

THE CRADLEY PTERASPIDES.

DEAR SIR,—In answer to your correspondent of last month, who signs himself "Mallæus," I merely state again that when I visited the quarry at Cradley, in June last, there was a large heap of stone in blocks of about a foot to a foot and a half square, which had been worked out of the quarry, and that most of these blocks when carefully examined, contained three or four good specimens (some more) of *P. rostratus*. I had in my possession one piece of sandstone from Cradley half a foot square, in which were imbedded five Pteraspides and one Cephalaspis. Part of this specimen is now in the British Museum. I should not have called my specimens *P. rostratus* unless I had had good authority for so doing. As your correspondent inquires as to what or whose it is, I beg to inform the "poor ignoramus," as he styles himself, that I have shown all my specimens of Pteraspis to Professor Huxley, who has had others from the same locality under examination, and it was upon his authority that I called them *P. rostratus* and not *Lewisii* or *Lloydii*. In conclusion, I would say with your correspondent, "Do not, young geologist, turn aside from Cradley, but repair thither," &c., and mind to provide thyself with the largest bag thou canst lay thine hands on.

I remain, dear Sir, yours truly,

8, Savile-row.

E. R. LANKESTER.

THE DARWINIAN THEORY.

SIR,—In replying to Lieut. Hutton's article on the Development Theory of Mr. Darwin, I understood him to advocate the Development Theory as usually propounded. I find, however, from his explanation in your number for July, that such is not the case; that he claims for his theory what the theory claims for the various forms of life, namely, the ability in the "struggle for life"—and a hard struggle this "theory" has had for its life!—to modify itself according to circumstances. And hence arises the fact that what seemed "shadows" to him possessed all the characteristics of reality to me. The "Development Theory," as I knew it before Lieut. Hutton published his views concerning it, is thus epitomized by Professor Oken ("Elements of Physio-Philosophy"—quoted by Hugh Miller in "Footprints of the Creator"):—"No organism has been created of larger size than an infusorial point. No organism is, nor ever has been, created which is not microscopic. Whatever is larger has not been created but developed. Man has not been created but developed." Do these sentences contain Lieut. Hutton's idea of the Development Theory?

As thus laid down the Development Theory says, "Man was not created but developed." The Bible says, "God created man in his own image." Again, the new "variation" of the theory, as "developed" by Lieut. Hutton, says, "Man" was developed from the brute until "the time was come that he was fitted to receive his mental and moral powers"—when *can* a brute be "fitted" to receive a responsible soul?—and that *then* "they were given him by a special interposition of the same power that created (developed?) all things." That is to say, one night the "man" Adam lay down to sleep a brute, with the irrational mind, brutish propensities, and irresponsible nature of a brute, and awoke the next morning a man, with the God-like intellect and untainted holiness of unfallen humanity! This is "development" with a vengeance; and the faith that can swallow this camel of transmutation need never strain at the gnat of creation. To me it seems very little different from what the advocates of creation by direct act claim, at least so far as man is concerned, for we can neither say that Adam the man was the same individual with Adam the brute, nor yet that the one was a development of the other. Therefore it is evident, from Lieut. Hutton's own admission, that the "Theory of Development" fails, in the case of man, to account for the various forms of organic life.

But let us pursue this admission to another of its results. While it is undeniable that the superior mental powers of man pre-eminently distinguish him above every other creature, it is equally undeniable that most, if not all, of the other forms of life possess their various degrees of mental power, and that they are not more distinguished by their peculiarities of form and structure than by their varied

degrees of intelligence and sagacity. Now, either the higher natures are developments of the lower, or they are not. If they are mere developments, *why* may we not regard the nature of man as a development too? What special reasons are there for supposing the nature of man to be a creation, while we regard the varied and distinctive natures of the other animals as mere developments? We perceive in the old proverb, "Necessity is the mother of invention," the popular recognition of the fact that circumstances have a certain modifying effect upon the intellect of man, and that, too, in cases where, in all probability, they would fail to exercise any modifying effect whatever upon the mental powers of the brute. If, therefore, the developing power of circumstances acts in certain cases with even greater effect upon the man than upon the brute, *why* may we not suppose that these modifying causes might act during an almost infinite succession of ages and through an almost endless chain of being, and the accumulated result be the mind of man as we now find it?

