

Book Review

Some Foundational Debates in Philosophy of Biology*

Francisco J. Ayala and Robert Arp (editors): Contemporary Debates In Philosophy of Biology, Wiley-Blackwell, 2009 , xii + 426 pp.

What are the main debates in philosophy of biology today? The present book (part of the series *Contemporary Debates in Philosophy*) attempts to identify and discuss some of the most important of these. The endeavour is, I think, successful; the collection is a valuable contribution to the literature of philosophy of biology.

Before discussing some particular lines of thought in the book, some brief remarks on structure and organisation: The book consists of ten parts, each of which is centered around a central issue in philosophy of biology. Like other collections in this series, each part includes two papers arguing for opposing views concerning the central issue, together with postscripts where the authors have the opportunity to directly confront the arguments of the opposition. There is also considerable interaction among the authors in the main body of their papers, plus short introductions by the editors and lists with suggestions for further reading. This arrangement is the main strength of the book: there is enough information in each part to introduce the newcomer to the main topics and orientate him in the sometimes vast literature, but also original arguments as well as useful analyses of already existing positions to reward the more advanced student and researcher. To be sure, some of the contributions may prove a bit demanding to the uninitiated; but a careful study of the papers together with the useful introductions can lead the beginner to the centre of the current battles in philosophy of biology.

To impose some order on the debates, we could divide them into three main categories. In the first category there are debates that focus most directly on the content and structure of biological theory. Here we have the question whether species are real, whether selection operates primarily on genes, whether microevolution and macroevolution are governed by the same processes, and whether evolutionary developmental biology offers a challenge to neo-Darwinism. The second category includes issues arising from the application of biology to other areas, i.e. evolutionary psychology, memetics and evolutionary ethics. Lastly, there is a third category with more general philosophical interest: whether it is possible to reduce biological to physical explanations, how should we understand the notion of function, and whether intelligent design has a place in biological science. Although this list may point to some bias towards issues that have to do with evolutionary biology rather than biology in general, I think that the content of the papers, which includes lengthy discussions of developmental and molecular biology, goes a good way to rectify this.

* Published in *Metascience* (2011) 20: 351–354.

Given the structure of the book, one is tempted to ask: is there a main controversy within contemporary philosophy of biology (rather than philosophy of science as it is applied to philosophy of biology) emerging from the present collection? In my view, there are two recurrent themes that give rise to several disagreements as far as the present debates are concerned: the first is how the concept of function should be understood; the second (and perhaps the most important) concerns the consequences for biology and for philosophy of biology of incorporating development into evolutionary theory. This doesn't mean of course that these themes exhaust the current debates (there are for example the debates on the nature of species, or about evolutionary ethics); the reason I picked out these two issues is because they are connected to most of the debates in the collection. In the remaining space, then, I will focus on these two themes as they relate to various arguments in the book.

The concept of function is involved in all three papers that comprise the third category mentioned above, so it would be useful to see how all these discussions are interrelated. The core debate is of course about how function attributions should be understood: should natural selection play a central role, as in selectionist accounts, or should the analysis be in terms of the causal role an entity has within a system, as in systematic ones? Perlman, Cummins and Roth (chapters 3 & 4), in one of the most philosophically lucid parts of the collection, debate this question. But talk about function in biology is highly relevant for the question whether biological explanations can be reduced to physical ones. Now, it seems that it is very important here whether we have a selectionist or a systematic account of function attributions. So, the existence of functional explanations in evolutionary biology, understood along selectionist lines, has been taken as the basis of the uniqueness of biology and its irreducibility to physical science (e.g. Ayala (p. 384) makes this point). I will not discuss this argument here, although it does not seem to me very convincing. Instead I want to ask: what are the consequences of a systematic account for the reduction question? Prima facie, the answer is not clear. Keller (chapter 1), who is in favour of the in principle reduction, uses what she calls a 'minimalist' conception of function, which seems to be a species of the systematic account. Dupré (chapter 2) argues for a strong irreducibility of the biological and seems again to presuppose a systematic account -he claims that the context dependence of the function of the parts, as well as their identity, argues against even metaphysical understandings of reductionism. Despite appearances, my impression is that Keller and Dupré are not necessarily in disagreement. But the point I want to make is that a connection of a systematic account of functions with the kind of anti-reductionists arguments presented by Dupré will clarify both positions. Similarly, a systematic account can explain apparent cases of design and so greatly undermine the inference from what Ratzsch, in his paper on intelligent design (chapter 19), calls design1 ('scientific teleology') to design2 (intention-laden teleology).

