

ed out before, that there are at least two manifest exceptions to be taken to this argument of the materialists. The first is that, even if it were granted that the law of natural selection is a true and sufficient account of all the phenomena of the organic world, this would be by no means the end of the question. It may be easy for some minds to conceive of a law without adding the conception of a law-giver; but to many minds that is simply impossible. At all events even if this conception be admitted, it is only the necessary force of the argument from design that will be weakened. No presumption will be raised against it; since this at least is plain, that the conception of a law does not exclude the conception of a law-giver. But the second exception is more to the point, so far as my present purpose is concerned. It is this; The law of natural selection, when admitted, and I for one, so far as I am able to understand and appreciate it, am quite disposed to admit it, does not and cannot explain all the phenomena, or anything like all the phenomena, of actually existing organisms, even so far as they are known to us. In the first place, there are found in many creatures organs which, in their complete development, as they now exist, are highly useful to the creature which possesses them but which in their rudimentary stages, if we are to suppose them to be gradually developed, must have been not only useless but highly inconvenient to many generations, and which therefore, according to the principle of Natural Selection, never could have been developed. We are expected to believe for instance, that the various senses which animals possess have gradually come into existence from the very slightest beginnings of sensitiveness in various nerves. It may have been so, but if it has, it has been under the fostering care of some over-ruling Power and in spite of Natural Selection; since it is plain that, in these rudimentary stages, when there was yet no perception but only a sensitiveness, the conflict for existence would soon have put an end to that nerve. But, again, there are to be found in the animal and vegetable world many creatures possessed of organs and habits which, so far as can be ascertained, are not very useful to themselves, certainly not necessary to their existence, but which are highly useful and beneficial to the world at large. And I want to know, if Natural Selection could be thought to be everything, how these creatures could be supposed to have come into possession of those organs and to have formed those habits. If an organ is useful to any creature, and was useful to it even in the very first stages of its development, one can of course see how the individual in which that organ was more fully developed survived the others, and so how from generation to generation in the conflict for existence the organ grew up; but if an organ or an instinct or habit be not useful, or not necessary to the creature itself, but in the use to which the creature puts it, be either necessary or useful to the world at large, the Principle of Natural Selection has nothing to do with such a phenomena; the Principle of Intelligent Design alone can explain its existence. And even if the organ or the instinct serve in any way the needs of the creature to which it belongs, yet, if it can be shown that the creature could do without it, whilst at the same time its existence is highly advantageous to other creatures and especially to man, there arises to say the least a very strong presumption in favor of the Principle of Design as against the mere blind agency of natural causes.

I have been led to bring this subject before you this evening, and to make these observations upon it, my reverend brethren, by the fact that the investigations and conclusions which the eminent man to whom I have referred made public a few months before his death, in that wonderful book entitled "The formation of vegetable mould through the action of Worms," seem to me to point to very plainly in the direction which I have indicated. The author does not himself indeed give the slightest intimation of such a tendency in his argument. But neither does he try to exclude it. His mind did not favor the super-natural, and if we claim for him that he did not deny an intelligent creative force as distinct from what was merely material, that is all that we can claim. But the truths to which his investigations often point are not the less unmistakable; most of all are they unmistakable in his book.

What is it that he has taught us here, as the result, absolutely certain as it appears, of the most patient and minute investigation, carried on through more than forty years and directed by that singular sagacity and power of forecast which characterized him? Let us hear it in his own words:—

"Worms have played a more important part in the history of the world than most persons would at first suppose. In almost all humid countries they are extraordinarily numerous, and for their size possess great muscular power. In many parts of England a weight of more than ten tons of dry earth annually passes through their bodies, and is brought to the surface on each acre of land; so that the whole superficial bed of vegetable mould passes through their own bodies in course of a very few years. From the collapsing of the old burrows the mould is in constant though slow movement, and the particles composing it are those rubbed together. . . . Thus the particles of earth, forming the superficial mould, are subjected to conditions eminently favorable for their decomposition and disintegration. Moreover the particles of the softer rocks suffer some amount of mechanical trituration in the muscular gizzards of worms, in which small stones serve as mill stones." All this he proves to us by the result of numerous observations; and he also tells us how the worm is provided with peculiar organs—a gizzard of remarkable construction, and calciferous glands such as are found in no other living creature, which enable it to accomplish this work of trituration and chemical decomposition. And further we learn how by means of this passage of the earth through the body of the worm, and by its constant habit of drawing in leaves to line its burrow and to stop up the entrance, the mere mineral substances in the superficial earth-covering are always being thoroughly mingled with decayed vegetable matter, which everybody knows to be essential to the production of a good soil; how the worms are continually covering up bones and other fertilizing matter lying upon the surface, and so facilitating their absorption into the soil; how they drain the ground with their burrowings and enable the air to penetrate deeply into it; how, in short, these poor blind and deaf creatures, so low down in the scale of sentient existence as to be taken as the emblem of that which is worthless and degraded, yet, not altogether as it appears devoid of intelligence, do for the ground, and do it more thoroughly if more slowly, all that man seeks to do by his implements of cultivation. "The plough," says Mr. Darwin, "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 ploughed by earth-worms. 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-organized creatures."