Further, if mind of any degree *can* be developed, I certainly see no greater difficulty in supposing that an animal, under the pressure of circumstances, might modify its mental powers (as in fact is done daily in education, both in man and many of the lower animals), than in supposing that it might acquire a new member or a new faculty. If, for example, the mussel *can* develop into the fish, as Oken says it can, *why* may not the nature of the mussel develop into the nature of the fish? Or, if the fish *can* develop into the land animal, *why* may not the nature of the fish develop into the nature of the land animal? Or, finally, if the brute *can* develop into the man, *why* may not the nature of the brute develop into the nature of the man? From a careful perusal of Lieutenant Hutton's article and explanation, it appears to me that he supposes the various natures of the inferior animals to be mere developments, the higher of the lower; but how he can at the same time consistently maintain that the nature of man was "given him by special" act of creational power, I confess I cannot make out. Perhaps he found himself in one of the "dilemmas" he speaks of, and wished to harmonize his theory with the facts before him. If, however, I misapprehend his "Theory," and if, in reality, he means to assert that mind cannot *in any case* be developed, then in effect the "Theory of development" becomes the "Theory of creation," for a continuous series of "special interpositions" is assumed, and the idea of development becomes a new and very comprehensive idea indeed.

But to return for a moment to the theological aspect of this theory, Lieutenant Hutton says, that "man" was developed from some inferior animal (he does not know which), but that his "mental and moral powers," that is, his soul, were bestowed upon him at the proper time by a "special" act of creation. The Bible says (Gen. i. 26, 27; ii. 7, &c.) that God *created* man both body and soul. I am aware of the use which Lieutenant Hutton makes of the word "created," but I reject that use of it in this place as evidently inappropriate. I have not as yet seen the pamphlet by Dr. Asa Gray, but I *have* read my Bible, and whether I interpret it aright or Lieutenant Hutton, I leave your readers to decide. For a further discussion of the theological bearings of the Development Theory, I must refer your readers to Hugh Miller's "Footprints of the Creator," a work containing some very good arguments on the subject.

I have already occupied more of your space than I originally intended, and consequently feel loath to trespass further; still I cannot close my letter without a remark or two on the actual position of geology with reference to this theory. I will endeavour, however, to be very brief; and if in consequence of this enforced brevity, my arguments or illustrations should seem to any incomplete or inconclusive, I trust they will ascribe such defects to their true cause, and not to any uncertainty in the teachings of geology, which, to me at least, are plain and unmistakeable.

In my former letter, inserted in your number for June, I quoted from Darwin the statement that, if his theory were true, then before the deposition of the lowest Silurian strata there elapsed periods of time "probably longer than the whole interval from the Silurian age to the present day," during which "the world swarmed with living creatures;" and I put to Lieutenant Hutton the question which had already been put to Mr. Darwin—"What has become of the records of these vast primordial periods?" In reply, Lieutenant Hutton simply refers me to his very elaborate

picture of the manifold shortcomings of geology—shortcomings which, if they really exist to the extent he wishes to make out, must go a great way towards invalidating nearly the whole of the facts of Palæontology. For example, what reliance can be placed upon the teachings of a science any one of whose *known* facts may be successfully denied by a reference to some other of its *supposed and unknown* facts, and of which it is asserted, by even its own cultivators, that we can at the best only hope to obtain a few fragments of its latter half? We shall return again to the subject of these alleged defects in the geological records; meantime be it remembered that these “primordial periods” are altogether hypothetical—that they are assumed in direct opposition to the opinion of the most eminent geologists—that they are admitted by Darwin himself to be “quite unknown,” and that they are assumed by the advocates of the Development Theory solely because the existence of their theory requires it. The dictum of Johnson strikes me as peculiarly applicable to such ingenious speculators. “He who will determine against that which he knows, because there may be something which he knows not—he who will set hypothetical possibility against acknowledged certainty, is not to be admitted among reasonable beings.”

Again, to test the “theory” still further. “What,” asks Hugh Miller, “in order to establish its truth, or even to render it some degree probable, ought to be the geological evidence regarding it? The reply seems obvious. In the first place, the earlier fossils ought to be *very small in size*; in the second, *very low in organization*” (“Footprints of the Creator,” p. 21). Every student of geology knows how completely the *facts* of geology contradict the “theory” on these points. “The earlier fossils” of *every formation*, from the lowest to the highest, are, as is well known, neither “very small in size,” nor “very low in organization.” The lowest found fossils of each form of life are not fetal or imperfect; when they make their first appearance they are always found fully formed, and perfect in their organization. Nay more, so far from the fossils of the different formations appearing imperfect in form or organization on their first appearance, and then exhibiting a gradually-increasing perfection of form and organization as we ascend from the lower to the higher beds (as they ought to do according to the “theory”), we find that in many respects the contrary is actually the case—that “the magnates of each race walk first,” and that if geology furnishes no “reasons for disbelieving the theory” of development, it furnishes many *undoubted facts* in favour of an opposite theory of degradation. Many of these facts are very ably set forth in Hugh Miller’s “Footprints of the Creator,” an excellent work, and to which I again refer the reader. I leave to Lieutenant Hutton the task of harmonizing the *negative evidence* which he considers geology to furnish in support of his Theory of Development with the *positive evidence* adduced by Hugh Miller in support of his theory of degradation.

