The Darwinian Theory of Transmutation of Species, Examined by a Graduate of the University of Cambridge. Nisbet.

Mr Darwin's work on the 'Origin of Species' has been too frequently assailed and too well defended to be now summarily disposed of by an anonymous critic, however eloquent and able. Since its appearance, Sir Charles Lyell, Professor Huxley, and Mr J. S. Mill—three great names in the scientific world—have all expressed their approbation of its contents, and their belief in the truth of the Darwinian hypothesis.

"A Cambridge Graduate," in the work before us, has an interesting chapter on what he calls the "Transmutation School." The first writer who "composed a work to explain the Origin of Life, without any regard to the established opinions," was De Maillet, a French author, who published his theory in 1748. The next of the school was the celebrated M. Lamarck, who derived all animals from a monad, and who produced the first part of his system in 1812. The 'Vestiges of Creation,' published anonymously about thirty years later, seems to be the next work on the subject; and being very pleasantly written, and containing many novel ideas, it soon attained to a great degree of

popularity. Professor Baden Powell, in 1859, published his notes on "The Order of Nature," and there gave his adhesion to the Theory of Transmutation; and in the same year appeared Mr Darwin's work on the 'Origin of Species,' which at once took the scientific world by storm, and rapidly made converts of the most distinguished men of the day. It is needless to recapitulate here the arguments and proofs adduced by Mr Darwin to support his hypothesis. It will be sufficient to state it in plain language, and perhaps we cannot do better than quote Professor Huxley's clear enunciation of it. Speaking of "Atavism, Variability, and Conditions of Existence," he says:

> Given the existence of organic matter, its tendency to transmit its properties, and its tendency occasionally to vary; and lastly, given the conditions of existence by which organic matter is surrounded: I apprehend that these put together are the causes of the present and of the past conditions of organic nature.

This sentence is perhaps the shortest and best description of Mr Darwin's hypothesis, and we can now proceed to investigate a few of the statements put forth by "A Cambridge Graduate."

In the first place, we must observe that he seems to mistake the meaning and scope of Mr Darwin's work. When he states that "all the main parts of the theory are assertions without proof," and that "it is not a system established by inductive reasoning, but by conjecture, assumption, and invention," we would venture to remind our author that Mr Darwin simply brings forward a hypothesis, which is perfectly allowable in all scientific investigations, and that he is not bound by the laws of induction, but by those of hypothesis. Mr J. S. Mill himself bears testimony that Mr Darwin's hypothesis is perfectly legitimate, and that the term "Natural Selection" is a *vera causa*.

> Mr Darwin's remarkable speculation on the origin of species is another unimpeachable example of a legitimate hypothesis. What he terms "natural selection" is not only a *vera causa*, but one proved to be capable of producing effects of the same kind with those which the hypothesis ascribes to it: the question of possibility is entirely one of degree. It is unreasonable to accuse Mr Darwin (as has been done) of violating the rules of Induction. The rules of Induction are concerned with the conditions of proof. Mr Darwin has never pretended that his doctrine was proved. He was not bound by the rules of Induction, but by those of Hypothesis, and these last have seldom been more completely fulfilled. He has opened a path of inquiry full of promise, the results of which none can foresee. And is it not a wonderful feat of scientific knowledge and ingenuity to have rendered so bold a suggestion, which the first impulse of every one was to reject at once, admissible and discussable, even as a conjecture? *

It should be remembered that it was by the use of a hypothesis that Newton discovered the law of attractive force, and that Kepler found the form of the planetary orbits to be an ellipse.

"A Cambridge Graduate" asks, as he thinks, the puzzling question: How did the progenitors of the giraffe ward off starvation in deserts without herbage, before their necks, and tongues, and front legs were prolonged to enable them to reach the foliage of the trees? Now, in answer to this, we need only mention that Mr Darwin supposes that in a time of scarcity a longer-necked variety, having an advantage in being able to obtain the foliage of the trees beyond the reach of the others, survived them, and transmitted its elongated neck to its descendants.

Our author also remarks that "in all this great agitation about continually advancing improvement by accidental modifications, Mr Darwin has not given us one single instance of real improvement in any species." Now improvement, at last, is a relative term, and what under some circumstances would be regarded as an improvement, in others would be reckoned a positive disadvantage. Is the race-horse, the hunter, or the dray-horse an improvement on the wild horse of the prairie? Probably "A Cambridge Graduate" would reply, that for purposes of existence the race-horse, the hunter, and dray-horse had deteriorated, but at the same time it must be admitted that in many respects the breed of horses has been materially improved.

