

Lamarck, J. B. (1914/1963): ZOOLOGICAL PHILOSOPHY. AN EXPOSITION WITH REGARD TO THE NATURAL HISTORY OF ANIMALS

It is not enough to invent a hypothesis, which covers the facts, and then regard it as true without further study. In the present case the facts are covered by at least three different and mutually exclusive hypotheses, special creation, inheritance of acquired characters and natural selection. The à priori method breaks down hopelessly, and we must resort to the à posteriori method.

It does not follow in biology that because we cannot see how a thing works, therefore it cannot work.

Lamarck committed the error, eminently excusable in the age in which he lived, of assuming that when he has formed a theory which will fit the facts, and when he can think of no other theory which will also fit the facts, then that theory must be true.

Why should it have occurred to Lamarck to inquire whether the origin of a variation may affect its heritability? In point of fact it never did occur to him. The problem of inheritance of acquired characters never presented itself to his mind: he never differentiated them from congenital variations. There was for him no antithesis between the two: the antithesis to use-inheritance was for him special creation and fixity of species. It was these latter doctrines that he mainly desired to attack, in the interests of an evolutionary theory; and he could not understand how evolution could have occurred without use-inheritance.

He saw that structures were adapted to their functions: hence, he argued, either the structure must create the function, involving special creation and design, or else the function must create the structure, involving inheritance of acquired characters. When once the problem is stated in this way, we see that Lamarck unquestionably chose the less untenable and more plausible of the two theories.

A variation must have some cause, and that cause must be of physico-chemical nature: this is one of the most fundamental axioms of science. Darwin, when he spoke of variations as spontaneous, did not mean that they rose up like a phoenix out of nothing: he meant that they occurred in a purely fortuitous manner, without any reference whatever to the preservation either of the species or of the individual which developed them. He meant that they had no purpose or design behind them, and in fact used the word in opposition to finalism or teleology in the old sense. Nevertheless, congenital variations must have some physico-chemical cause, and it yet remains to be proved that that physico-chemical cause is of different character from the cause which produces acquired modifications.

It may indeed be pointed out that modifications are purposive, or adapted to meet the individual's special needs, whereas variations are fortuitous. But the observation is of no relevance: for natural selection would speedily extinguish all races where the modifications acquired were not adapted to the individual's special needs; moreover, the distinction between purpose and chance is at best a shallow and subjective one.

It may further be pointed out that the factor causing an acquired modification acts on a particular organ or tissue, whereas in a congenital variation it acts upon the undifferentiated protoplasm of the germ. For inheritance to take place in the former case, the somatic modification would have to be conveyed to the germ-plasm, whereas in the latter case it is impressed there from the first. But this is merely a repetition of Weismann's argument that it is very difficult to see how a somatic modification can affect the germ-plasm in a corresponding specific sense: it is difficult to see, no doubt; but nature's methods are not limited to those that we may easily discern.

If the development of an individual is controlled by the environmental factors, and if those factors are in the last analysis of physico-chemical nature, then there seems reason to suspect that the fundamental difference between a variation and a modification is not related to any difference in their aetiology, or in the factors which produce them, but is dependent almost wholly on the period of the individual's life at which these factors operate. If they come into action after birth or before it in the course of development, they produce a modification apparently not heritable. If they come into action before development begins, they produce a variation which is heritable.

§ 6. Classification.

The first great service of Lamarck to classification was in establishing the distinction between vertebrates and invertebrates. Aristotle, indeed, had detected the profound difference between these two groups : but he had taken as his standard of differentiation the presence or absence of blood : a highly defective standard which was not to any great extent improved by Linnaeus. It was reserved for Lamarck, in his course of lectures at the Muséum in 1794, to direct attention to the immense taxonomic importance of the vertebral column, and to set up that great primary division of the animal kingdom, which was long regarded as final.

It is not quite clear how Lamarck thought that man was related to the animal scale. Throughout the work he constantly refers to man and animal in antithetical terms. He did not regard man as an animal, in the same sense as other animals; but he perceived that by confining his attention entirely to a study of structure, man might be classified as one family of mammals. This family he calls " Bimanous," and divides into six varieties—Caucasian, Hyperborean, Mongolian, American, Malayan, and Ethiopian or Negro.

§ 7. Physiology.

On approaching a work of philosophical physiology written a century ago, the point to which we look with the greatest interest is the attitude of the writer towards the ancient problem now bearing the modern name of vitalism. Through out last century, controversy was ever returning to that great and fundamental question as to whether organic processes or functions are due exclusively to the ordinary laws of physics and chemistry, or whether those laws are supplemented by others of a spiritual or non-material character.

When the problem is looked at with an exclusively physiological interest, the opposite schools are referred to as vitalism and mechanism. But this physiological question has a far deeper philosophical interest ; and when the problem is regarded from that wider point of view, the opposite schools are those loosely described as spiritualism and materialism.

