

## SERVICES RENDERED BY EARTHWORMS.

GILBERT WHITE, of Selborne, whose watchful observation reached to the minutest matters of natural history, devoted one of his "Letters" to Earthworms and their use in the economy of nature. "Earthworms," he says, "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 the 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." After referring to the detestation of worms usually shown by gardeners and farmers, and admitting the occasional annoyance caused by them, he shows that "the earth without them would soon become cold, hard-bound, and sterile."

Mr. White threw out these hints "in order to set the inquisitive and discerning to work," and adding, "A good monography of worms would afford much entertainment and information at the same time, and would open up a large and new field in natural history."

This suggestion, made by Gilbert White in 1777, has led to many observations on the subject, and we have at length a monograph such as he desired, in the form of a large volume, by no less distinguished a naturalist than Charles Darwin.

Mr. Darwin's book is the result of long study and observation. Thirty years ago he drew attention to the action of worms geologically, by their gradually covering the surface of the land with fresh soil; and he went so far as to say ("Proceedings of the Geological Society") that "every particle of earth in old pasture land has passed through the intestines of worms, and hence that in

some instances the term 'animal mould' would be more appropriate than 'vegetable mould.'"

In the "Leisure Hour" volume for 1862 an interesting paper on earthworms appeared from the pen of a careful observer and genial writer, the late Mr. C. Manby Smith. In his own garden he had often watched the proceedings of the worms, and mentions the apparent intelligence and skill which they displayed. When leaves were large they were seen to roll them into cylinders in order to be able to drag them into their holes. Mr. Darwin's book contains many wonderful details, and he gives some astounding statistics and calculations as to the number of worms and the amount of useful work done by them. These estimates illustrate the words of Gilbert White, who said, "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."

It will be curious to note the use made of Mr. Darwin's book in connection with what is called the Darwinian theory of evolution. The whole drift of this elaborate study on worms tends to show that their work is not carried on simply for their own benefit, nor is taken advantage of for their own elevation in the scale of being, but is an arrangement for the use of the more highly developed creatures, especially man. The "Spectator" has shrewdly pointed out this in an able review of Dr. Darwin's book. The result of Mr. Darwin's observations is thus summarised:—

"The effect that worms have produced in making the vegetable mould of the world can hardly be exaggerated. For ages before man appeared on the earth, the soil in which his food was to be produced was being ploughed by millions of infinitesimal ploughs, which not only crumbled the soil into much finer particles than our ploughs can crumble it, but also essentially altered its chemical

constitution, so as to make it infinitely better adapted for raising those richer products which higher organisations need."

And again, "The earthworms are the ploughs by which the surface of the globe was being prepared to yield man harvests long before either we or our harvests had been even conceived, except in the mind of that Eternal Wisdom to which the future is present, and the present contains the augury of the future. No one, we think, can read Mr. Darwin's remarkable book without being convinced that the earthworm works less for itself than for the future of the globe it inhabits, and would have been quickly superseded in the conflict

for existence by some other creature whose organisation is more economically adapted to secure solely its own nourishment and multiplication, had not the plan of the Universe included a deliberate preparation for slowly approaching but still distant ages, as well as for the immediate future."

Darwin himself is no materialist, but, like Humboldt, leaves others to draw conclusions from the facts which he puts on record. Plain, sensible people, as well as men of science who are not committed to the advocacy of materialism, will see in these researches a new illustration of the argument for Design, and a new chapter displaying "The Wisdom of God in Creation."