The absence of intermediate links connecting past and present species in the fossil animals found in the rocks is perhaps the strongest evidence advanced by our author against Darwin, and the whole of the geological question is very ably investigated in his pages. We should remember, however, that geology is yet, comparatively speaking, in its infancy, and that many strata have never yet been laid open and examined. On this subject Sir Charles Lyell's remarks will not be deemed superfluous.

> If, in the battle of life, the competition is keenest between closely allied varieties and species, as Mr Darwin contends, many forms can never be of long duration, nor have a wide range, and these must often pass away without leaving behind them any fossil memorials. In this manner we may account for many breaks in the series which no future researches will ever fill up.†

Mr Davidson, in his monograph on British Brachiopoda, speaking of "Spirifer trigonalis," says that it is so very unlike another extreme of the series (S. Crassa) that if any one had never seen the intermediate links, it would appear perfectly absurd to place them together. Thus we perceive that in fossil conchology we positively do get traces of a transition from certain types to others.

In chapter 12 of the book before us, Sir Charles Lyell is very much abused for having changed his mind on the subject of transmutation. But is it just to censure a change of mind when, new materials and arguments being set in a new light before us, we reconsider our decision? For, as Professor Huxley says:

> Men of science do not pledge themselves to creeds; they are bound by articles of no sort; there is not a single belief that it

* 'Mill's Logic,' vol. 2, chap. 14.
† Lyell—'Antiquity of Man.'

den duty with them to hold with a light hand and to cheerfully, the moment it is really proved to be contact, great or small.

or seems to deny that animals, and organs of y be varied by outward circumstances, although we need not search very far into natural history to prove the contrary. He also implies a belief that every species was a separate creation; but if so, how is it that the calf has rudimentary teeth in its upper jaw, which are never developed? Now Darwin's hypothesis is in entire accordance with this fact, as it supposes that the cow was developed from some other variety which required those teeth. And precisely the same line of argument may be used with regard to the rudimentary bone in the metatarsus of the horse, which is commonly called the "splint bone."

The chapter on the "Argument of Design" seems to us to be quite superfluous, as it is as much in favour of Mr Darwin's theory as opposed to it. The fact that all vertebrate animals are formed upon a similar framework proves that they had a common origin or a common creator; and thus the consideration of this discussion tells as much against our author as for him. In the Appendix to the book we find an extract from the *Athenæum* on "Mimicry in Nature;" but why this was inserted we are at a loss to understand, as the very fact of "protective resemblances among animals" is favourable to Mr Darwin's hypothesis. The whole question of "mimicry" was very ably discussed in the *Westminster Review* for last October, and we beg to refer our readers to that article for further information on that interesting subject, and for many facts highly favourable to the theory of the author of the 'Origin of Species.'

In the concluding chapter of the work before us we learn that the theory of transmutation differs but little from the Epicurean doctrine, and there is a long quotation from Lucretius to prove it; so that, according to this, the Epicurean philosophers of old were much further in advance of the other schools of philosophy than is generally supposed. We might, on the same principle, argue that Thales was the discoverer of steam power, since the chief doctrine of his philosophical system was, that everything came from water and everything returned to it. We rather suspect, from the numerous quotations from Lucretius in the work, that our author is either a believer in the doctrines of Epicurus, or that in his youth he was obliged to master one of the books of "De Rerum Naturâ" for college purposes.

In concluding our review of the "Examination of Darwin," we must admit that the language used is always perspicuous, and that much is eminently poetical. We cannot refrain from quoting a passage from what he calls nature's protest against the "tumultuous tragedy" of the "struggle for existence:"

> But what a dream is this! whoever suspected all this tumultuous tragedy in the serenity of nature's appearances? every returning season introduces us again to our old friends, in the same places; spring comes and brings with her the violet, the primrose, the cowslip, quietly shining in their old haunts; the hyacinths and the orchises carpet the woods as usual; all the sweet flowers smile upon us with their "quaint enamelled eyes" as they did on our forefathers; the little birds build their beautiful nests as of old, and the cuckoo tolls his bell in the groves as he did in the days of the Saxon Heptarchy.