

DARWIN ON EARTHWORMS.*

WHE have already given an outline of the contents of the new book by Mr. Darwin. The fact that earthworms have much to do with the condition of the soil has been commented upon by numerous observers during the last fifty years. As early as 1820 Mr. Darwin read a paper on the "Formation of Mould" before the Geographical Society, and Mr. C. F. Murray published in 1839 his valuable observations and experiments on "Worms." Since then other writers have taken up the subject, notably Von Hübner, who published the result of his researches in 1837. It has been reserved to Mr. Darwin, however, to sum up the knowledge acquired in a singularly masterly form, and to add the account of his own penetrating researches for many years. Mr. Darwin's facilities are almost unique. In his efforts to discover the secrets of nature he has the pertinacity of a hermit. He has, in addition to ample means, four sons following his father, and when at a loss for the verification of some statement, or for a fresh examination of evidence, "My son William" or "My son Horace" supplement very ably the labours of their sire. Besides on the Pacific Darwin himself often has noticed the ridges turning along the slopes, and wondered how they originated. Mr. Darwin, coming to the conclusion that the ridges on hill-sides are produced by the castings of earthworms assisted in their downward tendency by blades of grass or other growth, sends "My son Francis" to a chalk escarpment near Lewes, and from the careful report establishes the correctness of his theory. A long life of scientific observation, amounting to nearly or quite half a century, has enabled the veteran philosopher to watch the gradual formation of mould from the castings of earthworms, until it entirely covered a stone path in his garden, thus proving under his own eyes what worms can do. He has corresponded for a lifetime with observers of insects in all parts of the world. No wonder, then, that Mr. Darwin is enabled to exhibit a treasure-house of knowledge on the action of earthworms which partakes of the character of a new revelation.

Earthworms are very considerable factors in the apparent "denudation" of the earth's continents. Before the earth is ultimately consumed by fire, if such it is to be the final result, the sea will gradually encroach upon and engulf the vast elevated places now existing. Worms on steep and hill-sides are ceaselessly loosening the soil, causing it to slide into the valleys to be carried by rivers into the sea, until it is estimated that the great valley of the Mississippi, for instance, will be level with the sea in the comparatively short time, probably speaking, of 4,000,000 years. That is if (there is much virtue in an if) no elevation of the land takes place. But there are countervailing forces in nature. We owe to Mr. Darwin himself the discovery of the marvellous islands whose wonderful accretions are forming the coral islands of the Pacific. As far as recent discoveries carry us, and we are indebted to Mr. Darwin as the foremost leader in careful research, we are still very far from definite conclusions on the value of even the most likely theories of the world's history and future.

Whether intentionally or not, Mr. Darwin supplies new evidence of design in nature. For a million of years, to use his own suggestive calculation, that which we call vegetable mould has been passing through the bodies of earthworms. Not only has the earth been entirely ploughed up every few years, but converted with the ploughing has been the fertilizing. The soil has been triturated in the granular of the tiny agricultural and mixed with vegetable matters. If we could imagine a plough which turned up the soil and manured it in one operation, it would give a good idea of the action of earthworms. Worms were the purpose of fertilizing ploughs. They have pursued their avocations for ages without change of structure and without variation. They have not evolved into something else, and for aught we know have not been evolved out of a "fortuitous concurrence of atoms." If there is any law gradually originating or changing species by "natural selection," or the "survival of the fittest," a million of years has seen no application of it in history of earthworms. The evident design of their structure and work is to make the surface of the earth fit for the growth of all things necessary to man and beast. Are we not driven to the conclusion that there must be an Intelligent Power behind all this?

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