RECORD: Anon. 1881. [Review of] The formation of vegetable mould, through the action of worms: Mr. Darwin on worms. *The Times* (10 October), p. 4.

REVISION HISTORY: Transcribed by Christine Chua and edited by John van Wyhe 11.2019. RN1.

NOTE: See The formation of vegetable mould, through the action of worms, F1357.

[page] 4

MR. DARWIN ON WORMS.*

Two books from Mr. Darwin in the course of a year are a gift to be grateful for. A year ago he gave us tho strange results of a long series of observations on the movements of plants, and now he has even stranger things to tell us as to the work of worms on our earth. It must not, however, be thought that Mr. Darwin's new work is the product of a single year; it really embodies the results of something like half-a-century's observations and experiments. No better example could be adduced of the truth of Carlyle's definition of genius - an infinite capacity for taking trouble; and nearly every page abounds with instances of the importance in scientific investigation of what most people would consider trifles. Mr. Darwin's method of work may well be regarded as modelled on that method of nature herself with which his name is so intimately associated. Beginning with a nucleus of fact, he develops it by innumerable little additions from all sides, modifies his growing scheme in accordance with whatever new conditions may arise, and only asks us to behold his work when all its parts have been so fitly framed together and raised upon so solid and wide a foundation of facts as to compel our admiration and approval. Mr. Darwin has shed new and true light over great regions of nature, and the total result of his labours has been to revolutionize the methods of science in many of its departments, arid to readjust the standpoint from which we look at nature's multifarious handiwork. He has led us to suspect that probably nothing exists in the universe without a meaning and a service; that many creatures and parts of creatures -that seem useless and cumbersome are really ingenious adaptations to the performance of - the most essential functions; that nature is never wasteful and accomplishes the most stupendous ends by means that would seem to the untrained observer contemptible and hopelessly inadequate for the purpose. Mr. Darwin has given us reason to believe that probably nothing walks this earth "with aimless feet" that even "unintelligent" plants have something astoundingly analogous to a brain, and that their tiniest movements are all directed to a well-defined end. And now in the volume before us he has taught us to be cautious in calling anything common or unclean. If in his work on "The Descent of Man" he "put down the mighty from, their seats," In that just published he has certainly exalted them of low degree."

No subject for investigation could, at first sight, seem more unsavoury than worms. For centuries and centuries they have furnished moralists, poets, and ascetics with similes for all that is abject and grovelling and useless; humility itself cannot exult in a lower epithet than "worm of the dust." We all know what Cowper meant when be declared that he would not

count him among the list of his friends "who wilfully would tread on a worm"; the results of Mr. Darwin's investigations have put an entirely new meaning into the lines. In the mouth of a farmer, after reading Mr. Darwin's book, they would have a significance undreamed - of before. For, although doubtless worms may do some little damage to seeds and roots the benefits they annually confer upon humanity infinitely outweigh it. “It may be doubted,” Mr. Darwin concludes, "whether there are many other animals which have played so important a part in the history of the world as have these lowly organized creatures." Indeed, Mr. Darwin declares that these despised creatures are among the greatest benefactors of humanity. They are nature's ploughmen; and had it not been for the work they have done through long age, in many parts of the world, there would have been nothing for the plough to work upon. Mr. Darwin, as usual, wastes no words. He tells us at once what he means to do, and is never for one sentence diverted from his purpose "The share," he tells us in the first sentence of his book, "which worms have taken in the formation of the layer of vegetable mould which covers the whole surface of the land in every moderately humid country is the subject of the present volume." The first paper which Mr. Darwin wrote on the subject was read so long ago as 1837. It contained the results of several years' observations, amid these have been continued ever since. Not only has he himself, aided by his sons, carried on a long series of observations and experiments, but he has obtained information bearing on his inquiries from observers in all parts of the world. Other inquirers have been working at the same subject in recent years, ang some of them have published their observations. Mr. Darwin utilizes the results of other inquirers, and gives them all credit; but he waits patiently till his own work is complete before he gives it to the world. He gives us first of all a clear account of the structure of the worm, which is much more elaborate and beautiful than it seems. It has no eyes and no ears, but has a digestive system of some little complexity, including something very like a gizzard. Everyone knows the difficulty of pulling a worm out of its hole; it will rather break than yield, and this is owing to a multitude of tiny bristles that fix themselves against the sides of the hole. Worms may have a sense of smell, and certainly have one of taste, as is proved over and over again by their preference for certain kinds of food. Where they can get them, their staple food seems to be leaves, though they are specially partial to onions. These leaves they drag down into their holes, not only for food, but to line the mouths of their holes with, probably for the sake of keeping their bodies from the cold earth. And in the methods followed by the worms in dragging leaves thus down through their narrow holes, Mr. Darwin discovers clear traces of intelligence, of a faculty for adapting means to an end. The holes themselves exhibit workmanship of some elaboration, they are carefully lined often with a thin layer of fine, dark-coloured earth, which, when carefully smoothed, makes the holes fit easily, but perfectly, to the body of the worm. Often their holes are covered with a tiny heap of small stones, and sometimes they are plugged up by the stalks of leaves that have apparently been on purpose placed in proper position. But these and many other details as to the structure of worms and their habits are all preliminary

