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CHAPTER X.

In order to judge of the present status of Darwinism it is of primary importance to note the position assumed by the few really eminent investigators, who as pupils of Haeckel still seem to have remained true to him. Among these I reckon Oskar Hertwig, the well known Berlin anatomist.

As early as 1899 in an address at the University on, *Die Lehre vom Organismus und ihre Beziehung zur Sozialwissenschaft*, Hertwig gave expression to views which are very little in harmony with the doctrines proceeding from Jena, and which are also put forth in his manual, *The Cell and the Tissue*. In that address we read (p. 8): "With the same right, with which, for the good of scientific progress, an energetic protest has been raised against a certain mysticism which attaches to the word Vitality, I beg to give warning against an opposite extreme which is but too apt to lead to onesided and unreal, and hence also, ultimately to false notions of the vital process, against an extreme which would see in the vital process nothing but a chemico-physical and mechanical problem and thinks to arrive at true scientific knowledge only in so far as it succeeds in tracing back phenomena to the movements of repelling and attracting atoms and in subjecting them to mathematical calculation."

"With right does the physicist Mach, with reference to

such views and tendencies, speak of a 'mechanical mythology in opposition to the animistic mythology of the old religions' and considers both as 'improper and fantastic exaggerations based on a one-sided judgment.' "My position on the question just stated becomes apparent from the consideration that the living organism is not only a complex of chemical materials and a bearer of physical forces, but also possesses a special organization, a structure, by means of which it is very essentially differentiated from the inorganic world, and in virtue of which it alone is designated as living."

Here, then, the distinction between living and non-living nature is clearly and definitely expressed, and Hertwig expresses himself just as definitely when he says (p. 21): "Whereas, but a few decades ago a scientific materialistic conception of the world issuing from a onesided, un-historical point of view, misjudged the significance of the historic religious and ethical forces in the development of mankind, a change has become apparent in this regard."

To this gratifying testimony against materialism the distinguished naturalist added an equally valuable testimony regarding Darwinism on the occasion of the naturalists' convention in 1900. He there sketched an excellent summary of the "Development of Biology in the Nineteenth Century," in which he decidedly opposes the materialistic-mechanical conception of life. In so doing he also touches upon Haeckel's carbon-hypothesis, to which the latter still clings, and says: "That from the properties of carbon, combined with the properties of oxygen, hydrogen, nitro-

gen, etc., in certain proportions albumen should result, is a process which in its essence is as incomprehensible as that a living cell should arise from a certain organization of different albumina." Then the speaker is inevitably led to speak of the doctrine of Descent and Darwinism.

In the first place he declares definitely that ontogeny alone, i. e., the development of the individual being, is "capable of a direct scientific investigation." On the other hand we move in the domain of hypotheses in dealing with the further question: "How have the species of organisms living to-day originated in the course of the world's history?" This is a very valuable admission in view of Haeckel's dogmatic assertion that the descent of man from the ape is a "certain historical fact." Very moderate and pertinent are also the further words of the speaker: "Of course, a philosophically trained investigator will regard it as axiomatic that the organisms which inhabit our earth to-day did not exist in their present form in earlier periods of the earth and that they had to pass through a process of development, beginning with the simplest forms."

"But in the attempt to outline in detail the particular form in which a species of animals of our day existed in remote antiquity, we lose the safe ground of experience. For out of the countless millions of organisms, that lived in earlier periods of the earth, the duration of which is measured by millions of years, only scanty skeleton remains have by way of exception been preserved in a fossil state. From these naturally but a very imperfect and hypothetical representation can be formed of the soft bodies with which they were

once clothed. And even then it remains forever doubtful whether the progeny of the prehistoric creature, the scant remains of which we study, has not become entirely extinct, so that it can in no way be regarded as the progenitor of any creature living at present." I should like to know wherein this differs radically from Fleischmann's contention in his *Descendenztheorie*" (p. 10.) For we find stated here what Fleischmann emphasizes so much, viz., that with the problem of Descent we leave the domain of experience. It is worthy of special note in this connection that Hertwig likewise evidently regards as the sole really empirically and inductively serviceable proof of Descent, that which is drawn from palaeontology, from prehistoric animal and plant remains. He makes not the least mention of the indirect proofs taken from ontogenetic development or comparative anatomy, to which the Darwinians and advocates of Descent love so much to appeal, because they feel that the real inductive proof is lacking and totally fails to sustain their position. Hertwig next points out that the problem of Descent stirred scientific as well as lay circles twice during the past century. He then pays Lamarck and Darwin the necessary tribute, at which we cannot take offense since he was reared in the Darwinian atmosphere of Jena. I also willingly admit that Darwinism served science as a "powerful ferment," even if I must emphasize just as decidedly how harmful it was that this "ferment" was introduced into lay circles at an unseasonable time by the apostles of materialism. For while it was very well adapted to bring about in educated circles a fermentation which pro-

duced beneficial results, in uncritical lay-circles this ferment produced nothing but a corruption of world-views.

Hertwig then designates "Struggle for Existence," Survival of the Fittest, and Selection, as "very indefinite expressions." "With too general terms, one does not explain the individual case or produces only the appearance of an explanation whereas in every case the true causative relations remain in the dark. But it is the duty of scientific investigation to establish for each observed effect the prevenient cause, or more correctly, since nothing results from a single cause, to discover the various causes."

