

LECONTE'S EPITOME OF EVOLUTION

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As has been pointed out by various writers, the history of the evolution idea is not a brief one. Many thinkers—the ancient Greeks, the early theologians, the eighteenth- and nineteenth-century philosophers and biologists—have directed their attention to the difficult and unsolved problem of the origin and development of life, of society and of the universe. As we trace through the history of thought, with the light which science has given us, we observe that some of the great thinkers who have wrestled with this problem of development have made contributions of inestimable value in spite of their meager scientific knowledge and inadequate observations; others, due to the same limitations, submerged their more valuable thoughts in a host of naïve ideas; still others made no advances but merely summarized and organized the ideas and suggestions of those who preceded them. As Lucretius summed up all the teachings of the non-Aristotelian philosophy, so LeConte epitomized the major pre-twentieth-century ideas concerning evolution. Let us, then, examine LeConte's idea and see what there is in it of value.

In the first chapter of his book, *Evolution**, which first appeared in 1887, LeConte deals with the scope and definition of evolution. In order to objectify his notions, he refers again and again to the development of the egg as the type form of all evolution.

Every one is familiar with the main facts connected with the development of an egg. We all know that it begins as a microscopic germ-cell, then grows into an egg, then organizes into a chick, and finally grows into a cock; and that the whole process follows some general, well-recognized law. Now, this process is evolution. It is more—it is *the* type of all evolution. It is that from which we get our idea of evolution, and without which there would be no such word. Whenever, and

*Joseph LeConte. *Evolution, Its Nature, Its Evidences, and Its Relation to Religious Thought*, (Second Edition, Revised), 1899. New York: D. Appleton and Company.

wherever we find a process of change more or less resembling this, and following laws similar to those determining the development of an egg, we call it evolution.*

LeConte, like Spencer, says that evolution, as a process, is not confined to the development of one thing, as the egg, nor as a doctrine is it confined to one science, as biology, "The process pervades the whole universe, and the doctrine concerns alike every department of science—yes, every department of human thought." All things may be studied from two points of view. From the one view we are concerned with things as they are; but from the other, with the process by which they become what they are. "This 'law of becoming'", says LeConte, "in all things—this universal law of progressive inter-connected change—may be called the law of continuity." This law asserts that there is a universal causal relation between things in time. "This is the universal law of evolution." Thus evolution is a single process which unifies and binds together all things into a causal and temporal relationship. Although LeConte does speak of evolution as being universal, he seems to limit his discussion and thinking almost exclusively to biological evolution. "If there be any evolution, *par excellence*, it is evolution of the individual or embryonic development."

Now that we have an idea of LeConte's general approach to the problem of development, we are ready for the statement of his definition which is as follows: "Evolution is (1) continuous *progressive change*, (2) *according to certain laws*, (3) and by means of *resident forces*."† Since he takes embryonic development as his type for all evolution, he assumes that everyone will admit that his definition is completely realized in this process of development. "The change here is certainly continuously progressive; it is according to certain well ascertained laws; it is by forces (vital forces) resident in the egg itself." Since, then, this definition applies to the type form, he concludes that it applies equally well to all things and hence is a valid definition.

Since we are not satisfied with the mere statement of his definition, let us analyze it carefully and see what he means by each of the elements which it embraces. First, what does

*LeConte: *Evolution*, p. 3.

†Loc. cit., p. 8.

LeConte mean by *progressive change*? We shall best understand his meaning from his own statements. He discusses this first element of his definition in three paragraphs and illustrates his idea by the Ontogenetic series, the Taxonomic series, and the Phylogenetic series. Of the first he says:

"Every individual animal body—say man's—has become what it now is by a gradual process. Commencing as a microscopic spherule of living but apparently unorganized protoplasm, it gradually added cell to cell, tissue to tissue, organ to organ, and function to function; thus becoming more and more complex in the mutual action of its correlated parts, as it passed successively through the stages of germ, egg, embryo, and infant to maturity. This ascending series of genetically connected stages is called the embryonic or *Ontogenetic* series."*

Similarly, he discusses the Taxonomic series and the Phylogenetic series, and in a sentence closes that section by saying: "It will be admitted, then, that we find *progressive change* in organic forms throughout geologic times." Does this make clear to us what "progressive change" is? It is true that in the individual we have the stages of germ, egg, embryo, infant and maturity. Also in examining the rock strata, we find simpler forms of life in the lower levels and more complex in the higher; but a mere statement of these facts does not explain to us what progressive change is. What is meant by change which is progressive? LeConte makes extensive use of the analogy of the branching tree of life in which he represents progressive change by the branches which go upward. Manifestly to say that progressive change is change upwards means nothing. If, however, he means by *up* increasing complexity, then his statements bear a little more meaning. But is all change in the direction of increasing complexity? Is increasing complexity necessary to change before we may call it evolution, or may we call any process of change evolution? These are some of the questions which confront us, and which LeConte does not answer.

