The Action of Worms in the Formation of Vegetable Mould. By CHARLES DARWIN, M.A., LL.D. Murray.

Most persons will be surprised to learn what Mr. Darwin teaches them in this volume, and proves by a series of careful and minute experiments, that earth worms perform the most important functions in renewing the fertility of our soil, and therefore in supplying the food of men. These creatures are not very often seen, unless accidentally turned up in digging in a garden; but the undersoil to the depth of one or two feet literally swarms with them, and every one must know what disfigurement the 'worm-casts' make in a smooth lawn or grass-plot. These little mounds, which are of circular form, and about an inch high, are the *excreta* of the lob-worm, and consist of digested leaves and earth sucked in from the boring of the holes. They are, therefore, manure applied to the roots of grass; and so abundant is the constant supply of undersoil thus brought to the surface, that Mr. Darwin calculates, from data very carefully obtained, that from sixteen to eighteen tons of earth are annually spread over each acre. The little heaps are dissolved by rain, dried and blown away by the wind, dispersed by the feet of grazing animals, and very largely eaten with the grass by the animals themselves. By these means the virgin earth brought up by worms is again enriched by passing through a second series of animal stomachs. And it is probable that, as eating much earth serves to digest, and to neutralize the acids of the fallen leaves the worms largely consume, so earth in great quantities taken into the stomachs of grazing animals performs the same function for them, and assists in the digestion of the green fodder.

Mr. Darwin further shows that the worm exercises an intelligence which it is very difficult to explain in a brainless creature, and, moreover, in one totally blind. He has proved that the worms nearly always draw into their holes dead leaves with the stalks uppermost. Any one may notice that the worm-holes are generally plugged with bits of stick, leaves, even feathers or scraps of string, or with little stones or cinders piled over them. This operation is performed by the worms at night, when they come out of their holes, either partially, or to move to another spot. It is thus that the 'early bird' of the proverb secures the worm; for though the creature is so timid and sensitive that it withdraws when it feels the tremor of a heavy foot, it is not conscious of the light hop of a thrush or blackbird on the watch to pounce upon it.

The object of stopping up the holes appears to be twofold. First, the leaves are drawn down and gradually consumed—a process by which the greater part of the autumnal leaves is got rid of in a very short time; secondly, the hole is stopped to prevent the entrance of ants, beetles, or other noxious creatures. The holes, however, do not exclude air, which is thus conveyed to the roots of plants, and is a most important stimulus to their growth. The reason why the stringy stalk is left uppermost is because the tip of the leaf is first consumed, after being lubricated with saliva. The raising of soil, and the consequent burial, after many cen-

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