to the great purpose of the work, which is to show that what is generally called "vegetable " mould is almost sorely the work of these worms, and is, therefore, more animal than vegetable. They are constantly swallowing earth and tiny stones, and passing them through their bodies to the surface in a finely triturated and fertilized condition; in fact, they may be said to manure the earth inside their own bodies. By means of this process the entire earthy surface of a country is constantly in a state of change. The whole earth underneath our feet all over the world is swarming with worms; probably all over there are in every acre of land from 33,000 to 50,000 worms. Everyone is familiar with the casts of worms, which themselves look like worms of earth. With so many worms at work, then, it is not difficult to imagine what will be the effect of a constant accumulation of such casts. In some cases, if spread over the ground, they would measure one-fifth of an inch in depth per year, equal to one inch of earth brought up from below, passed through the bodies of worms, and deposited on the surface in five years. In one instance given by Mr. Darwin 12oz. of castings were thrown up in a year on a square foot, or 6.75lb. on the square yard, equal to 141/2 tons of so-called fertile "vegetable" mould over an acre in one year. Leaves and atones and lime and other substance spread over a field, and left untouched, have been found in a very few years several inches below the surface in a uniform layer. This, there can be no doubt, from the multitude of data supplied by Mr. Darwin, is all the work of worms. The millions of leaves and other vegetable matter dragged by the persevering creatures underneath the soil, whether passed through their bodies or not, form a splendid natural manure. Not only so, but "the bones of dead animals, the harder parts of insects, the shells of land molluses are before long all buried beneath the accumulated castings of worms, and are thus brought in a more or less decayed state within reach of the roots of plants." The worm burrows generally do not go beyond a few inches beneath the surface, though not unfrequently they have been found at the depth of several feet, and thus, it is supposed, materially aid the drainage and allow the air to penetrate deeply into the ground. They are even a powerful factor

*"The Formation of Vegetable Mould through the Action of Worms, with Observations on their Habits." By Charles Darwin, BL.D., F.R.S. With Illustrations. London: Murray. 1881

in geology, performing a great part in the disintegration of rocks, not simply by direct action on. the softer kinds, but by the indirect action of the acids which get mingled in their bodies with whatever they swallow, and which will have a slow, but ultimately powerful effect on even hard rocks. Not only the farmer, but the archaeologist ought to be grateful to the worm for the work at has done. Mr. Darwin shows that large stones, and even paved, walks, when left undisturbed, have in the course of a few years been completely buried beneath the casts of worms. To this cause we owe the preservation of part of the floor of Beaulien Abbey, and the recumbent huge stones of Stonehenge have sunk partly underground owing to similar action. Not only so, but Mr. Darwin shows that there is the greatest probability that whole towns, like the old Roman towns of Silchester and Uriconium, owe their preservation for the inspection of modern archaeologists to a large extent to the ceaseless work of generations of these lowly creatures, showing the stupendous effects of a continually recurring cause, even

when it seems almost infinitesimally small. No one can rise from the study of Mr. Darwin's new work; which is one of, the most interesting he has written,, without thenceforth feeling something like tenderness and respect for the hitherto loathed worm, even if he hesitates to credit it with all the stupendous feats which its advocate attributes to it. Mr. Darwin has elevated the creature from a cumberer of the ground, to the rank of a benefactor of our race, and has by his researches thrown another fresh flood of light upon the workings of nature. As usual, there is little theorizing in his book; it consists mainly of an accumulation of authenticated instances from which the reader may draw his own conclusions; and, as usual also, Mr. Darwin points out any weaknesses in the line of his argument, and suggests objections as candidly as if he were on the other side. But the weight of the multitude of facts he brings forward is too powerful to be resisted.