When we study the earth's history we find, as we progress through the Eozoic, Palaeozoic, Mesozoic, Genozoic and Psychozoic periods, there an indication of a progression in life from simple to complex. Since we admit that there have been changes, we must also assume some process of change which we may call progressive if by it we mean improvement—improvement in adaptation. This is probably what LeConte

*Loc. cit., p. 9.

meant. Evolution, then, is a process of change, each change being an improvement in adaptation to the environment, and resulting in an increase in complexity.

But this is not all evolution is. It is progressive change, but also change "according to certain laws." What are these laws? LeConte says: "I have been accustomed to formulate them thus: a. The law of differentiation; b. The law of progress of the whole; c. The law of cyclical movement."*

First let us consider the law of differentiation. Taking again the type form of evolution the development of the egg—first is the germ cell which as it divides and subdivides forms the egg. As cell division continues different aggregates of cells are set aside for different purposes: some form the ectoderm germ-layer which later forms the nervous system; others the entoderm layer from which is formed the nutritive system; and still others the mesoderm from which the circulatory system is formed. Thus there is an increasing differentiation among the cells resulting in greater specialization. Also, in the case of phylogenetic development, if we trace backward, we find that the various specialized types merge to form one branch, and the various branches one main trunk. "From such a common trunk, by successive branching and rebranching, each branch taking a different direction, and all growing wider and wider apart (differentiation), have been gradually generated all the diversified forms which we see at the present day. The last leafy ramifications—flower-bearing and fruit-bearing—of this tree of life, are the fauna and flora of the present epoch. The law might be called the law of ramification, of specialization of the parts, and diversification of the whole."†

His second law is the law of progress of the whole. LeConte assumes that there is a progress of the whole, but not necessarily a progress of all the parts of that whole. He seems to have a special idea of progress, namely, that progress is *up*—the passing of something to something else which is higher. He undoubtedly falls into this error by using the analogy of the tree. He speaks of some cells as advancing "to the dignity of brain-cells," while "other cells descend to the position of kidney-cells." This seems to be a purely anatomical distinction

*Loc. cit., p. 11.

†Loc. cit., p. 13.

of higher and lower, and unwarranted from the point of view of development. What does he mean by the whole? Apparently we may mark off any unity we desire and call it "the whole." Thus within this whole are units each of which may be taken as a whole necessarily in progress, and within each of these other units and so *ad infinitum*. This being true there could be no degeneration, if degeneration is the opposite of progress. Thus, we are left in mid-air, so to speak, as to the meaning of his second law. He does, however, make one statement which may bring us on a more solid footing. "But here, also," he says in speaking of the specialization of different cells for various functions, "the highest cells are successively higher, and the whole aggregate is successively nobler and more complex." The last two words are the significant ones, for if he means by progress of the whole an increase in complexity, then we have here the same element which we found in the first part of his definition.

The last law is that of cyclical movement. Development is not uniform but in cycles. Each wave or cycle rises higher than the preceding one and then declines, and another wave comes and mounts still higher. The molluscs of the Silurian age dominated the earth, but they declined and gave place to the fishes which rose above the molluscs because of their greater complexity of structure and function. They too, however, declined and today hold a lowly position because the reptiles, mammals and man have successively reached points higher and higher than that of the fishes. These, LeConte calls, cycles of development. He applies this law to the development of society where he thinks it is quite conspicuous. He says:

"Society everywhere advances, not uniformly, but by successive waves, each higher than the last; each urged by a new and higher social force, and embodying a new and higher phase of civilization. Again, as each phase declines, its characteristic social force is not lost, but becomes incorporated into the next higher phase as a subordinate principle, and thus the social organism as a whole becomes not only higher and higher, but also more and more complex in the mutual relations of its interacting social forces."*

This may be true, but it does not explain why social forces come in waves, nor why each is higher than the last. To

*Loc. cit., p. 26.

strike at the root of the matter we must know the meaning of that vague term "social forces." To say that the development of civilization happens thus and so does not explain it. We ask further, Why does it happen thus and so? Thus instead of finding a partial explanation in this law, we find it suggesting further questions.

