

*Percont qui ante nos nostra dicunt.*

Darwin's last book, "The formation of Vegetable Mould through the action of Worms," attracted and still attracts an extraordinary degree of attention, and it is hardly too much to say that the humble earthworm has quite usurped the place of the anthropoid ape which seemed destined at one time to stand sponsor for Darwin's fame. The reviewers vied with one another in their praises of this wonderful book on worms. One of them—who pretty fairly expresses the opinion of them all—said:—"It is in many respects more characteristic of the change which has within the space of a generation passed over the face and the spirit of modern science, than any other that could be named." If we ask what there is so very wonderful in the book, we are told for answer, that Darwin discovered the place of the earthworm in the scheme of nature, and proved that it occupies a very important place. "This poor animal," says the reviewer already quoted from, "has hitherto served as the type of everything that is low and mean and sordid in nature. It can hardly do so henceforth. Mr Darwin has shown that it is to the incessant action of earthworms that the layer of vegetable mould which covers the face of the country like a mantle, is largely owing. Worms in almost countless numbers are ceaselessly at work, burrowing in the soil in all directions, passing it through their bodies, manuring it by dragging down leaves to serve as food and as lining to their burrows, undermining any object lying on the ground, and bringing the earth to the surface and gradually burying the object under the layer of vegetable soil." And so on and so forth. Hence, we are told, Darwin proved that vast results ensue from "small and little heeded causes working insensibly through immensely long periods," and hence, of course,—evolution. The supreme merit of the book, then, is said to be the novel disclosures that it makes to the world of science, as to the function of earthworms in the formation of vegetable mould. Darwin's admirable style, his accuracy, his clearness, above all his readability, are mere accessories which do him credit, no doubt, but which are common to other writers and which cannot add to his fame as a naturalist and a philosopher. It is his unique insight into the secrets of nature, as displayed in his discoveries concerning earthworms,

his discoveries concerning earthworms, that we are called upon specially to admire. Now, we have the highest respect for Darwin, as we have for all earnest searchers after truth, and we are quite ready to admit that his book on worms is a charming one and a very valuable one. But we must be allowed to challenge the claim made for him by his reviewers, to be deemed the discoverer of the function of the earthworm. Most of our readers probably have heard of and many of them, we hope, have read, Gilbert White's "Natural history of Selborne," a collection of letters concerning natural objects written by a country parson of observant habits to various brother naturalists, about the middle of the last century. It is the earliest popular work on natural history extant in the language, and it does not pretend to be anything more than what we have described it to be. Well, in this excellent old book, we find the following letter (No. LXXVII.) on Worms. It is addressed to the Honorable Daines Barrington, a great crony and frequent correspondent of White's, and is dated "Selborne, May the 20th, 1777":—

"Lands that are subject to frequent inundations are always poor, and probably the reason may be that the worms are drowned. The most insignificant insects and reptiles are of much more consequence and have much more influence in the economy of nature than the incurious are aware of; and are mighty in their effect from their minuteness which renders them less an object of attention, and from their numbers and fecundity. Earthworms, though in appearance a small and despicable link in the chain of nature, yet if lost, would make a lamentable chasm, for to say nothing of half the birds and some quadrupeds which are almost entirely supported by them, worms seem to be great promoters of vegetation, which would proceed but lamely without them; by boring, perforating and loosening the soil, and rendering it pervious to rains and the fibres of plants, by drawing straws and stalks of leaves and twigs into it, and most of all by throwing up such infinite numbers of lumps of earth called worm-casts, which being their excrement, is a fine manure for grain and grass. Worms provide new soil for hills and slopes where the rain washes the earth away, and they affect slopes probably to avoid being washed

washes the earth away, and they affect slopes probably to avoid being flooded. Gardeners and farmers express their detestation of worms, the former because they render their walks unsightly and make them much work, and the latter because, as they think, worms eat their green corn. But these men would find that the earth, without worms, would soon become cold, hard-bound and void of fermentation and consequently sterile; and besides, in favor of worms it should be hinted that green corn, plants and flowers are not so much injured by them as by many species of *colcoptera*, and *tipulae* in their larva or grub state, and by unnoticed myriads of small shell-less snails called slugs, which silently and imperceptibly make amazing havoc in the field and garden. *A good monography of worms would form much entertainment and information at the same time, and would open a large and new field in natural history.*" Now is not this the hint on which Darwin acted? It seems to us that his book, which is at this moment the subject of so much eulogy, is neither more nor less than the "good monography of worms" suggested by the worthy curate of Selborne more than a hundred years ago. It is quite certain, at all events, that White was perfectly familiar with those particular secrets of nature which Darwin is declared by his

too impulsive admirers to have discovered. The letter which we have quoted above contains, in fact, in a homely but by no means inelegant shape, the pith of Darwin's book. White plainly discerned that "great department of natural change which is effected solely by the agency of small and little heeded causes working insensibly through immensely long periods;" and he expressed his discernment of it with a philosophical clearness which, we take leave to think, is not surpassed by any passage in Darwin's works. Yet the researches of White led him to totally different conclusions from those arrived at by Darwin. The more he studied nature, the more humbly and reverently he worshipped God. Accurately, and with a wistful interest, he observed and noted the wonderful operations of the lowest creatures; but he arose from his pursuit only the more convinced of the power and wisdom of the Creator. Let us look a little farther into this matter. It seems that others besides White in 1777 and Darwin in 1801 have

