

## What's new in philosophy of biology?

*Philosophy of Biology*. (2007) Edited by Mohan Matthen and Christopher Stephens. Elsevier, Amsterdam. Hardback, 603 pp. Price £95/\$165. ISBN: 0-444-51543-7

### Reviewed by

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Philosophy of biology is arguably an area of scholarship that has grown tremendously over the past several years yet, with the occasional exception, remains largely ignored by biologists. While certainly it should not be expected that biologists turn themselves into philosophers, it would nonetheless be useful if they were a bit more familiar with serious conceptual analyses of their theories and methods.

That is why this new volume edited by Matthen and Stephens is a welcome addition to the recent literature, despite suffering from the usual maladies of collections of papers. The book reads half as a general introduction to the philosophy of (mostly evolutionary) biology and half as a more or less random update on what's hot in the field. The first part, comprising five chapters, is devoted to biographical essays on some major figures in evolutionary biology: Darwin, Fisher, Haldane, Wright and Kimura. While the individual chapters are interesting and well written, one cannot help but wonder why these particular choices. The combination of Darwin, the founding father of the entire field, and four theoretical population biologists active during the first part of the 20<sup>th</sup> century seems odd. If one wishes to examine the development of the Modern Synthesis (as, for instance, made explicit by the title of Sarkar's chapter on Haldane), wouldn't one want to include entries on Dobzhansky, Mayr and Simpson, to say the least?

The seven chapters of the second part, on evolution (broadly speaking) seem to better reflect some degree of organic planning, including as they do essays on natural selection, neutralism, levels of selection, evolvability and development, though the last two entries (on evolution and normativity, and evolutionary ethics) really belong to a separate logical set. I particularly enjoyed Kim Sterelny's chapter on evolvability, which is as clear and informative a discussion of that complex topic as one is likely to find anywhere in the biological literature. Sterelny's knack for uncovering illustrative examples is particularly evident in his treatment of developmental constraints and the case of the missing centipedes. Following Wallace Arthur's discussion of the matter, Sterelny points out that some gaps in phenotypic space must be due to developmental bias: it is hard to imagine an environmental factor capable of explaining why Geo-

philomorphian centipedes (about a thousand species worth) vary in the number of segments between 29 and 191, but not one of the species of this group is characterized by an even number of segments! Surely something intrinsic to the developmental system of these animals has severely biased the evolvability of the entire clade when it comes to segmentation.

The third part of the volume is devoted to genetics, but it really focuses on evolutionary genetics, with the exception of the first entry, by Raphael Falk, of a largely historical nature. I found Michael Wheeler's chapter on "traits, genes and coding" particularly stimulating in his critical analysis of the whole concept of causality and information in genetics. For instance, the author mentions Paul Griffiths' rather provocative argument that "on the basis of a purely causal notion of information, the human genome would encode the instruction when exposed to the drug thalidomide grow only rudimentary limbs". This may strike biologists as a ludicrous example, but Wheeler (and Griffiths) uses it to propose a serious re-evaluation of what exactly biologists might mean when they talk about "information". That is philosophy of science at its best: when it forces us to slow down and think about the assumptions and consequences of our language and use of metaphors.

The fourth section of Matthen and Stephens' book is, rather oddly, dedicated to taxonomy (why not ecology or paleontology?), and it features three chapters, on "species, taxonomy and systematics", "homology and homoplasy", and "biological conceptions of race". The latter is by Robin Andreasen, who is one of an increasing number of philosophers of science that actually defends some biologically interesting conception of race (something that practicing biologists tend to stay as far away as possible, at least in part because of the treacherous social terrain on which they would tread). While I disagree with Andreasen's analysis (and in fact she dedicates a significant chunk of her chapter to criticizing my own work on race, carried out with philosopher Jonathan Kaplan), her treatment of the topic is exceedingly lucid and deserves the attention of biologists who work on human geographical and genetic variation.

The last part of the book is actually the most stimulating, despite the fact that these five chapters are grouped under the rather uninspired heading of "special topics": formalizations of evolutionary biology, functions, biological approaches to mental representation, innateness and artificial life. For instance, Tim Lewins' chapter on functions walks the reader through several distinct understandings of the concept, beginning with the clear observation that biologists mean something quite different from physicists when they use the term (though there is variation among biologists as well, with molecular and evolutionary biologists often referring to functions as the result of selective processes, while ecologists talk of, say, ecosystem "functions", for which it is much easier to see a parallel with the physicist's usage). Scientists' use of

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language is supposed to be accurate, but it is amazing how a few pages of philosophical analysis reveal much conceptual confusion where there seemed to be none.

*Philosophy of Biology* will not convince many biologists to look seriously at philosophy (especially given the price tag of \$165), but it can certainly be used in seminars at the graduate

level, perhaps in conjunction with a more systematic and introductory treatment of the subject matter, to get our students to think a bit more broadly than usual. It certainly wouldn't hurt.

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