Now that we have these three laws in mind, let us pause a moment and consider what LeConte means by the phrase, "according to certain laws." Of course, he is referring to the three laws which we have just discussed above. The question which arises, then, is, Do these three laws exhaust all the laws of evolution? Apparently LeConte thinks so for he does not mention any others. What, then, do we have thus far? The second law—progress of the whole—we have found bears little meaning; the third law—cyclical movement—is unimportant and practically negligible, as he himself admits, and so we have remaining only the law of differentiation, and "resident forces." This latter concept we shall now consider.

The third and important element of LeConte's definition is, "that the *forces* or causes of evolution are *natural*; that they reside in the thing developing and in the reacting environment."* The important thought, then, is that the forces are *natural* and *resident*. This is true, LeConte says, of embryonic development—the forces in the embryo are natural and they are resident. Is this true of all evolution? First we must see what he means by these two terms, "natural" and "resident." In discussing these he says:

"Before stating the two opposite views of the cause of evolution, it is necessary to remind the reader that when the evolutionist speaks of the forces that determine progressive changes in organic forms as *resident* or *inherent*, all that he means, or ought to mean, is that they are resident in the same sense as all natural forces are resident; in the same sense that the vital forces of the embryo are resident in the embryo, or that the forces of the development of the solar system according to the nebular or any other cosmogonic hypotheses are resident in that system. In other words, they mean only that they are *natural*, not supernatural. This does not, of course, touch that deeper, that deepest of all questions, viz., the essential *nature and origin of natural forces*; how far they are independent and self-existent, and how far they are only modes of divine energy."†

*Loc. cit., p. 28.

†Loc. cit., pp. 28-29.

Thus we are to understand that "resident" and "natural" forces are one and the same. From this quotation, we might be led to believe that LeConte is presuming too much; but when we turn to the third part of his book—*The Relation of Evolution to Religious Thought*—we find a clearer statement of his concept.

In discussing this point of natural law he says:

"It is the bringing together and complete reconciliation of the two apparently antagonistic and mutually excluding views of *direct agency* and *natural law*. Such reconciliation we have already seen is the true test of a rational philosophy. It is the belief in a God not far away beyond our reach, who once long ago enacted laws and created forces which continue of themselves to run the machine we call Nature, but a God *immanent*, a God resident *in* Nature, at all times and in all places directing every event and determining every phenomena. . . . According to this view the phenomena of Nature are naught else than objectified modes of divine thought, the forces of Nature naught else than different forms of one omnipresent divine energy or will, the laws of Nature naught else than the regular modes of operation of that divine will, invariable because He is unchangeable. According to this view the law of gravitation is naught else than the mode of operation of the divine energy in sustaining the cosmos—the divine method of sustentation; the law of evolution naught else than the mode of operation of the same divine energy in originating and developing the cosmos—the divine method of creation; In a word, according to this view, there is no real efficient force but spirit, and no real *independent* existence but God."*

Thus God is immanent in Nature; He is the resident and natural forces which account for evolution. Evolution is His method of creation. Thus, when LeConte says, "by means of resident forces," he means God, Divine Will or Vital Force. To merely state that evolution is "due to resident forces" adds nothing to the elucidation of the *nature of the process* of development. Thus although LeConte's statement may be perfectly true, it does not go far enough; it does not answer our questions nor solve our difficulties. We wish to penetrate further into the problem and discover, if possible, the nature of these resident forces, why they are resident, and how they have produced that which is in evidence.

Let us sum up LeConte's definition of evolution as we have interpreted it. Evolution is change, in the direction of greater complexity, and differentiation due to a Vital Force. This is

*Loc. cit., pp. 300-301.

apparently all that we have left that is meaningful. Thus we see that there is nothing expressed in this definition which was not expressed by other thinkers before LeConte; he merely brings some of these thoughts together to form one concept. Change, we know was suggested by Heraclitus; the idea of complexity we find in Lamarck, Darwin and the Neo-Darwinians; differentiation was emphasized by Spencer, and Vital Force or God is a religious concept which we find in the history of evolutionary thought as early as Aristotle. Thus as we come to the close of our discussion of LeConte's contribution to evolutionary thought, we realize that it is rather significant that he wrote at the close of the nineteenth century for he epitomized the major ideas concerning evolution which were presented by thinkers who came before him. LeConte significantly marks the close of a long period in the history of evolutionary thought.