

ENGLISH LITERATURE.

THE THEORY OF NATURAL SELECTION.

On the Origin of Species by means of Natural Selection, or the Preservation of Favoured Races in the Struggle for Life. By CHARLES DARWIN, M.A., F.R.S., &c. London: John Murray. pp. 502.

“**M**AN HAS BEEN A MONKEY AND MAY BECOME A BIRD” was the flippant verdict of one of Mr. Disraeli’s heroines, and, it may be fairly presumed, of Mr. Disraeli himself, on the theory hinted at, rather than expressed, by the author of “*The Vestiges of Creation*.” With respect to that work itself, as the secret of its authorship is as yet unsolved, in spite of many strenuous efforts to discover it, we can only judge by internal evidence the scientific acquirements of its writer. Judging by that, we cannot help thinking that the author, whoever he may be, must have been a person of general rather than particular acquirements. Possessing a general

knowledge (which is but a fine term for a smattering) of most of the physical sciences, he sketched out a broad theory without possessing sufficient knowledge to work out an accurate demonstration, and the consequence was that his book, instead of proving anything, pointed out as it were a far distant point, at which subsequent and better furnished explorers might possibly some day or other arrive. This distant point was the discovery of the law that difference of species is caused by a law of change and development; that the most perfect and complicated organisms have descended, or rather ascended, out of the simplest and most imperfect. In laying this down, the author of “*The Vestiges*” left the road wide open to future inquirers. In point of fact he proved nothing. He put his theory in a broad general way, expressed it in a bold and eloquent style, presented a few analogies which were no analogies at all, committed a variety of mistakes in dealing with almost every department of science (mistakes

which drew upon the book the reprobation of experts in each separate branch), and succeeded in producing a very deep impression upon the public, and none at all upon scientific men. Both these results were unfortunate; both were undeserved by the book. Judged fairly and by its merits, "The Vestiges" deserves neither so much credit as is awarded to it by the unscientific, nor so little as profoundly scientific men are disposed to concede to it.

Mr. Darwin is one of those explorers whose lot it is to pursue the track pointed out in "The Vestiges." That he follows that work is really only a chronological coincidence; for it appears that he was working out this conclusion before the appearance of "The Vestiges," and that his views were sufficiently advanced to be submitted to Dr. Hooker and Sir Charles Lyall in 1844.

The theory of Mr. Darwin is infinitely more perfect than that of "The Vestiges," inasmuch as it really includes a law; but the other only supposes a change for which it can give no explanation.

The author of "The Vestiges of Creation" (says Mr. Darwin) would, I presume, say that, after a certain unknown number of generations, some bird had given birth to a woodpecker, and some plant to the missoletoe, and that these had been produced perfect as we now see them; but this assumption seems to me to be no explanation, for it leaves the case of the co-adaptation of organic beings to each other and to their physical conditions of life untouched and unexplained.

The theory (if it deserve the name) of "The Vestiges" is that a certain plant very like the Missoletoe, but not quite like, went on producing its like many millions of times, until suddenly, for no apparent reason, the law changed and a Missoletoe was the result. Whatever may be done by Babbage's calculating machine, it may be gravely doubted whether numbers are subject to such eccentricities; but certainly we ought to require good evidence before accusing the laws of nature of such vagaries. Now Mr. Darwin refers the change to what he terms the Law of Selection, by which he means that a pair of a certain species may, under certain favourable circumstances, produce offspring slightly differing from themselves, and that these differences, by becoming perpetuated and augmented, amount in time to a difference in species. Referring to the domesticated animals for the best illustrations, he points out how this law of selection and change is used by breeders of animals for the use of man.

Breeders habitually speak of an animal's organisation as something quite plastic, which they can model almost as they please. If I had space I could quote numerous passages to this effect from highly competent authorities. Youatt, who was probably better acquainted with the works of agriculturists than almost any other individual, and who was himself a very good judge of an animal, speaks of the principle of selection as "That which enables the agriculturist not only to modify the character of his flock, but to change it altogether. It is the magician's wand, by means of which he may summon into life whatever form and he pleases." Lord Somerville, speaking of what breeders have done for sheep, says:—"It would seem as if they had chalked out upon a wall a form perfect in itself, and then had given it existence." That most skillful breeder, Sir John Sebright, used to say, with respect to pigeons, that "he would produce any given feather in three years, but it would take him six years to obtain head and beak." In Saxony the importance of the principle of selection in regard to merino sheep is so fully recognised, that men follow it as a trade; the sheep are placed on a table and are studied, like a picture by a connoisseur; this is done three times at intervals of months, and the sheep are each time marked and classed, so that the very best may ultimately be selected for breeding.