But now, why do the earth worms do all this ploughing and turning up of the soil? Why do they thus busy themselves through a considerable part of every year in pounding little stones, decomposing fibre, mingling various elements together, exposing that which has been exposed, doing everything that is needful to prepare a fertile soil for the use of man? How do they come to have not only the instinct to do this, but the organs also that are necessary for it? If Natural Selection is the true and complete account of everything, they do these things because they are necessary for their existence, they have these organs, because by means of these organs they live. But what says our teacher? He tells us that there are two objects with which worms swallow the earth and grind it. The one is to make their burrows; the other is to get food out of it. But it is certain that for neither of these objects is digestion of the soil at all necessary. The worm has the power of burrowing without swallowing, by a simple mechanical use of its head and pharynx, and actually does burrow in that way as much as in the other. And as for food, not only can it obtain food without swallowing the earth, but it can obtain food much more easily and much more abundantly, and does so for the most part. The creature, therefore, which would find upon the surface of the ground an abundance of half-rotted leaves such as form its ordinary food, is impelled by an instinct certainly not born of Natural Selection or the conflict for existence to pass large quantities of

earth through its body, from which it obtains a very small amount of nourishment, benefitting future ages of mankind the more in proportion as it chooses to employ greater exertions to satisfy its hunger. Surely the conflict for existence would impel the worm to obtain its food in the easiest and most direct fashion, and would lead to the development of organs adapted for such use, at the expense of those that were adapted to more circuitous methods. It seems to me to be beyond question that, if in the case of these creeping things of the earth, the law of Natural Selection had been the only law imposed, or if they had been simply left to use for their own advantage the amount of intelligence which it seems from this book that they possess, we should have had by this time upon the earth only such races of worms as burrow by outward mechanical means and obtain their food directly from the stores which lie thick about them; that supposing these creatures to have been originally endowed with the rudiments of two different faculties, one supplying them with abundance of food at the cost of little labor, and the other giving them little food by laborious processes, the latter faculty would in the course of ages have been lost, the former alone developed. This being the case, the instinct which leads so many species of the worms to swallow the earth, whether for burrowing or for nourishment, and the organs whereby they triturate and modify it, must owe their existence, not to Nature but to a Will and a Power above Nature.

Thus, then, we think of these innumerable little creatures, spread all over the world—they are found, Mr. Darwin tells us, not only throughout the great continents but on the most isolated islands, from Iceland to Kerguelon—and everywhere busily occupied, generation after generation, in wearing down rocks and compounding vegetable mould, in which man may sow and plant with certainty of fruit, doing this not for their own advantage or convenience, but the advantage it may be of races yet to live, we may recognize one signal proof, if not of the Existence and Wisdom and Power of God (which it may well be are to us past all need of proof), yet of His marvelous care for all His creatures, and of that wonderful economy of Nature which makes all the various parts of the great whole mutually dependent, so that the lives of none are useless, and even their very wants may become means of benefitting others as well as themselves. It may be that we have not yet learnt thoroughly the great truth which Bacon expresses in the words "God hangs the heaviest weights on the finest wires," have not yet discovered for ourselves that there is no room anywhere in the universe of God for contempt of that which is merely little, and that all our faculty of scorn was given us to spend itself on that which is false, not on that which is lowly. If it be so, I know of no discovery of modern times better fitted to teach us that lesson than this discovery which has been gradually coming to the light during half a century, and which so recently as in 1869 was ridiculed as impossible: and I know of no teacher so well fitted to impress this lesson upon us, however grievously he may fail in other matters, than the man who has brought into such great prominence in all his books the two great truths of an unceasing and unlimited action and reaction of all parts of Nature upon one another, and of the production of gigantic results from the gradual and accumulated operations of the most trifling causes.

There are many points of interest in the book to which I have been referring, some of them not without their bearing upon the great argument from Design, which I have omitted to notice, thinking it best to confine our attention to the most significant. The name of God is, unhappily, not mentioned in it, but I cannot think that any one can read it carefully without having thoughts of God and of His goodness suggested by it. At all events, what ever may become of the book, the facts seem to be firmly established, and that those facts are such as to strengthen the Theistic argument and to help the devout soul to greater reverence and thankfulness I hope I have shown. The worm, which has been known chiefly as the emblem of mortality, is found to be a minister of fertility and life, and He who so constituted it is our God, whom henceforth the very creatures that live in the dust shall help us to praise.