White in 1777 and Darwin in 1881, have studied the habits of earthworms and discerned the great lesson in natural philosophy that they teach. Frank Buckland was a true lover of nature—alas! *fuit Ilium*. He died more than a year ago,—and no creature was too insignificant to arouse his delighted interest. We are not surprised, therefore, to find that in his noble edition of White's *Selborne* (MacMillan—1877) this letter about worms attracted his particular attention. Buckland was quite an original sort of Editor. That is to say, he knew nothing whatever about literary work, and as long as he got in the material he wanted and made his subject clear and striking, he cared not a jot how it was done. His "Notes" on White are not notes at all in any recognised sense of the word, but rambling reflections of his own, suggested ever so remotely by his author's text, and amplified by opinions or observations of other people, varying in style and station from his father, who was Dean of Westminster, down to Davy, the bird-fancier (query: dogstealer?) in St. Martin's lane. The Dean, as it happened, was an amateur naturalist of no ordinary pretensions, a deeper thinker on nature, we should judge from the glimpses we get of his researches and conclusions, than his busier and more versatile son. Hence the extracts which Frank Buckland every now and then digs out of his father's manuscripts and shovels *holus bolus* into his edition of White's *Selborne*, are among the most apposite and valuable of the so-called Notes. The subject of earthworms furnishes a typical case. On the letter No. LXXVII., which we have quoted at length in an earlier part of this Note, the filial editor thus abruptly draws on the parental stock of wisdom:—  
"My father made several observations on earthworms. I possess his manuscript notes on this point which are to this effect:—'The digestion of animals is a geological power of greater extent than might at first sight be imagined. In the operations of earthworms, we find an example. It is a bad thing to plough up ancient pastures, as a number of years are required to reform the mould the result of centuries of digestion by these humble and hitherto unappreciated fellow laborers with farmers to ameliorate the condition of the earth's surface and to adapt it to the production of grass, food for the higher animals. Thus the whole of the earth, which forms a kind of turf

for the higher animals. Thus the whole of the earth which forms a rind of turf has again and again passed through the entrails of the successive generations of earthworms.' See also *Literary Gazette*, November 25, 1857." Frank scorns dates, else he might have told us when these essentially philosophical remarks were written, and what the reference to the *Literary Gazette* means. To compensate for the lack of this information, which would only be important as showing how far in advance of Darwin in point of time, Dean Buckland was, in his "discoveries" concerning worms, he gives us the following particulars as his own contribution to the Note:—"The earthworm is admirably adapted by its structure for tunnelling in the earth, and its wonderful borings are often laid bare in the railway and other cuttings. When we consider the great pressure of earth, besides its solidity, through which these worms have to bore, it seems surprising that their delicate organisms should not be crushed. The body is made of a number of small rings which are armed with short, stiff, harsh bristles, by means of which they pull themselves along. As the sea mouse has brilliant hairs, and the Cape mole has lustrous fur, so the earthworm's cuticle has a shining, iridescent lustre, the reason of which I am not in a position to explain. The nervous and vascular system of the earthworm is very complicated. It lays eggs, for which the reader should look in decayed dung heaps. The mouth consists of two small lips, the superior of which resembles in some degree that of the Tapita. In the Royal College of Surgeons there is an admirable preparation (No. 470) of the anatomy of the earthworm. The oesophagus, a wide membranous canal, is continued straight down for half an inch and ends in a delicate bag or reservoir. To this succeeds a muscular stomach or gizzard, disposed in the form of a ring. The intestine is constricted at each segment of the animal by a series of ligaments or partitions connecting it to the parietes of the body, and swells out in the intermediate spaces when distended by the particles of earth." The last paragraph is quoted by Buckland, just as we have given it, but its source is not acknowledged. We take it to be a description attached to the preparation in the College of Surgeons. Now both the Bucklands, father and son, were strictly orthodox

of Surgeons. Now both the Bucklands, father and son, were strictly orthodox, and their orthodoxy was not only not shaken, but actually confirmed by their researches in the *arcana* of nature. Frank Buckland begins his preface to White's Selborne by announcing that his purpose is to "help to counteract the growth of doubt, infidelity and atheism," which he declares to be enemies of science. On the religious question we desire to preserve strict neutrality. It has nothing to do with the two points which we set out to establish, and which we maintain we have established. They are these:—Firstly, that Darwin has no title to be proclaimed the discoverer of the function of minute causes in the scheme of nature; secondly, that it is quite possible for the function of minute causes in the scheme of nature to be thoroughly well understood by the most powerful minds, without leading them in the direction of Evolution.

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