subject of evolution is disclaimed, yet, by the time the reader finishes the pages headed "Darwinism—the Geological Evidences of Evolution," he may not be blamed for concluding that in Mr. Wallace's mind Darwinism and Evolution are synonymous, or, on rising from the last chapter, "Darwinism Applied to Man," that he accounts for everything by Natural Selection plus occasional interpositions of spirit. To illustrate, compare the following quotations. Taking up the discussion of some of the more fundamental problems and difficulties advanced by eminent naturalists, Mr. Wallace says:

"It is the more necessary to do this because there is now a tendency to minimize the action of Natural Selection in the production of organic forms, and to set up in its place certain fundamental principles of variation, or laws of growth, which, it is urged, are the real originators of the several lines of development, and of most of the variety of form and structure in the vegetable and animal kingdoms. These views have, moreover, been seized upon by popular writers to throw doubt and discredit on the whole theory of evolution, and especially on Darwin's presentation of that theory, to the bewilderment of the general public, who are quite unable to decide how far the new views, even if well established, tend to subvert the Darwinian theory, or whether they are really more than subsidiary parts of it, and quite powerless without it to produce any effect whatever."

From page 444 we copy a declaration of the faith:

"While admitting, as Darwin always admitted, the coöperation of the fundamental laws of growth and variation, of correlation and heredity, in determining the direction of lines of variation or in the initiation of peculiar organs, we find that variation and natural selection are ever-present agencies, which take possession, as it were, of every minute change originated by these fundamental causes, check or favor their further development, or modify them in countless varied ways according to the varying needs of the organism. Whatever other causes have been at work, Natural Selection is supreme to an extent which even Darwin himself hesitated to claim for it. The more we study it, the more we are convinced of its overpowering impor-

tance, and the more confidently we claim, in Darwin's own words, that 'it has been the most important, but not the exclusive, means of modification.'"

Accepting this as the more exact statement, the sceptical ask, for the more moderate, proof that selection is a supreme cause, or, for the more radical, in addition to proof of its existence, proof that it is really a cause. The book will satisfy neither; in fact, its version will only be accepted with considerable modification by many of the advocates of Darwinism.

Some students recognize phases or varieties in artificial selection, as, that due to climate, food, etc., that due to the effort of the organism, and that due to the will of man; these ask what in Natural Selection corresponds to man's will. If there is such an agent, it must be present and acting in artificial selection; so that the latter equals Natural Selection with the added element, the exercise of man's choice. An approach toward an answer is seen in the "Survival of the Fittest." Survival is a consequence of compliance with the demands of circumstances, and the responses to these are regulated by the laws of growth, etc. With the diversity in demands, the causes are numerous, and by bunching them together in the phrase Natural Selection nothing is explained.

In different paragraphs Darwinism is defined as a principle, a law, a theory, a self-acting process, descent with modification, Natural Selection, or the Survival of the Fittest. On one page "it acts solely by the preservation of useful variations," on another it "acts by the life or death of the individual submitted to its action." In answer to the objection that the first rudiments of certain organs could not have been of use, we note the following: "Now, the first remark to be made on objections of this nature is, that they are really outside the question of the origin of all existing species from allied species not very far removed from them, which is all that Darwin undertook to prove by means of his theory." In this connection we may use Darwin's words in expressing his conviction that species have been modified during a long course of descent: "This has been effected chiefly through the natural selection of numerous successive slight favorable variations, aided in an important manner by the inherited effects of the use and disuse of parts, and in an unimportant manner—that is, in relation to adaptive structures whether past or present—by the direct action of external conditions, and by variations which seem to us, in our ignorance, to arise spontaneously." Mr. Wallace would subtract from this the inheritance of the effects of use and disuse, and of the effects of the direct action of external conditions, except, perhaps, on organisms very low in the scale.

A constant employment of the word "use" and its derivatives makes it appear as if Lamarckism had served as a foundation for the theory. According to Wallace, Lamarck attributed the change of species chiefly to the effect of changes in the condition of life—such as climate, food, etc.—and especially to the desires and efforts of animals themselves to improve their condition, leading to a modification of form and size in certain parts, owing to the well-known physiological law that all organs are strengthened by constant use, while they are weakened or even completely lost by disuse. By this a most important difference between Lamarckism and Darwinism proper lies in the process of accumulation; it is further from our author's belief in that he advocates non-inheritance of acquired characters to strengthen his position. Galton and Weismann