"The origin of the world of organisms from natural causes, however, is certainly an unusually complicated and difficult problem. It is just as little capable of being solved by a single magic formula as every disease is of yielding to a panacea. By the very act of proclaiming the omnipotence of natural selection, Weismann found he was forced to the admission that: "as a rule we cannot furnish the proof that a definite adaptation has originated through natural selection," in other words: We know nothing in reality of the complexity of causes which has produced the given phenomenon. So we may on the contrary, with Spencer, speak of the "Impotence of Natural Selection."

"In this scientific struggle with which the past century closed, it seems necessary to distinguish between the doctrine of evolution and the theory of selection. They are based on entirely different principles. For with Huxley we can say: "Even if the Darwinian hypothesis were blown away, the doctrine of Evolution would remain standing

where it stood." In it we possess an acquisition of our century which rests on facts, and which undoubtedly ranks amongst its greatest."

This last sentence affirms exactly what I have repeatedly asserted: the doctrine of Descent remains, Darwinism passes away. Hertwig then is decidedly of opinion that Darwinism entirely fails in the individual case because in its application the basis of experience vanishes. Indeed, according to him, phylogeny is not at all capable of direct scientific investigation. These are all important admissions which one would certainly have considered impossible twenty years ago; they unequivocally indicate the decline of Darwinian views, and in a certain way also harmonize with Fleischmann's work.

True, Hertwig still clings to the thought of Descent, but apparently no longer as to a conclusion of natural science. This appears from the assertion: "Ontogeny alone is capable of a direct scientific (he evidently speaks of natural science) investigation," and from the other statement that a *philosophically* trained investigator will accept it (Descent) as axiomatic although it belongs to the domain of hypothesis. What else does this mean but that: We have no specific knowledge of Descent but we believe in it. In short, this is not natural science but natural philosophy; it forms no constituent part of our certain knowledge of nature but it is one aspect of our world-view.

All the above-quoted assertions of Hertwig are calm

and well-considered and show a decided deviation from the Darwinian position. Above all we are pleased to note that he appropriates Spencer's phrase regarding the "Impotence of Natural Selection" and that in the citation from Huxley he at least admits the possibility that the Darwinian doctrine will be "wafted away."

It is also proper to mention here the fact that in another place Hertwig no longer recognizes so fully the dogma set up by Fritz Mueller and Haeckel which is so closely bound up with Darwinism. I mean the so-called "biogenetic principle" according to which the individual organism is supposed to repeat in its development the development of the race during the course of ages.

In his book: "The Cell and the Tissue" (*Die Zelle und die Gewebe*, II. Jena 1898, p. 273) Hertwig says: "We must drop the expression: 'repetition of forms of extinct ancestors' and employ instead: repetition of forms which accord with the laws of organic development and lead from the simple to the complex. We must lay special emphasis on the point that in the embryonic forms even as in the developed animal forms general laws of the development of the organized body-substance find expression."

Any one can subscribe to these statements; in truth they contain something totally different from the "biogenetic principle"; for Haeckel has really no interest in so general a truth, but is intent only upon a proof of Descent.

Hertwig continues: "In order to make our train of thought clear, let us take the egg-cell. Since the develop-

ment of every organism begins with it. the primitive condition is in no way recapitulated from the time when perhaps only single-celled amoebas existed on our planet. For according to our theory the egg-cell, for instance, of a now extant mammal is no simple and indifferent, purposeless structure, as it is often represented, (as according to Haeckel's "biogenetic principle" it would necessarily be); we see in it, in fact, the extraordinarily complex end-product of a very long historic process of development, through which the organic substance has passed since that hypothetical epoch of single-celled organisms."

"If the eggs of a mammal now differ very essentially from those of a reptile and of an amphibian because in their organization they represent the beginnings only of mammals, even as these represent only the beginnings of reptiles and amphibians, by how much more must they differ from those hypothetical single-celled amoebas which could as yet show no other characteristics than to reproduce amoebas of their own kind."

This is a view which has frequently been clearly expressed by anti-Darwinians: The egg-cells of the various animals are in themselves fundamentally different and can therefore have nothing in common but similarity of structure. In opposition to Hertwig, Haeckel in his superficial way deduces from it an internal similarity as well. After a few polite bows before his old teacher, Haeckel, Hertwig thus summarizes his view: "Ontogenetic (that is, those stages in the individual development) stages therefore give

us only a greatly changed picture of the phylogenetic (i. e., genealogical) stages as they may once have existed in primitive ages, but do not correspond to them in their actual content." This is a very resigned position, very far removed from Haeckel's certainty and orthodoxy.

To sum up: O. Hertwig has become a serious heretic in matters Darwinian. Will Haeckel, in his usual manner try to cast suspicion on Hertwig also? For Haeckel himself says (Free Science and Free Doctrine, Stuttgart, 1878, p. 85): "Since I am not bound by fear to the Berlin Tribunal of Science or by anxieties regarding the loss of influential Berlin connections, as are most of my like-minded colleagues, I do not hesitate here as elsewhere to express my honest conviction, frankly and freely, regardless of the anger which perhaps real or pretended privy councillors in Berlin may feel upon hearing the unadorned truth."

Verily, it is a matter of suspense to know whether his school will now pour forth their wrath upon O. Hertwig, or whether finally the discovery will not be made in Jena that Hertwig secretly possessed himself of his position in Berlin, in the same manner as Fleischmann obtained his at Erlangen, viz., by a promise of desertion from Darwinism.