The relevance of development for questions in evolutionary theory constitutes the second main theme in the anthology. The chapters by Laubichler and Minelli (chapters 11 & 12) debate directly this question. The problem is whether the research program of evolutionary

developmental biology (evo devo) constitutes a challenge for neo-Darwinism, which is the traditional evolutionary theory. Laubichler's and Minelli's papers serve as a nice introduction to and discussion of the main tenets of evo devo. But as philosophical discussions they are less clear. The authors want to argue for opposing conclusions, although they seem to be in agreement on the basic fact that evo devo introduces new concepts and explananda into evolutionary theory. A difficulty here seems to be what exactly to include in 'neo-Darwinism'. So, Minelli argues that some neo-Darwinists (for example Haldane) held views similar to the tenets of evo devo. But the more interesting question is: are the novel concepts introduced by evo devo incompatible in a deep sense with neo-Darwinian ones? It seems to me that the discussion by Dietrich and Erwin (chapters 9 & 10) on the relations between microevolution and macroevolution is highly relevant here. Rather than relying on species selection (better, species sorting) to argue in favor of uniquely macroevolutionary processes, Erwin criticizes the uniformitarian character of traditional discussions of micro and macroevolution. He argues that the evolutionary process has itself changed, for example with the transition to multicellularity, or the emergence of gene regulatory networks. In both of these examples the 'locus of selection' has been changed. Because a historical dimension is needed in order to understand these changes, macroevolution cannot be reduced to microevolution. Apart from the problems one might find with such a view (some of which developed in Dietrich's paper), surely the question over the significance of evo devo has to include this debate. If Erwin is right, then we have a clear sense why evo devo, and the macroevolutionary processes it proposes, go beyond traditional neo-Darwinism.

Moreover, developmental considerations are relevant for the units of selection debate, represented here by the detailed and rich in biological details papers by Sapienza and Burian (chapters 7 & 8). Sapienza's arguments seem to presuppose that if variation in phenotypic traits is a result of differences in a small number of genes, then if selection operates on those traits, it operates at the genic level. But I think this is too hasty: to say that selection acts on genes just in case selection can 'see' individual genes, although a necessary condition for genic selectionism, is not an argument in favour of it. But quite apart from this issue, the kind of examples mentioned above count against the level of selection being primarily the gene, in a way that complement Burian's arguments against genic selection. So, during evolutionary transitions selection may be said to act at different levels. There has been already some work on this issue. The emergence of gene regulatory networks mentioned above provides yet another example where selection can act at higher levels.

Lastly, developmental considerations are also relevant for modelling cultural evolution. In one of the most constructive papers in the collection, Wimsatt (chapter 16) argues against memetics and in favor of a developmental theory of cultural evolution. If development points to a more rich evolutionary theory, then this provides further justification for such a kind of approach to cultural evolution.

These have been just some suggestions about how some lines of argument in this

collection can be synthesized and extended. All chapters (including the very interesting contributions on the species problem by Claridge and Mishler, as well as the stimulating papers on evolutionary ethics by Ruse and Ayala) serve as an excellent introduction to the most hotly debated topics in philosophy of biology today. Indeed, it is a virtue of the book that it acts as a stimulation for the reader to try to resolve some of the debates himself, by building on the ideas and arguments presented here.

Stavros Ioannidis
University of Bristol
Department of Philosophy
43 Woodland Rd
Bristol
BS8 1UU
Email: stavros.ioannidis.phil@gmail.com