

## REVIEWS OF BOOKS.

MR. DARWIN ON "ARTIFICIAL SELECTION."<sup>1</sup>

(First Number.)

The little old maxim which tells us that Nature does nothing spasmodically is literally the marrow and essence of a doctrine manifested in its application, and rapidly gaining ground in all departments of modern philosophy. The theory of evolution is one which finds much favour with scientific men in these times, and which some political thinkers regard as the principle on which the progress of civilisation is wholly dependent. That the world as we see it now, with its infinitely numerous forms of organic life and its marvellous length of duration, started as it were into spontaneous existence, very few of our modern writers are willing to admit. On the contrary, the leading thinkers in the fields of geology, natural history, and botany are disposed to account for the present phase of the globe and its inhabitants by supposing that the state of things we see around us now is the expression of the last term in a long series of changes which have taken place during the millions of epochs of years since, let us say, the days of *Monna Comacina*. In other words, the world as we see it is the consequence of a multitude of metamorphoses which are summed up in the one term, evolution. The Alps and Himalayas, the Atlantic and Pacific oceans are no more the work of cataclysmic operations than the slowly growing semi-lagoons, the submerged or elevated sea-coast, or the deltas of our great rivers. This is an application of the doctrine of evolution to geology; but it may be applied to every department of natural science, and so Mr. Darwin belongs the credit of attempting to explain the great problem of divergence of animal forms, by evading its assistance. There are at the present moment living on the earth's surface millions of widely different forms of organic life, which naturalists have grouped together according to their internal and external resemblances into two great primary divisions—animal and vegetable, and into further included sub-divisions of sub-kingdoms, classes, orders, families, genera, and species. The species in this series is the ultimate term, and it is held to embrace a number of individuals having certain minor characters in common. The genus includes a number of species all differing from each other in their specific characters, but still having certain qualities—those which are generic, universal. So we might go on from genus to family, and to the most comprehensive group of all, the kingdom itself. The species are said to differ from each other in well-marked points, but it is found by naturalists of wide experience that so many intervening forms exist between any two species that it is impossible to draw a natural line. It becomes thus a question for the speculative biologist—How did these several forms arise? Do they represent so many distinct and separate acts of special creation, or have they proceeded from a number of original types which may themselves have been either spontaneously generated or called into being by an Almighty God? It is to the solution of this question that Mr. Darwin has devoted his life, and on which he now a second time addresses the general public.

It is well to be denied, that since the days of Aristotle the question of the origin of species has been regarded as an enigma proposed by the Sphinx of Science, and destined to puzzle all who attempted to explain it. Even the Stoic philosopher ventured to solve the mystery (in his "Physica Acousticalia"), and his solution certainly has more on Mr. Darwin's side than on that of his opponents. Buffon, Linnæus, Bonpland, De Wailly, Deum Harbert, Professor Grant, and the author of the "Vestiges," each and all put forth hypotheses approaching that of natural selection, but with little result. It was not, in fact, until Messrs. Wallace and Darwin came before the world of naturalists with an hypothesis which correlated and explained phenomena hitherto unassociated, that the minds of all philosophers were directed to the question of the origin of species. Since then the problem has engaged the attention of savants all over the world, and with few exceptions Mr. Darwin's hypothesis has met with a general acceptance. The theory of natural selection is briefly this—Species have not been directly created, they are merely the result of continued variation which causes successive generations to diverge more and more from the original type. If all animals lived we should see the connecting links between these different forms; but since there is a constant struggle

for existence those only survive which are best adapted to the conditions which surround them. Nature, to use a figurative expression, admits those variations best suited to her, and rejects the others, and thus, by "natural selection," specific forms come to be preserved. This statement of the theory is open to some objection, but it will serve our purpose for the present. There are two branches of the argument in favour of this evolution doctrine—one derived from an observation of organic beings in a state of nature, the other based upon a knowledge of the facts connected with the artificial breeding or domestication of animals and plants. The first division has already been given to the public in Mr. Darwin's former work. The second is found in the two volumes now before us.

