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MR. DARWIN ON WORMS.*

The celebrated author of the Darwinian theory is now in his seventy-third year, and might, without any imputation on his industry, accept some respite from his labours. Yet this interesting work is the second which he has published within twelve months, and in freshness, literary grace, and the other qualities which distinguish Mr. Darwin's minute observations, is inferior to none of its many predecessors. During a long lifetime wholly devoted to science, Mr. Darwin has made excursions into nearly every field of natural history, and from all of them has returned with booty ample enough to afford a wealth of reputation to any one less famous than the Squire of Down. Yet, unlike the majority of specialists, he has the power of almost immediately divesting himself of the surroundings of his studies, and, what is even rarer among those who spend their days and nights among the minutiae of some little corner of knowledge, of arranging his various discoveries with almost unerring perspective in regard to those of other observers, even when those writers are his avowed opponents. The young naturalist who promulgated the theory of coral reefs seemed to have little in common with the geologist of the same name who, the year before, described so lucidly the Pampas of the Plate and the volcanic rocks of Ascension. Nor, unless we knew that both authors were identical, could we guess, from even the slightest allusion to their common work, that he who penned the charming treatise on the fertilisation of orchids is the same Charles Darwin who so many years before had compiled that laborious and perfectly unimaginative monograph in the Cirripedia. In like manner, the

unintelligent foreigner who could by any possibility gain his first acquaintance with the name on the title-page from the present little volume, might believe that the writer had for half a century thought of nothing save the *Lumbricus terrestris*, worm castings, and the formation of what may now, in the light of his researches, be more fittingly styled animal than vegetable mould. There is barely an allusion to the vexed question of natural selection, and not one to the descent of man, the variation of animals under domestication, or the good effect of intercrossing. The whole volume is devoted to a minute yet extremely interesting account of the anatomy and habits of the lowly earthworm, and the wonderful effects which its taste for eating dirt and voiding it again, "acting through long ages," has produced on the surface of the earth. From this point of view—and the timid reader, to whom the name of Darwin still conveys heterodox associations, may be assured from this alone—the book has some slight bearings on the "theory" to the support of which all of his researches tend more or less. In every other respect it is simply a popular treatise on a common object of almost every country in the world.

Nor, indeed, is the subject new. A score of works and "papers" have been written on the earthworm, and forty-four years ago Mr. Darwin himself published an outline of the observations of which the present book may be considered as the expansion. In 1837, he showed that worms by swallowing earth, in order to extract from it the organic nutriment which it contains, passing it through their intestines, and then voiding it in the little castings so familiar to every one, play an important part in the natural cultivation of the soil. In time, the stony surface of the ground is covered with a layer of virgin earth, brought up from a depth of from three to eight feet, or if the ground is, as in forests, littered with leaves, aids in forming a rich mould peculiarly suited for the growth of vegetable life. By and by, prostrate stones will also get covered over, so that not only the agriculturist but the archaeologist is indebted to the worm for many useful services. The untrained theorist is, however, so inept at grasping the power of small forces acting continually through long periods, that gardeners, farmers, and even distinguished geologists, like the late Viscount d'Archiac, jeered at Mr. Darwin's "*singulière théorie*." Yet, singular though the theory may seem, subsequent observations have proved that in many parts of England a weight of more than ten tons of dry earth annually passes through the worms' bodies and is brought to the surface on each acre of land, so that the whole superficial bed of vegetable mould passes through their bodies in the course of a very few years. Furthermore, by the collapsing of old burrows, the mould is in constant though slow movement, and the particles composing it are thus rubbed together, and fresh surfaces exposed to the disintegrating action of the atmosphere and of the acids generated in the soil. In rainy weather the finely levigated castings flow down any moderate slope, so that there is a continual renewal of the surface. In this manner great results are accomplished for the benefit of the agricultural interest. But Mr. Darwin is even more enthusiastic over the gratitude antiquaries owe to the despised worm. Coins, gold ornaments, stone implements, &c., if dropped on the surface of the ground, will infallibly be buried by the castings of the worms in a few years, and will thus be safely preserved until the land at some future period is turned up. The tessellated pavement of Abinger, in Surrey, was covered with at least fourteen inches of worm castings. The remains of a Roman villa at Chedworth, in Gloucestershire, were concealed under thirty-eight inches of similar soil; and the fine villa recently discovered at Brading, in the Isle of Wight, had been buried by worms to the depth of from three to four feet, the floor having gradually sunk as the earth which the annelids piled up was removed by them. In like manner—not to heap one fact above another—the Roman towns of Silchester, in Hampshire, and Uriconium (Wroxeter), in Shropshire, have experienced the kindly attention of the worms; and, among other instances of a like nature, one of the fallen blocks

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

at Stonehenge has sunk considerably below the level of the surrounding ground through the same agency.

It must, however, not be forgotten—and so impartial a theorist as Mr. Darwin is careful to remind us of this cause of possible error in his own calculations—that the washing down of soil from the neighbouring higher lands and the deposition of dust have together aided largely in the work of concealment when the ruins are so placed as to permit of the action of these subsidiary causes. At the same time, the worms, while helping to preserve ancient monuments, have done much to destroy them, by undermining their foundations. The smooth-turf-covered expanses which we admire are mainly due to all the inequalities having been slowly levelled by worms. “It is a marvellous reflection,” Mr. Darwin remarks in closing his volume, “that the whole of the superficial mould over any such expanse has passed, and will again pass every few years, through the bodies of worms. The plough is one of the most ancient and most valuable of man’s inventions; but long before he existed the land was in fact regularly ploughed, and still continues to be thus ploughed, by earthworms. It may be doubted whether there are many other animals which have played so important a part in the history of the world as have these lowly organised creatures.” Worms are, nevertheless, poorly provided with sense-organs. They cannot see, for they have no eyes, although their scattered nerve-knots enable them just to distinguish between light and darkness. They are deaf, and have only a feeble power of smell; the sense of touch alone is well developed. They can, therefore, learn little about the outer world, and it is surprising that they should exhibit some skill in lining their burrows with their castings and with leaves, and in the case of some species, in piling up their castings into tower-like constructions. They even exhibit—what is still more wonderful—some degree of intelligence, instead of mere blind instinctive impulse, in their manner of plugging up the mouths of their burrows. “They act,” to use Mr. Darwin’s words, “in nearly the same manner as would a man who had to close a cylindrical tube, with different kinds of leaves, petioles, triangles of paper, &c., for they commonly seize such objects by their pointed ends.” Such are a few of the numerous points Mr. Darwin aims at elucidating in his latest contribution to knowledge. The book is certain to be so widely read wherever the English language is understood, and, like all Mr. Darwin’s other works, to be translated into the tongues of the civilised world, that it is superfluous wasting words of eulogy over it. It is sufficient for those who know the writings of the greatest of modern naturalists to say that in careful observation, impartial generalisation, and literary form it is surpassed by none of its predecessors; and, while not inferior to any of them in scientific value, it is likely to receive a more unanimous welcome than could be accorded to some of Mr. Darwin’s earlier volumes.