have not helped him greatly, since he admits transmission of predispositions, as in disease, or of tendencies in lines of descent in cases like those of the flat fishes; but Darwin's recognition of the existence of tendencies, in the words, "There can be little doubt that the tendency to vary in the same manner has often been so strong that all the individuals of the same species have been similarly modified without the aid of any form of selection," is declared to be without proof, and to be so entirely opposed to all we know of the facts of variation given by Darwin himself that the important word "all" is probably an oversight. By the older theory the presence of organs or their loss would be credited to use or disuse; the variation being induced by effort, and owing increase and permanence to it and to usage. The later one alleges the variation to be fortuitous, and that the beneficial (useful) is seized upon by selection, increase being made by further spontaneous variation. Wallace says of the wingless birds: "Year after year, therefore, those individuals which had shorter wings, or which used them least, were preserved; and thus, in time, terrestrial, wingless, or imperfectly winged races or species have been produced." A modern Lamarckian would read it thus: "Year after year the effects of disuse were felt by all the individuals, and, from lack of effort and use, a tendency in variation was induced which, continued for generations, has led to loss of ability to fly"; thus premising a modification of all the progeny, instead of a weeding-out process. It is admitted that in individual cases something may be left to chance; we see no proof, however, that most if not all sudden extinctions are not accidental, at least in so far as directly concerns the victims. The best examples of variation cited, such as the Oahu land-shells, show no proof of a weeding out.

Use (or a derivative) may be substituted for the word selection in the majority of instances without changing the sense. Much of the evidence adduced will serve the Lamarckian equally well, with little or no modification in statement. For instance, take the paragraph relating to the founders, on page 129, which will also indicate the transmission of acquired characters through tendencies or habits consequent upon effort and use:

"Soles, turbot, and other flat fish are, as is well known, unsymmetrical. They live and move on their sides, the under side being usually differently colored from that which is kept uppermost. Now the eyes of these fish are curiously distorted in order that both eyes may be on the upper side, where alone they would be of any use. It was objected by Mr. Mivart that a sudden transformation of the eye from one side to the other was inconceivable, while, if the transit were gradual, the first step could be of no use, since this would not remove the eye from the lower side. But, as Mr. Darwin shows by reference to the researches of Malm and others, the young of these fish are quite symmetrical, and during their growth exhibit to us the whole process of change. This begins by the fish (owing to the increasing depth of the body) being unable to maintain the vertical position, so that it falls on one side. It then twists the lower eye as much as possible towards the upper side; and the whole bony structure of the head being at this time soft and flexible, the constant repetition of this effort causes the eye gradually to move round the head till it comes to the upper side. Now, if we suppose this process, which in the young is completed in a few days or weeks, to have been spread over thousands of generations during the development of these fish, those usually surviving whose eyes retained more and more of the position into which the young fish tried to twist them, the change becomes intelligible; though it still remains one of the most extraordinary cases of degeneration, by which symmetry—which is so universal a characteristic of the higher animals—is lost, in order that the creature may be adapted to a new mode of life,

whereby it is enabled the better to escape danger and continue its existence."

The exercise of selection here is entirely supposititious, for some of the species have the eyes greatly distorted, others but little. In regard to want of symmetry, Mr. Wallace says, "When, however, it has become useful, as in the case of the single enlarged claw of many crustacea, it has been preserved by Natural Selection." It is not at all clear that this is an improvement on the explanation, "It has been induced and preserved by effort, use, and heredity."

Much of the evidence presented as new is taken from what apparently are exceptional cases, and from insufficient observations; in the conclusions drawn there is much use of such phrases as "may be due to" and "is probably due to." The presence of a great deal of assumption or guess work does not increase the value of the proof. The assumptions that the effects of dread and pain are not similar in men and other animals, that man, in general, has greater fear of death, that among lower creatures no fear is felt, that death is generally prompt, that the animal enjoys the height of pleasure in successfully escaping an enemy without experiencing the opposite in failure, etc., are far from established. The actions, shrinking, panting, trembling, struggling, moaning, shrieking, of birds or beasts in distress do not differ greatly from those of a human being in similar condition. If it is not fear of death that keeps the animal so constantly on its guard, and causes it to take such precautions for safety, we are left quite in the dark as to what occasions the terror.

A bird rejects an insect at a particular time for various reasons besides inedibility: he may not be hungry, it may be strange to him, he may prefer other food. Other individuals of his species may feed upon it readily; in other localities, or in scarcity of food more to their taste, the insect may form a considerable portion of the food supply of his own or different species. The first requisite in arguments of this kind is sufficient proof of the premises. Supposed selection through the inexperience of young birds does not appeal to us very strongly. In regard to the brown rabbits, of which "the white up-turned tails of those in front serve as guides and signals to those more remote from home, to the young and feeble," it is a question whether this is founded on observation, and whether the white tail may not be more beneficial to the survivors, as keeping up the food supply by keeping down the number of rabbits, since it serves as a signal to the wolves, dogs, foxes, cats, weasels, hawks, owls, and others that prey upon them. The chapter on mimicry and warning colors is full of conjecture.