Everybody knows that the same process is constantly carried on with regard to plants; rose-growers and tulip-growers being in the habit of boasting that they can produce almost any pattern or colour of flower that may be desired. We need hardly point to the extraordinary varieties produced from the common rock pigeon (*Columba livia*) and the wild rabbit, by the fanciers of those animals.

From the consideration of the changes which take place in natural species under domestication Mr. Darwin proceeds to mention the variations which occur under natural conditions, that is to say, when the change has taken place without the slightest assistance from man. Of course every naturalist is aware that these are very numerous; and it is almost certain, especially in the botanical kingdom, that varieties once exceptional have come within the memory of man to be constant. And what is a constant variety but a new species? A specimen can no longer be reckoned a hybrid when its recurrence is constant. Thus Mr. Darwin instances the Primula, of which in times past botanists reckoned two varieties *veris* and *elatior*, the cowslip and the oxlip. Now these are accounted by many to be distinct species, and we believe rightly so. Suppose again that in a certain district the herb Paris (*Paris quadrifolia*) were always to be found with five or six leaves; would not its present name become a misnomer? Would there not be a new species, instead of a variety?

The struggle for existence, caused by the bountiful reproduction of all living organisms, is referred to by Mr. Darwin as a main influence in perfecting species. In man, the slowest breeding of animals, with the single exception of the elephant, the consequence of the over-supply is that the weakly children seldom survive, the hardy ones being in the majority of cases preserved to continue the race. Were it not for this constant struggle, the world would become so full of animal life that it would be uninhabitable. Sad, therefore, as it may be in a sentimental point of view to contemplate the never-ending and most deadly struggle for very existence which is going on between God's creatures, the philosopher must reconcile himself to it as an absolute necessity. "We behold," says Mr. Darwin, "the face of nature bright with gladness; we often see superabundance of food; we do not see, or we forget, that the birds which are idly singing round us mostly live on insects or seeds, and are thus constantly destroying

life; or we forget how largely these songsters, or their eggs, or their nestlings, are destroyed by birds and beasts of prey." This destruction of the many to make room for the best is, as Mr. Darwin very happily expresses it, "the doctrine of Malthus applied with manifold force to the whole animal and vegetable kingdoms." As an instance of how this element of natural destruction governs the physical circumstances of a country, the author relates how it came to pass that when certain land in Surrey was inclosed large quantities of fir trees grew up spontaneously, although before that period only a few old Scotch firs were on the hill-tops:

When I ascertained that these young trees had not been sown or planted, I was so much surprised at their numbers that I went to several points of view, whence I could examine hundreds of acres of the unclosed heath, and literally I did not see a single Scotch fir, except the old planted clumps. But on looking closely between the stems of the heath, I found a multitude of seedlings and little trees, which had been perpetually browsed down by the cattle. In one square yard, at a point some hundred yards distant from one of the old clumps, I counted thirty-two little trees; and one of them, judging from the rings of growth, had during twenty-six years tried to raise its head above the stems of the heath, and had failed. No wonder that, as soon as the land was inclosed, it became thickly clothed with vigorously-growing young firs. Yet the heath was so extremely barren and so extensive, that no one would ever have imagined that cattle would have so closely and effectually searched it for food. Here we see that cattle absolutely determine the existence of the Scotch fir.

Mr. Darwin then goes on to argue that just as man, in his desire to produce a certain bird or animal by careful breeding, selects the specimens with which to work, so nature exercises a natural selection of those examples and species best adapted to circumstances. In the manner of working, it is not wonderful that nature far surpasses the finite labours of her imitator:

As man can produce and certainly has produced a great result by his methodical and unconscious means of selection, what may not nature effect? Man can act only on external and visible characters; nature cares nothing for appearances, except in so far as they may be useful to any being. She can act on every internal organ, on every shade of constitutional difference, on the whole machinery of life. Man selects only for his own good; nature only for that of the being which she tends. Every selected character is fully exercised by her; and the being is placed under well-suited conditions of life. Man keeps the natives in many climates in the same country; he seldom exercises each selected character in some peculiar and fitting manner; he feeds a long and a short beaked pigeon on the same food; he does not exercise a long-backed or long-legged quadruped in any peculiar manner; he exposes sheep with long and short wool to the same climate. He does not allow the most vigorous males to struggle for the females. He does not rigidly destroy all inferior animals, but protects during each varying season, as far as lies in his power, all his productions. He often begins his selection by catching his eye, or to be plainly affected by some modification prominent enough to catch his eye, or to be plainly affected to him. Under nature the slightest difference of structure or constitution may well turn the nicely-balanced scale in the struggle for life, and so be preserved. How fleeting are the wishes and efforts of man; how short his time! and consequently how poor will his products be, compared with those accumulated by nature during whole geological periods. Can we wonder, then, that nature's productions should be far "truer" in character than man's productions; that they should be infinitely better adapted to the most complex conditions of life, and should plainly bear the stamp of far higher workmanship?

