DARWIN ON EARTH-WORMS.*

To most persons, the topic of "worms," must appear decidedly uninteresting, if not in some respects unsavoury. There are, of course, worms and worms; but amongst backboneless things, the whole worm-race may be said to exist only for the delectation of people who, like zoologists and botanists, can find delight in a sponge, or who may in a sense be said to "live up to" a fungus. Yet every rule has its exceptions, and the general opinion that worms and their kith and kin are both uninteresting and unimportant members of the animal series, seems likely to be considerably modified. The publication of Mr. Darwin's last book on "Vegetable Mould and Earthworms" marks a new era in the history of the annelid or worm race. That eminent philosopher is popularly believed to have been the means of raising the gorilla, chimpanzee, and other "poor relations" in public estimation. The not over-lively "sea-squirt," existing as a kind of "leather bottel" by the seaside, likewise owes to Mr. Darwin a meed of gratitude, in that we are invited to behold in this leathery bag a kind of far-off ancestor of all backboned beasts, including ourselves of course. What Darwin has accomplished for the apes and seasquirts—not to mention the respect he has engendered for numerous other insignificant beings—he now attempts on behalf of the earthworm. From a popular point of view, it is clear that Mr. Darwin would have been a most congenial companion to that estimable "Sir Thomas the Good" of *Ingoldsby* fame, whose proclivities in the way of observing everything at once invertebrate and nasty, have been duly immortalised in the ballad. The earthworm in Mr. Darwin's hands is no longer merely a kind of crawling and burrowing cousin of the slug and beetle. It becomes elevated into an important animal, of whose race he remarks that "it may be doubted whether there are many other animals which have played so important a part in the history of the world." The justification for this elevation of the worm is not far to seek or difficult to find. But the general conclusion just noted has only been reached through a long and elaborate series of investigations, extending practically from 1837 to the present time. In order to thoroughly appreciate the earthworm's work, it is first necessary to know what the earthworm is. And following Darwin's own order, it becomes an easy matter to satisfy ourselves that the animal in question is by no means such a lowly being as popular philosophy might lead us to suppose.

The ringed and jointed body of the worm proclaims its title to be regarded as a humble offshoot of such aristocratic animals as centipedes, insects, spiders, and the like. But our worm itself is by no means destitute of the belongings we are accustomed to associate with higher grades of life. It possesses a very perfect type of digestive system, to the operation of which, in elaborating the coarser particles of earth and vegetable matters into fine mould, the worm owes its fame. Its body may consist of some 200 joints, each armed with very small bristles, and its movements are provided for by a system of muscles, that give it the power of executing its varied movements, from the undignified wriggle to the stately crawl. Like a fowl, it has a strong crushing mill in the shape of a gizzard, wherein, in the absence of jaws, the food is bruised and broken up preparatory to its digestion. Along the floor of its body lie its nerves, the worm thus differing materially from such animal aristocrats as ourselves, since we carry the great bulk of our nervous belongings in our backs. No ears are developed, and when Mr. Darwin whistled loudly, or entertained his annelides with a tune on the piano, they remained perfectly passive. Neither have they eyes, though they are sensitive to light, and when disturbed by a bright light, dash into their burrows like rabbits. They are by no means thick-skinned animals, and they are besides highly sensitive to touch, and to the vibrations of solid bodies. That they exercise a certain defined intelligence Mr. Darwin has abundantly proved. Worms, he tells us, show a very human and decided objection to leaving their premises open at night, and in the work of plugging up the mouths of their burrows they employ leaves of various kinds, and occasionally may utilise small stones by way of barricade. The construction of a suitable plug of leaves is accomplished in a manner showing high intelligence on the part of the worms; and Mr. Darwin's account of the manner in which variously shaped leaves were adjusted to the required end in the readiest manner is alone worth careful perusal. The sharp pine-leaves, for instance, are placed in the mouths of their burrows, so as to form a kind of *chevaux de frise*, whereby defence and protection are duly secured. As to the remaining points in worm anatomy, little need be said. No heart worth speaking about exists in the worm, although they manufacture blood from their food, as do their higher neighbours. The habits, lastly of the worm, are nocturnal. His period of activity, like not a few species of the human race, is after dark. Worms leave their burrows and crawl abroad to seek sustenance at night. As regards their tastes, Mr. Darwin describes the worms as omnivorous—that is to say they are by no means particular what they eat, and prefer quantity to quality. Of the earth, earthy, worms devour large quantities of the soil for the sake of the organic matter it may harbour. But the tit-bits in the worm's bill of fare are leaves; and if half-decayed, so much the better. They are fond of meat, and especially in a raw condition; and in the absence of anything more tasty, they will devour their dead brethren; from all of which facts it is clear that a considerable fund of information still awaits us concerning worm-psychology.

The exceeding plenty of worms all over the world forms a primary fact in the elucidation of their work on the earth's surface. The family seems to be cosmopolitan, and appears to possess a remarkable unity of habit besides. What, briefly stated, may be regarded as the essential source of the worm's power in nature? Burrowing everywhere in the loose earth and subsoils, the worms continually eat up earth, leaves, and terrestrial odds and ends at large. But during the process of digestion those matters undergo within the worm-frame considerable change. Each worm may be succinctly described as a kind of underground agriculturist. As the farmer employs his clodhoppers as clod-breakers to ensure the fertility of his soils, so the business of the worm fraternity seems to consist in the continual grinding down of the big earth particles into a state of fine division. There ensues in consequence the continuous outpouring on the earth's surface from below quantities of exceedingly fine soil, which forms the best and most fertile medium for the growth of plant life. Nor is this all. The worm-castings thus outpoured on the earth's surface do not depend entirely for their fertile nature on their fine quality alone. The minute fragments of vegetable matter which mingle with the earth render that earth singularly productive. It acts as a kind of highly-spiced manure, and thus ensures the due nutrition of the plant-life that may grow therein. In a word, to worms, Mr. Darwin maintains, we owe the fertility of our soils, and in these humble creatures we see the agents which render to unconscious humankind a lasting service. If it be correct that in an ordinary acre of ground 53,767 worms may exist, we can understand the cumulative power resident in this agricultural army; and if, as Mr. Darwin insists, a weight of ten tons of dry earth is annually brought to the surface of each acre of land in some parts of England, it is easy to conceive how much we owe, as a nation, to their efforts. We need not point out the addenda which Mr. Darwin attaches to his recital. It is beside our present intention to note what he says of the preservation of old pavements and other archæological things by the worm-castings; and we need not stay to remark the geological effects of worm action on the land surface. What may, however, be lastly noted is the fact that, like the most powerful natural agencies, the work of the worms illustrates the power of time and numbers. As the raindrops of ages form the stalactite of the cave, big as the pillar of a cathedral aisle; or as the tiny coral polypes through numerical strength build the great barrier reef of a thousand miles in extent—so the insignificant worms, by their cumulative action through long periods of time, may literally turn over the whole surface of the globe. It is in the demonstration of such studies of the insignificant that the power of true scientific genius is best seen.

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* *Mr. Darwin on the Formation of Vegetable Mould through the Action of Worms; with Observations on their Habits.* [London: John Murray.]