CHAPTER V.

THE ORIGIN AND NATURE OF LIFE.

Spontaneous Generation.

OUR next inquiry is concerning the teachings of the Fathers and the Schoolmen in respect of the origin and nature of life, and what views one may, consistently with revealed truth and Catholic Dogma, entertain regarding this all-important topic. These are questions, as is well known, in which evolutionists of all classes, monistic, agnostic, and theistic, are specially interested, and questions, consequently, which cannot be passed over in silence.

The lower forms of life, as we learned in the beginning of this work, were supposed by Greek and mediæval philosophers to have originated spontaneously from the earth, or from putrefying organic matter. From the time of Aristotle to that of Redi, the doctrine of spontaneous generation was accepted without question, and it is scarcely yet a generation since the brilliant experiments of Pasteur drove abiogenesis from its last stronghold.

For over two thousand years the most extravagant notions were prevalent regarding certain of the smaller animals. Virgil, in his famous episode of Aristæus, tells us of the memorable discovery of the old Arcadian for the production of bees from the tainted gore of slain bullocks. But this is but an echo

of what was universally believed and taught. Not only was it thought that putrefying flesh gave rise to insects, and other minute animals, but it was the current opinion that different kinds of carrion generated diverse forms of life. Thus, as bees were produced from decomposing beef, so beetles were generated from horseflesh, grass-hoppers from mules, scorpions from crabs, and toads from ducks. Diodorus Siculus speaks of multitudes of animals developed from the sun-warmed slime of the Nile valley. Plutarch assures us that the soil of Egypt spontaneously generates rats, and Pliny is ready to confirm the statement by an example of a rat, half metamorphosed, found in the Thebaid, of which the anterior half was that of a fully developed rodent, while the posterior half was entirely of stone! The Fathers and the Schoolmen, as we have seen, made no hesitation in accepting the doctrine of spontaneous generation. But while ready to admit abiogenesis as a fact, they gave it a different interpretation from what it had received from the philosophers and naturalists of Greece and Rome. According to Epicurus: "The earth is the mother of all living things, and from this simple origin not even man is excepted." Brute matter, said the Epicureans—as Hæckel and his school now proclaim—generates of its own power both vegetable and animal life; that is, non-living gives rise to living matter. But Christian philosophy, contrariwise, teaches that it is impossible for inorganic to produce organic matter *motu proprio*, or by any natural inherent powers it may possess. "The waters," declares St. Basil, in speaking of the work of creation, "were gifted

with productive power, but this power was communicated to them by God." "From slime and muddy places, frogs, flies and gnats came into being," he was willing to admit, "but this was in virtue of a certain germinative force conferred on matter by the Author of nature." "Certain very small animals may not have been created on the fifth and sixth days," opines St. Augustine, "but may have originated later from putrefying matter," but still, even in this case, God it is who is their Creator.

Spontaneous generation, therefore, was never a stumbling block either to the Fathers or Scholastics, because the Creative act was always acknowledged, and because God was ever recognized as the Author, at least through second agents, of the divers forms of life which were supposed to originate from inorganized matter. Whether He created all things absolutely and directly, or mediately and indirectly, it mattered not, so long as it was understood that nothing could exist without His will and coöperation. Whether, then, the germ of life was specially created for each individual creature, or whether matter was endowed with the power of evolving what we call life, by the proper collocation of the atoms and molecules of which matter is constituted, was, from their point of view, immaterial, so far as dogma was concerned. The doctrine of spontaneous generation might be an error, scientifically, but, even if so, there was nothing in it contrary to the truths of revelation. It was always and fully recognized that God was the sole and absolute Creator of matter, and that He, by the action of powers conferred on matter, by certain

seminal forces, as the Scholastics taught, disposed matter for the assumption of all the multitudinous forms into which it subsequently developed.

The Nature of Life.

Respecting the real nature, not the origin, of life, there have, indeed, been many and diverse opinions. Even now it is almost as much of an enigma as it was in the days of Aristotle, and we are at present, apparently, no better qualified to give a true definition of life than was the great Stagirite, twenty-five centuries ago. Living beings can, indeed, be distinguished from non-living beings by their structure, mode of genesis, and development, but this does not help us toward a clear and precise definition of life.