In all examples of true mimicry, Mr. Wallace says, the harmless is less abundant than the harmful, which is mimicked; from which we are to infer that, closely as some harmless snakes (for instance, *Erythrolamprus venustissimus* or *Ophibolus doliatius*) seem to copy species of *Elapidæ*, they are not examples of true mimicry. The idea advanced by others that the rattle of the rattlesnake is useful in preventing attack is adopted. The author says of the snake:

"If gently tapped on the head with a stick, it will coil itself up and lie still, only raising its head and rattling. It may then be easily caught. This shows that the rattle is a warning to its enemies that it is dangerous to proceed to extremities; and the creature has probably acquired this structure and habit because it frequents open and rocky districts, where protective color is needful to save it from being pounced upon by buzzards or other snake-eaters."

Garman shows the rattle to have originated

as a consequence of effort and use, or habit, without need or appearance of selection; his conclusions being reached after long-continued study of the animals, of their embryology and of their anatomy. Whatever the merits of the conclusions, it seems to us that science has more to expect from the latter of the two methods employed in reaching them.

The cases of the crustaceans, *Artemia salina* and *A. Milhausenii*, the transformations of which, from one to the other, back and forth, on being taken from brackish to salt or from salt to brackish waters, or the transforming of either into or from *Branchippus stagnalis* of the fresh water, as noted by Semper, and so often used to illustrate the direct action of environment and the inheritance of its effects, are here met by suppositions only. Developments which in a struggle would no doubt be injurious—as the plumes in the peacock's tail or on birds of paradise—are supposed to arise from a condition of perfect adaptation to circumstances, with a surplus of vital energy which may be expended in this way without detriment. Particular degradations are said to be possibly due to correlation of growth or economy of nutrition; and different grades of reduction in other instances, it is held, may be caused by the action of several distinct causes, sometimes acting separately, sometimes in combination.

In the author's words, "The law of Natural Selection or the survival of the fittest is, as its name implies, a rigid law, which acts by the life or death of the individuals submitted to its action." Selection, as is admitted, only steps in after the variation has originated and after some use is found for it; survival is predicated only on what exists at a particular time; and it is by means of this post-factum post-mortem theory that we are to account for the origins of things. The struggle for life is usually spoken of as unceasing; on one page it is stated to be intermittent and exceedingly irregular in its incidence and severity, and on another it is said the war of nature is not incessant. To some extent what goes on among animals may be likened to what takes place on a tree full of blossoms, few of which mature in fruit, some being imperfect in the bud, some unfertilized, some destroyed by insects, some torn off by birds and mammals, some withered by the blight, some frosted, some scorched, some beaten down by the wind, the rain, and the hail, and some shrivelled up from want of nourishment because of drought, or weakness and disease in the tree. One would hardly dare to say that the fruits gathered at the end of the season survived because they were the fittest; in reality the only ones we have any warrant for calling less fit were the imperfect buds; and this book does not give proof that the proportion of destruction by accident in the case of the animals is so very much less than we can afford to drop it out of account in estimating the work of selection. There is no disproving the fact that the diverse laws act as aids or checks and counter checks to each other, and without doubt much is due to their action which now in our ignorance might be supposed due to selection.

In the last chapter the author brings forth a sort of spiritual climax, certain to give rise to much difference of opinion and to be rejected by many Darwinians. He here asserts his conviction that the theory is insufficient to account for much heretofore included, and to supply the deficiency he advocates a series of interpositions ("due, probably, to causes of a higher order than those of the material universe"), intruded in a manner like the glacial period in the earth's evolution, one of which introduced

life, another sensation and consciousness, while another (or others, intellectual and moral) was limited to humanity. To establish the latter, he argues from the appearance of particular faculties, the mathematical, the musical, the artistic, the metaphysical, and the faculty of wit and humor, more or less completely lacking in savages and some or all of which are absent in the great majority of mankind. The facts given in regard to the possession of these faculties by particular communities or individuals would lead to the conclusion that they are regarded as special dispensations to the favored ones, though not stated in so many words. Reasoning powers are ascribed to instinct.

That the name of his partner is given to this book will be credited to the modesty of the author. But, after changing or abstracting entirely portions of Darwin's conclusions on which great stress was placed, as sexual selection and the progressive development of man's entire nature, and after injecting a theory of special manifestations of spiritism which Darwin himself might be most unlikely to admit, it is not quite exact to call the result Darwinism. In his splendid effort the author presents his theory as the only competent one, and asks acceptance of it as established truth. We have endeavored to indicate some of the respects in which too much has been claimed for it, believing it inimical to the best interests of science that the masses should blindly adopt it, or that students should prejudice the results of their future labors by committing themselves to a theory which is in great part unproved and of doubtful application.