Section: 2 Epistemology and Philosophy of Science

The Deductive Character of Darwin's Theory

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One of the problems in the methodology of science is whether Darwin's theory as the core of Darwinism is either a fully or at least partially axiomatisable, and thus conforms to the traditional hypothetico-deductive model of scientific theories. The problem with this assumption is that not all parts of *Origin of Species* can be easily reformulated as axioms. In particular the places where Darwin argues on the basis of the analogy between artificial and natural selection seem impossible to reformulate in this sense and rather than a hypothetico-deductive strategy they demonstrate an inductive method of reasoning. This leads certain authors to the conclusion that this constitutes such a serious shortcoming from the point of view of the hypothetico-deductive ideal of science that it reduces the weight and impact of Darwin's theory, irrespective of whether we take the view that it is "merely an attempt at a hypothetico-deductive outline" or proceed straight to the admission that it is not a deductive argument.

M. Ruse points out, however, that it is not appropriate to completely renounce the interpretation of working with a hypothetico-deductive outline, because Darwin himself contemplated proposing a hypothetico-deductive system (Ruse 1975, 233). On the other side Darwin considered the analogy between natural and artificial selection to be a decisive and important aspect of his theory. Within the rigorous conception, however, incorporation of analogy, i.e. the inductive approach, into the structure of a deductive theory is inadmissible. Thus we face the dilemma of whether to give up the deductive character of Darwin's theory or to try to preserve it even at the cost of eliminating the arguments based on analogy. Ruse assumes that analogy forms an integral part of Darwin's theory and therefore that it is not possible to remove it. He thus believes that the core of this theory is achieved in part deductively and in part analogically, and that it is subsequently used to explain phenomena in many other areas of biological research (Ruse 1975, 240). One must agree that the structure of Darwin's theory is much more complex than many commentators assume, but Ruse's conclusion, admitting a role for both deductive and inductive arguments, seems to me to be too much of a compromise. The question arises whether Ruse is not overestimating the role of analogy in Darwin's theory or possibly he understands it incorrectly. The reason Darwin initially argued on the basis of artificial selection and only later, analogically, on the basis of natural selection, was clearly strategic: Darwin was trying to gain support for his discovery of natural selection as the cause of the inception of species and evolutionary changes. Ruse correctly points out that Darwin traces his path to the discovery of natural selection in such a way so as to more easily lead the reader to the main and controversial parts of his theory (Ruse 1975, 225). He therefore considers the analogy of artificial selection to be important from the point of view of the *support* it lends to Darwin's theory and equally important from the perspective of its *heuristic* function, which illustrates a thought process through which the substance of the theory can be easily reached. He insists, however, that this important part of Darwin's theory cannot be deductively linked to the rest of the theory, and that consequently in at least one part of *Origin* Darwin makes use of the method of analogical inference, or more generally, inductive inference (Ruse 1975, 226).

If we consider that 1) Darwin did not attempt to axiomatise a consistently deductive theory, but rather to present and defend a work that would persuade the broadest possible scientific and lay public of the true cause of the origin and diversity of species, as well as of the cause of their mutual dependence and adaptation to their environmental conditions; and 2) that, with respect to the methodology of science, he was heavily influenced by Herschel's *Discourse* (i.e. a work which understands the inductive method as a fundamental scientific approach) and also by the induction and consilience of W. Whewell, based upon which Darwin could have understood the presence of analogy – as an inductive strategy – in his theory as an advantage; then it seems that one must agree with the compromise point of view which attempts to reach the core of Darwin's theory with the help of deductive as well as inductive arguments. Does this mean, however, that the chosen strategy of elaborating the theory and the generally shared ideas on methodology must necessarily be part of the theory itself? Here, too, I believe it is appropriate to distinguish the theory's logical content from the form of its elaboration. In such a case, the analogy of artificial and natural selection can be understood in a completely different manner, i.e. in such a way so that even this aspect can be reformulated deductively.

If we add to the traditionally mentioned four axioms of Darwin's theory, whose logical consequence is natural selection, a new fifth axiom, stating that under certain conditions we can intentionally select organisms in order to enable or preclude their reproduction and survival, and in so doing to accumulate desirable characteristics or eliminate undesirable ones, then artificial selection becomes a deductive consequence of the theory just like natural selection. Artificial selection is possible if and only if natural selection is possible. Artificial selection is nothing other than the utilisation of the laws of natural selection under special conditions. From this perspective, there is just one process which merely has an intentional and unintentional form. With respect to the deductive

structure of the core of Darwin's theory, however, artificial selection is just as much a deductive consequence as natural selection.

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