According to the philosophers of antiquity there was a certain independent entity, or vital principle, which, uniting with the body, gives life, and, separating from it, causes death. Plato and Aristotle, as is well known, admitted the existence of three souls, or animating spirits, the vegetative for plants, the vegetative and sensitive for animals; and for man, an intelligent and reasoning spirit in addition to those possessed by plants and animals.

Paracelsus and Van Helmont spoke of the principle of life under the name of *archæus*, and attempted to explain vital functions by chemical agencies. Others, still, "made the chyle effervesce in the heart, under the influence of salt and sulphur, which took fire together and produced the vital flame!"

Bichat defines life as "the sum total of the functions which resist death;" Herbert Spencer makes it "the continuous adjustment of internal relations to external relations," while Oliver Wendell Holmes tells us, that "Life is the state of an organized being in which it maintains, or is capable of maintaining, its structural integrity, by the constant interchange of elements with the surrounding media."[1]

Such definitions, however, are almost as vague and unsatisfactory as the notions implied in the "spirits" of Aristotle and Plato, and in the archæus of Van Helmont and Paracelsus. They afford us no clearer conception of what life really is in itself, of what it is that constitutes the essential difference between living and non-living matter, than we may derive from the idea of Hippocrates, who regarded "unintelligent nature as the mysterious agent in the vital processes."

But whatever views we may entertain respecting the actual nature of life; whether we regard it as a force entirely different in kind from the purely physical forces, or look upon it as a special coördination and integration of physical forces, acting in some mysterious way on inanimate matter, and in such wise as to cause it to exhibit what we call the phenomena of life, the fact still remains, that at some

[1] "La vie," writes a professor of physiology of the Faculty of Medicine, in Paris, "est une fonction chimique et la force dégagée par les êtres vivants est une force d'origine chimique." In contradistinction to this statement, Cardinal Zigliara declares: "Vita repeti non potest a materia." Again, life has been defined as "Une force qui tend à perfectionner et à réproduire, suivant une forme déterminée, l'être qu'elle anime par une impulsion spontanée."

period in the past history of our planet, the first germ of organic life made its appearance, and that, too, independent of any antecedent terrestrial germ.

The Germ of Life.

Whence this primordial germ, this first electric spark, which effected the combination of inorganic elements and transmuted non-living into living matter? Is it an "intellectual necessity" that we should, with Tyndall, "cross the boundary of the experimental evidence and discover in matter the promise and potency of all terrestrial life?"[1] Must we believe with Lucretius that nature "does all things spontaneously of herself, without the meddling of the gods;" and are we forced to regard matter and life as indissolubly joined, as entities which cannot be divorced from one another even in imagination? These are questions which are constantly recurring, and while in nowise sharing the materialistic views of Tyndall and Lucretius, we are, nevertheless, forced to admit that the problems involved are as difficult to solve as those concerning the nature of life itself.

In 1871, Sir William Thomson (Lord Kelvin), in an address at Edinburgh, discussed a theory which had been broached by a German speculator, Prof. Richter of Dresden, and involved the careering through space of "seed-bearing meteoric stones," and the possibility of "one such falling on the earth," and causing it, "by what we blindly call natural causes," to become "covered with vegetation." "The hy-

[1] "Fragments of Science," p. 524.

pothesis," the distinguished physicist tells us, "may seem wild and visionary; all I maintain is, it is not unscientific."

But even if it were proved that the first germ of life had been brought by some seed-bearing meteorite from the depths of space, or from some far distant world, it would, as is obvious, afford no explanation either of the real nature or of the ultimate origin of life. It would be but removing the difficulty farther away; not giving it a solution.

Still another question confronts us. Was there but one primordial germ, the origin and parent of all the multitudinous forms of life which now variegate and beautify the earth, or were there many germs independently implanted in the prepared soil of this globe of ours? And if many, did they make their appearance simultaneously, or at different and widely separated periods and localities?