"Artificial Selection," the principle upon which "breeders" form peculiar breeds, or, in other words, artificial species, of animals and plants, supplies Mr. Darwin with an amount of evidence in accordance with, and in support of his doctrine, which, though it must leave the verdict still the Scotch one of "not proven," affords, nevertheless, to the impartial reasoner sufficient grounds for moral certainty. Dealing with the minutest details of the history of our domestic animals, and treating on the subject of artificial selection in the dog, horse, ass, cat, pig, sheep, goat, rabbit, pigeon, fowl, duck, goose, peacock, turkey, goldfish, and silkworm, successively, Mr. Darwin traces no point unnoted or obscure. Indeed, if there is any fault, it is that the evidence is excessive, and from its mass and minutiae wearying even to the most enthusiastic reader. To enter upon an analysis of the facts adduced would be out of the question; the very attempt which can be expected of the reviewer is that he shall state the bearing of the testimony, and adduce some of its more striking features, and this we now proceed to do. So far as we have been enabled to do with Mr. Darwin's evidence—and we have spared no pains to do so fully—it succeeds in demonstrating four distinct propositions. First, That several forms of animals and plants—in fact an immense multitude—not found in a state of nature, but which have clearly been derived from certain natural types, have been called into existence through the agency of man. Second, That these have been produced by the process of "artificial selection," i.e., by careful observation of individual variations, selection of those for breeding, rejection of other forms, and, finally, perpetuation of the specific characters thus selected at. In fact, by a species perfectly analogous to that pursued by nature. Third, That examination of the several breeds of any one animal, say a pigeon, reveals a degree of external difference of form, and internal distinctions of structure such as would warrant a naturalist, not familiar with their mode of origin, in classifying them as distinct species, and in some cases even as separate genera. Fourth, That artificial selection depends for its operation on the fact that all animals, but especially domestic ones, display a remarkable tendency to vary. In all the instances he advances, Mr. Darwin, as we have stated, gives ample proof of the truth of these propositions, but the testimony afforded by the history of the domestic pigeon, is, on the whole, the most satisfactory. We find that at the present time there are no less than 150 different races of pigeons, which perpetuate their character with the most exact precision. These all differ from each other by the most striking peculiarities that separate most of our recognised species of animals, and yet, as the author shows, they have been produced by a constantly-maintained process of artificial selection. What greater distinction can there be between two birds than that which exists between the hen and tumbler, the pouter and carrier, the hawk and the turtle? yet all these have been derived from the common Rock dove, *Columba livia*, as the following reasons will show:—

"To sum up the foregoing arguments, which are opposed to the belief that the other domestic races are the descendants of at least eight or nine or perhaps a dozen species. Firstly, The improbability that so many species should all arise somewhere, but be unknown to zoologists, or that they should have become extinct in the historical period unless, although man has had so little influence in naturalising the wild *C. livia*. Secondly, The improbability of man in former times having thoroughly domesticated and rendered fertile under confinement so many species. Thirdly, The impossibility that having nowhere become fixed. Fourthly, The extraordinary fact that man should intentionally or by chance have chosen for domestication several species extremely obscure in character. Fifthly, The fact of all the races, though differing in many important points of structure, producing perfectly fertile offspring; whilst all the hybrids produced between even closely allied species in the pigeon family are sterile."