I am aware that in opposition to these statements Lieut. Hutton will refer me to that part of his article in which he describes the imperfection of the geological record, and assumes that we have not yet reached, and that we ought not to expect ever to reach, the horizon of any form of life. But to this I reply—first, by asking him if he means to oppose to acknowledged fact hypothetical probability, and if so, I refer him to my quotation from Johnson. But I reply still further, that this argument *admitted to its fullest extent*, is very far from being conclusive. Admitted that we are not to assume that the lowest-found fossils of any form of life coincide with the dawn of that particular organism, still if it is an admitted fact that that form of life makes its first appearance *perfect and fully formed and comparatively high in its organization*, the “Development Theory” plainly asks too much of us when it asks us to believe that this form could have gone on developing itself from some other form, during perhaps “hundreds of thousands of years,” until it had assumed its most perfect form, and no record *whatever of its condition during all this enormous period of time be preserved*. And this too, be it remembered, not merely in the case of one particular form of life, but of *all the forms of life*! If the records of geology are really as imperfect as this amounts to, their testimony is certainly of very little value either for or against the development or any other theory.

But this leads me to remark, that I have cause to believe that the geological records are not nearly so imperfect, nor the results of what imperfection actually does exist nearly so important, as some naturalists to suit certain purposes attempt to make it appear.

The readers of Owen will no doubt remember the paragraphs on the distribution of the Mammalia in his "Paleontology," in which he asserts the value of even the negative portions of geological evidence. Objecting to the "conjecture that the mammalian class may have been as richly represented in primary and more ancient secondary as in tertiary times, could we but get remains of the terrestrial fauna of the continents," he insists that the negative evidence furnished by the total absence of mammalian remains from the primary, and "the scanty and dubious" traces of them in the secondary beds, is sufficient to carry conviction to the unbiassed mind that this class did not exist at all during primary times, and only began to exist in secondary times, and says that, "to the mind that will not accept such conclusion, the stratified oolitic rocks must cease to be trustworthy records of the condition of life on the earth at this period." The applicability of this to the case in hand is obvious.

Again, as we descend into the crust of the earth, the animal kingdom gradually loses its present high and diversified character—first, one great class and then another disappears from the stage of existence, until as we approach the lowest of the fossiliferous beds, the evidences of former life become not only confined to the lowest forms, but gradually more and more rare, and finally they cease altogether. This is the lowest zone of ancient life, and *below it no trace of organic life is found*. And this too, be it remembered, in situations not at all ill-calculated to preserve any forms of life which might have been committed to their charge, many of these rocks being in fact much less metamorphosed than many others higher up in the geological series, which actually do retain impressions of the organisms originally buried in them. From these facts the conclusion naturally follows, that if we have not in these lowest fossiliferous strata actually reached the dawn of life on the earth, we have approached sufficiently near to warrant our forming an opinion respecting it, and to make the expectation of further discoveries in this direction all but hopeless.

Here again we find additional proof of the trustworthiness of the geological records. In them we find an almost complete history of the progress of life on the earth from its dawn millions of ages ago down to the present day. In them we find breaks certainly—breaks sufficient to show us that our history of life on the earth, full as it undoubtedly is, is not perfect; and to stimulate the diligent inquirer with the hope of occasionally adding a new link to the chain—but as certainly we find nothing in them to warrant the idea of such breaks as the Development Theory demands—breaks of thousands of centuries, at least as often as the commencement of each geological formation, and probably of much more frequent occurrence.

On these and many other grounds, therefore, I arrive at the conclusion that the facts of geology do *not* support the Theory of Development, and in concluding this communication, I would urge upon your readers the duty of a thorough and impartial examination of the bearings of geology upon this "theory" before its claims are admitted or even temporized with. It is evidently, as Professor Owen expresses it, a "chance aim of human fancy, unchecked and unguided by observed facts;" and further he says respecting it, that "observation of the effects of any of the hypothetical transmuting influences in changing any known species into another has not yet been recorded."

The "inconsistencies and absurdities" Lieut. Hutton speaks of are merely imaginary. For example, I believed, and still believe, that if I could show one of the links of the supposed chain of development to be defective, the whole theory would fail as a theory attempting to account for the conditions of life on the earth, because insufficient to account for the phenomena of life. Well, did I not show the defectiveness of the supposed link between man and the brute? And did not Lieut. Hutton acknowledge this defect by attempting to patch it up with an act of "special interposition?" Did he not, therefore, by this act acknowledge that his theory was, by itself, insufficient to explain the conditions of life? Then let Lieut. Hutton show *where* the "inconsistency" or "absurdity" of my assertion lies, and having done *that*, let him next explain his own inconsistency in introducing creational acts into a "Theory of Development."

His other objections are about equally well founded, and as my communication is already far too lengthy, I therefore pass them over in silence.

I am, &c.,

T. GRINDLEY.

Glossop, July 26th.