Darwin inclines to the belief that "all animals and plants are descended from some one prototype." From this prototype, or primordial germ, as from a common root, is developed "the great tree of organic life," a tree which is conceived as having "two main trunks, one representing the vegetable and one the animal world," while each trunk is pictured as "dividing into a few main branches," the branches subdividing into a number of branchlets, and these, in turn, into "smaller groups of twigs." Prof. Weismann, on the other hand, is of the opinion that not one, but numerous organisms first arose "spontaneously, simultaneously, and independently one of the other."

Such considerations as the foregoing, and the diverse and contradictory opinions to which they have given rise, compel one, will-he nill-he, to recognize the fact that science, I mean experimental science, can tell us nothing more about the origin of life than it can regarding the origin of matter. These are questions which, by their very nature, are outside the sphere of inductive research, and their answers, so far as observation and experiment are concerned, must ever remain in inscrutable and insoluble mystery.

Abiogenesis.

So far as science can pronounce on the matter, spontaneous generation, as we have already learned, is, in the language of Pasteur, but a chimera. Even those whose theories imply, if they do not demand, the spontaneous origination of living from non-living matter, are forced to admit that there is, as yet, no warranty whatever for believing that abiogenesis obtains now, or ever has obtained, at any time in the past history of our globe.

"I should like," writes Darwin, "to see archebiosis"—Bastian's term for spontaneous generation—"proved true, for it would be a discovery of transcendent importance."[1] So much, indeed, does the theory of Evolution, as commonly held, imply the existence, at some time or other, of spontaneous generation, that Fiske avers: "However the question may eventually be decided, as to the possibility of archebiosis occurring at the present day amid the

[1] "Life and Letters," vol. II, p. 437.

artificial circumstances of the laboratory, it cannot be denied that archebiosis, or the origination of living matter in accordance with natural laws, must have occurred at some epoch in the past." [1]

With Huxley, as with Fiske, a belief in spontaneous generation is a necessary corollary to the theory of Evolution. "The fact is," he affirms, "that at the present moment there is not a shadow of trustworthy direct evidence that abiogenesis does take place, or has taken place, within the period during which the existence of life on the globe is recorded. But it need hardly be pointed out, that the fact does not in the slightest degree interfere with any conclusion that may be arrived at, deductively from other considerations, that, at some time or other, abiogenesis must have taken place." [2] Elsewhere he declares: "If it were given me to look beyond the abyss of geologically recorded time, to the still more remote period when the earth was passing through physical and chemical conditions, which it can no more see again than a man can recall his infancy, I should expect to be a witness of the Evolution of protoplasm from non-living matter. I should expect to see it appear under forms of great simplicity, endowed, like existing fungi, with the power of determining the formation of new protoplasm from such matter as ammonium carbonates, oxalates and tartrates, alkaline and earthy phosphates and water, without the aid of light. That is

[1] "Outlines of Cosmic Philosophy," vol. I, p. 430.

[2] See his article on Biology, "Encyclopædia Britannica," vol. III.

the expectation to which analogical reasoning leads me, but," he adds, "I beg you once more to recollect that I have no right to call my opinion anything but an act of philosophical faith." [1]

Hæckel, as we have seen, is far more positive in his assertions respecting spontaneous generation. His theory of Monism absolutely demands it as a *sine qua non*, and he is the first to announce that abiogenesis—he calls it autogeny—is a necessary and integral part of the hypothesis of universal Evolution, "a necessary event in the process of the development of the earth." "He who does not assume a spontaneous generation of monera . . . to explain the first origin of life upon our earth, has no other resource but to believe in a supernatural miracle; and this is the questionable standpoint still taken by many so-called exact naturalists, who thus renounce their own reason." [2]

But suppose that some time or other it should be proved, that spontaneous generation not only has taken place, but that it actually occurs, *hic et nunc?* The fact that we have as yet no evidence that it ever has taken place, or that it does not occur now, does not prove that it is impossible. We may not be prepared to affirm, with Huxley and Fiske, that it *must have* taken place at some period in past history, but may we not admit the possibility of the occurrence? We certainly do not agree with Hæckel that we renounce our reason if we believe in a special Divine intervention for the production

[1] "Lay Sermons, Addresses and Reviews," pp. 366 et seq.

[2] "The Evolution of Man," vol. I, p. 32.