Although in the case of certain pigeons it is possible to trace a regular gradation from the Rock dove through *Fringilla*, *Lotian*, and common tumbler, up to those marvellous short-tailed birds, which would certainly not of themselves alone be

<sup>1</sup> The Varieties of Animals and Plants under Domestication. By Charles Darwin, Esq., F.R.S. Toronto, London: John Murray.

judged as relatives of the 'original parent, yet in all other instances, the connecting links are gone. And if within the historic period so many intervening forms have been lost, how many more have passed away in tertiary and secondary, not to speak of palæozoic eras! The anatomical variations of the pig, though strongly marked, are by no means so remarkable as those seen in the case of the pig, the rabbit, or the common fox. Perhaps the rabbit supplies the best example of what grave osteological changes may result from a change of the physical conditions of life. Those who contend that specific forms cannot result from change of external circumstances, should pay particular attention to this point in Mr. Darwin's case. As we have already said, our summary of the testimony must be very brief. It is sufficient for our purpose to state that—

"By the supply of abundant and excellent food, together with other causes, and by the continued selection of the fittest individuals, the weight of the larger horns has been more than doubled. The bones of the horns have increased in weight. . . . With the increased use of the body, the third cervical vertebra has assumed characters proper to the fourth cervical, and the eighth and ninth dorsal vertebrae have steadily assumed characters proper to the tenth and eleventh vertebrae. The skull in the larger horns has increased in length. The horns have not only increased in diameter, but have even actually decreased, and consequently the bony coat for the horns has remained unaltered, and by corrosion has exposed the bases of the horns and the outer length of the skull. From numerous causes, the superfluous processes of the frontal bones and the free end of the outer horns have increased in thickness, and in the larger horns the cerebral hemispheres in some have deeply notched them in width, and certain parts of the snout and twisted dorsal bones have become highly vascular in structure."

These details are perhaps wearisome to the general reader, but to the physiologist they are pregnant with interest, since they show how early the consequences of an alteration of conditions, and therefore of the perpetuation of an individual variation may become the basis of a specific distinction. Such and numerous similar facts demonstrate to the unprejudiced biologist that the essential character of a species is not necessarily fixed and immutable; and they therefore furnish an additional argument, and a very forcible one, in favour of Mr. Darwin's view.

But, says the advocate of "specific creation," there is one difficulty which you have not got over. Natural species are sterile, or nearly so, when crossed, your artificial species are remarkably fertile inter se. How do you account for this? This is certainly a serious objection, and it is one which, it must be confessed, Mr. Darwin has failed to give a satisfactory reply to. Doubtless all the reasoning done analogically in his favour. All that he has urged points to the extreme probability of his hypothesis, but his opponents have raised an objection which, while perfectly reasonable, is nevertheless very difficult to meet. However, Mr. Darwin has attempted—he admits that the attempt is not all that he could wish—to explain this apparent anomaly. He says, in the first place, this sterility is not invariably decided—indeed, it is often so slight as to lead to very opposite opinions as to its extent; secondly, he argues that domestication in all animals tends to increase fertility; and thirdly, he observes that this same sterility is found in different species of trees, on which it is endeavoured to produce a graft, and is evidently due to particular reproductive conditions. Yet he asks was the quality sterility given them to prevent their intergrading? Now these are undeniably very specious arguments; but we doubt if they even satisfy Mr. Darwin himself, and they by no means fully meet the anti-Darwinian question. Another objection—fair enough in its way—is the theory lies in the assumed character of those connecting links which Mr. Darwin's opponents ask to be produced. But this is met by absolute evidence (as shown by Professor Huxley in his recent lecture at the Royal Institution, which, though small in size, is invaluable in mass).

There we see that as far as the Darwinian hypothesis of the origin of species exists, at the least, or temporary acceptance, since it meets the facts better than any other explanation yet advanced, and because it explains and associates phenomena which, under any other theory, would, so far as we can see, be absolutely unintelligible. That it is not demonstrated as a doctrine, as we would be more willing to admit than its distinguished and accomplished author. But while we admit previous the probability of a theory which so neatly dovetails with our knowledge of nature, we are still in the dark as to many of the laws which regulate the singular tendency to variation which both animals and vegetables display. These branches of the question, however, have not engaged Mr. Darwin, who has devoted his second volume to their consideration. His views on this part of the subject we shall examine in another notice. In concluding our present remarks, we must compliment the author upon the honest and expres-

sioned manner in which he has laid down his opinions. Nevertheless as have been his assistants, better and more useful as has been the literature created against him by the advocates of "specific creation," Mr. Darwin passes a calm and dignified moment, and while he writes an argument which has been brought against his theory, he neither flinches to personally see yields to counterfactual passion.