Into this law of natural selection sexual feelings necessarily enter, and the wager of battle which gives the best females to the best and most vigorous males descends from the highest to very low grades in creation. Some curious speculations arise in the case of plants and the manner in which they are crossed and selected by the preference of bees and winged insects. In treating of the reproduction of plants, Mr. Darwin coincides with the views of Andrew Knight, that two individuals always unite to reproduce, even when both sexes are found in the same plant.

A leading principle in the operation of the struggle for existence, as laid down by Mr. Darwin, is that where variations are brought about by the effort of nature to adapt her creatures to the circumstances amid which they are placed, the exceptional individuals in whom these variations stand the best chance of being perpetuated. They become, in fact, after a series of generations, the rule, and the old form grows more and more exceptional, until it finally dies out. The effect produced by the use and disuse of organs and acclimatisation are dwelt upon by Mr. Darwin at a length which their importance deserves.

The great difficulty in the way of the change theory is obviously the absence, or rather the extreme rarity, of transitional examples. Mr. Darwin meets this by expressing his belief that "new varieties are very slowly formed, for variation is a very slow process, and natural selection can do nothing until favourable variations chance to occur, and until a place in the natural polity of the country can be better filled by some modification of some one or more of its inhabitants." It should be recollected that in speaking of variations it is contemplated that they require immense periods of time for their completion. The change may take place and yet we not see it. The hour hand of a watch is making, we know, its slow progress round the dial, which it will complete in twelve hours, and yet what eye can detect its motion? Nature takes her own time in perfecting her work, and the leaves of the "great stone book" contain proofs undeniable that the mighty changes there recorded have required periods of time scarcely appreciable to our finite understandings.

It would be impossible for us to follow out all the stages of this great argument within the limits of a brief article; we turn therefore to the concluding chapters in which Mr. Darwin passes in review all the links in his chain of reasoning. He lays down as propositions—"that gradations in the perfection of any organ or instinct, which we may con-

sider, either do now exist or could have existed, each good of its kind,—that all organs and instincts are, in ever so slight a degree, variable,—and, lastly, that there is a struggle for existence leading to the preservation of each profitable deviation of structure or instinct." The changes which thus take place are slow in their operation, or as Mr. Darwin expresses it, "species have changed, and are still slowly changing, by the preservation and accumulation of successive slight favourable variations."

Although I am fully convinced of the truth of the views given in this volume under the form of an abstract, I by no means expect to convince experienced naturalists whose minds are stocked with a multitude of facts all viewed, during a long course of years, from a point of view directly opposite to mine. It is so easy to hide our ignorance under such expressions as the "plan of creation," "unity of design," &c., and to think that we give an explanation when we only restate a fact. Any one whose disposition leads him to attach more weight to unexplained difficulties than to the explanation of a certain number of facts will certainly reject my theory. A few naturalists, endowed with much flexibility of mind, and who have already begun to doubt on the immutability of species, may be influenced by this volume; but I look with confidence to the future, to young and rising naturalists, who will be able to view both sides of the question with impartiality. Whoever is led to believe that species are mutable will do good service by conscientiously expressing his conviction; for only thus can the load of prejudice by which this subject is overwhelmed be removed.

Such is the theory which Mr. Darwin has submitted to the consideration of natural philosophers, and which is likely to create more stir in the world of science than anything which has appeared since "The Vestiges." Upon the ultimate verdict we cannot pretend to decide; the question seems to us infinitely too great, and the present amount of human knowledge infinitely too small, for dogmatism. One thing seems certain, that this is a most remarkable work, and that its author has brought to the difficult task of revolutionising opinion the valuable qualities of experience, caution, and temper.

With those who contend that the attempt to bring Creation within the limits of law is tantamount to an attempt to exclude the Creator from the place which is his due, we certainly do not agree. Is not this as much as to say that to recognise the Law is to degrade the Lawgiver? Still less do we sympathise with those who regard the development or change theory as a humiliation to the human race. We are as we are. Moreover, is it not possible, is it not even probable, that the production of Man, who holds such an exceptional position in the scale of Creation, who differs so widely from every other animal in the world, and for whose especial use and behoof this fair earth seems to have been created, is governed by some law other than that which regulates the brute creation? To us it appears more than possible.