Now it happened at the dawn of civihsation that men began to speculate about the causes of things long before they had any science or organised knowledge to guide them ; long, therefore, before there was any possibiHty of their finding those causes. In this position the mental craving was met by the invention of a new kind of entity, different from matter, and called spirit. All difficulties were immediately levelled : What causes disease ? An evil demon. Why do the winds blow ? A spirit is responsible. What is the origin of the universe ? A god or gods made it ; and so on. Thus all things received an easy explanation.

I take it that one of the chief values of a historical study such as the present is to establish a comparison between the methods of the past and the methods of the present, so that we may know not only where our ancestors failed, but why they failed, and how we may avoid a similar fate. " Nur durch Werden wird das Gewordene erkannt." In describing Lamarck's physiological philosophy, I shall therefore pay special attention to certain instances of the modern use of the same type of argument, which led in his hands to so miserable a failure.

Now this argument fer exclusionem is sound, upon one condition only ; and that is that all possible alternatives have really been marshalled together at the outset of the argument. This is a condition which, in the present state of physiology, is entirely impossible to satisfy. It is interesting to note that, of the various possibilities named by Lamarck, not one figures in the list of possibilities named by Driesch. A century has swept them all away, and brought out a whole series of new possibilities, never dreamt of by Lamarck. Few students of the history of science can doubt that another century, or much less (for things move faster now) will sweep away no less effectively Driesch's list of possibilities. In order to name every conceivable mode of explanation of any phenomenon, it is necessary to know infinitely more about the conditions of that phenomenon than is at present possible in any branch of physiology. We have to know that we have exhausted every possible alternative ; we have to know that there is nothing more to be known ; and that is a condition of the most extreme stringency.

This logical method, dignified by the name of *per exclusionem*, is indeed a method of argument by which nearly all untrained minds, and a great many trained minds, are wont to establish propositions they desire, in place of the disagreeable confession of ignorance or agnosticism. It is at the bottom of every vitalistic theory.

„Here is a process difficult to explain : it cannot be caused this way, or that way, or the other way : hence the only remaining conceivable explanation must be the true one." And then ensues some ridiculous theory, always depending on a new, mysterious, and invisible agency : it has to be invisible of course, since no power of microscope or balance can discover it. Hence we get spirits, animal spirits, souls, subtle fluids, vital forces and other " monstrous products begotten by the imagination," as Lamarck himself well calls them elsewhere.

Lamarck begins his physiological section with an account of the distinguishing features between the organic and the inorganic. He reduces the differences to nine. An organism has an individuality of its own : it is necessarily heterogeneous : it comprises solid parts and fluid parts : its different parts are mutually dependent on one another : it undergoes what we should now term metabolism : it grows, not by external accumulation of matter, but by " intro-susception " ; it feeds; it reproduces itself ; and it dies. None of these peculiarities, says Lamarck, are exhibited by inorganic matter.

§ 8. Psychology.

Of the various philosophical questions agitated among the group of materialists in the latter half of the eighteenth century, none occurred more frequently than this : " Can matter think ?" A man is made of matter; a man can think : hence matter must be able to think. A syllogism of this kind was at the basis of the question. Yet it was found very hard to admit that matter can think. The question was mainly agitated among the men of science and the materialistic philosophers : the spiritualistic philosophers got out of the difficulty by inventing a new entity, to which they gave the name of soul, spirit or mind, and saying that it is this entity which thinks.

Of course, by this facile method, there need never remain any difficulty in any possible sphere of inquiry. All things are susceptible of " explanation " by the invention of a factitious entity of non-material qualities.

Lamarck, however, knew too much to slide out of the iddifficulty by such discredited methods. Holding his views, it was inevitable that one of his earliest psychological problems must have been the old question : " Can matter think ?" He put it squarely to himself, and decided that matter did not think; thought was only an " effect." Although probably the whole subject remained rather vague in his mind, as it is in his writings, he scarcely could have got farther in his time.

Lamarck went far in the direction of materialism, though the imperfect physiology of his day led him into a materialism almost as crude as was the spiritualism of his day. He denied the existence of the " peculiar entity called mind " (*esprit*). " In this factitious entity," he continues, " which is not like anything else in nature, I see a mere invention for the purpose of resolving the difficulties that follow from inadequate knowledge of the laws of nature." Mental manifestations are simply " effects " of cerebral processes, not manifestations of a separate entity. He could hardly have expressed it better. The whole of Lamarck's psychology is thus reduced to an investigation of the physical or cerebral processes which are correlated with mental processes.

When once false ideas become current in any subject, the terminology of that subject becomes correspondingly false. The false ideas become frozen into a permanent language : and their displacement is far more difficult than in a fluid condition.