#### MAX HAVELAAR.\*

ABOUT seven or eight years ago, great excitement was caused among the usually philistine Dutch public by a novel with the title mentioned at the head of this article. It set people talking at clubs and in offices; it formed the topic of conversation in quiet, steady-going homes; it opened a fruitful channel for journalists, and it even led to debates in Parliament, to questioning of Ministers, and to Ministerial resignations. Those who resident the agitation created in America and England by the publication of "Uncle Tom's Cabin"—a work unquestionably instrumental in no small degree in bringing about the civil war of some years later—will have little difficulty in comprehending that even a work of fiction may, under certain circumstances, be a power in the political world, making itself felt from the humblest classes up to the head of the State. It is true that "Max Havelaar" has not yet worked a revolution in Holland or anywhere else; but it has called attention to a condition of things in the East Indian possessions of Holland which was well then unknown to the home-staying Dutch, but which loudly demanded, and still does demand, the reforming zeal of the statesman. The author, who for a time called his real name under the pseudonym of "Melinckoff," is a Mr. Edward Douma Dekker. He was formerly Assistant Resident of the Dutch Government in Java, and we believe had his position there because he would no longer be a party to the cruelty with which the natives are treated. In writing and publishing the present volume, he did not design simply to state his views with an existing force; he wished to persuade the public before then in the most striking form, and therefore the form most likely to be popular, a representation of tyranny and suffering, in the instances of which they were themselves in a manner responsible. He has done so with considerable ability. Although the novel is rather unskilfully in its construction, it exhibits a great deal of power in the delineation of character. Mr. Dreyfuss, the coffee-broker, is admirably drawn: a hard, shrewd, cunning man of business, whose other weakness in supplying water or generous to human nature is only equalled by his slavish devotion to the letter of religion, and his selfish "responsibility." The way in which this despicable creature—whom the author himself, in a burst of indignation at the end of his book, calls the "minimally speck of dirty rottenness and blasphemous hypocrisy"—reveals his own shabby and heartless nature while ostentatiously asserting his virtues and his aims, is exactly in its graded unfolding of a base spirit lurking beneath pretences which might pass water with the world. The story is supposed to be written by several persons, the coffee-broker being one; but the chief part of the narrative is got that with which he is concerned. Dreyfuss is a trader of Amboina, and the main incidents of the story are laid in Java. The state of things in that island, to which Mr. Dekker desired to draw the attention of his countrymen, is this—

Some of the Dutch East India possessions are practically governed by their native Kings and princes, though these are tributary to Holland; but Java is ruled directly by the representatives of the Dutch King. The Javanese is a Dutch subject; his taxes go to the exchequer of Holland, and, if he commits a crime, he is condemned and punished by laws made at the head of which is a Resident. The title of this functionary dates from the time when Holland acted the part of a protecting State to the native princes, as we see at the present day in certain parts of India, where England, by means of a similar official, bearing the same designation, exercises a very considerable control over quasi-independent States. But in Java the Residents have now become rulers in all but the name; for, although they are subordinate not only to the Home Government, but also to the Governor-General, the Senators of the Indies, and the Director of Batavia, their power is seldom called into question by their superiors. The Residents are divided into three, four, or five departments, at the head of each of which is an Assistant Resident; and each Assistant Resident

\* *Max Havelaar*, or, the Coffee Auctioneer of the Dutch Trading Company, by "Melinckoff." Translated from the Original Manuscript by Dutch Authors. Basing, Whittaker & Douglas.