The influence of language upon thought is largely, I should suppose, in the direction which it inevitably gives to the attention of the student. When he comes fresh to the new subject, all is disorder and confusion. The terminology comprises, however, a system of names which indicate or should indicate the prominent and significant facts and principles to be noted in reducing the subject to order. Now, if that terminology is wrong, the whole subject will be wrongly focussed : what should be prominent remains unnoticed : what is really insignificant is held to be an important foundation principle : the attention is wrongly directed throughout.

You can create difficulties about almost anything, even about a running man overtaking a tortoise. Such difficulties are analogous to those mechanical puzzles, which are often extremely difficult to make out, though based on the most simple and elementary of principles : the main law to be observed in making a puzzle (as also in conjuring) is to draw attention to the significant feature, and, if possible, to direct it on to insignificant features.

Now this is just precisely what has happened in psychology. Attention is thrown on to the irrelevant, and withdrawn from the relevant : and the language of centuries has securely fixed the resulting false outlook. Hence we do not find, on studying psychology, a set of simple laws and great principles such as we meet with in physics and chemistry. We find a collection of puzzles of the free-will type—which are only puzzles because they so ingeniously draw attention from every relevant feature in the discussion. And what should be a mere psychological toy becomes the heading of an important chapter of the science.

Modern psychologists have many such vexatious follies to deal with. We have inherited a psychology that is sodden with metaphysics, and perpetually haunted with unreal entities. We have to discuss it in a terminology framed by our opponents, and wholly unsuited to a true science. Let us firmly assail the pestilential and slovenly habit of attributing all things unknown to some psychical entity, invented by ourselves for the occasion, or more usually inherited from our savage ancestors.

He placed it approximately in its correct rank : he pointed out that the extraordinary instincts of various insects has nothing whatever to do with will or any conscious effort : he rightly assumed that conscious will has infinitely less to do with initiating even human activities than it is supposed to have. He denied the so-called free-will altogether, saying that any volition flowed as necessarily from antecedent conditions as the quotient in an arithmetical sum. In all this he has been thoroughly justified by modern knowledge.

Lamarck was a follower of Locke and the empirical school. He believed that all ideas were acquired, and that there were no such things as innate ideas. Since he traced all intellect to ideas, and all ideas to sensations, he must be reckoned as a sensationalist; probably he was influenced by Condillac. But he is careful to say that though every idea is derived from a sensation, not every sensation yields an idea. It is only when attention is fixed upon the sensation, at the moment when it is experienced, that an idea of more or less permanence remains.

§ 9. Conclusion.

He defended the doctrine of organic evolution at a time when it was opposed not only to the entire authority of the Church and people, but also to the judgment of the leading men of science. For half a century his writings stood as almost the only public representation of a belief which no one now questions. Then came the Origin of Species : a work which naturally and immediately superseded every earlier publication, a work moreover which perhaps aroused more emotion than any other work of science ever published.

Almost inevitably, discipleship of Darwin engendered antagonism to Lamarck. Once evolution became an accepted fact, no one studied Lamarck to be convinced of it. His arguments in favour of it ceased to excite interest : and attention became concentrated on minor details as to the process itself. Lamarck was at once seen to have offered a very different account from that of Darwin, and the whole energy of Darwinian discipleship was roused to antagonism by the concentration of attention on the anti-Darwinian elements of the older theory.

I am aware that there are many who repudiate all suggestion of a philosophical treatment of scientific problems. Such a view cannot for a moment be defended. It arises from the fact that the name philosophy is so often used as synonymous with metaphysics : and that the most inaccessible problems of science have been so often treated to bushels of high-sounding words from which no genuine solutions can issue.

In the foregoing pages I have endeavoured to draw certain rules of scientific method from an analysis of the causes of the errors into which Lamarck fell. These rules are neither new nor startling ; yet their importance is so great as to bear almost endless repetition.

The first principle is one which has never ceased to be preached since the time of Bacon : it emphasises the truth that the methods of science are those of observation and experiment : and that as soon as we travel outside these methods, we become involved in hopeless error and confusion. The second follows from the first : it enjoins upon us the principle, never to seek the explanation of some difficult problem by the manufacture of a new and unknown entity.

I do not mean that we should only believe in the existence of what we can see or feel; I mean that when we form some hypothesis to explain a process or event, and when that hypothesis involves us in the assumption of some existence not appreciable to our senses, that existence must be invested with similar properties to those possessed by other existences which are appreciable to our senses. That is to say, it must either have the properties of matter, or of material force or energy : and therefore must be capable, theoretically at least, of being some day removed from the sphere of hypothesis to that of observation. To this rule there has never been any exception in the history of science. Wherever any suggested hypothesis has included any factor of a different order from those known to us by observation and experiment, that hypothesis has ultimately decayed or been refuted.