

## **The Linnean Tradition of Classifying Organisms under Attack**

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Marc Ereshefsky,

*The Poverty of the Linnean Hierarchy. A Philosophical Study of Biological Taxonomy.*

Cambridge: Cambridge University Press. 316 pages.

Systematics has always been an important topic for philosophy of biology. Nonetheless, philosophical books dealing with this subject alone are very rare. Marc Ereshefsky, known for his contributions in the philosophy of taxonomy, now gives an encompassing treatment of systematics, and shows that this field is still full of philosophical—and also biological—interest. His main concerns are philosophical questions about classification, the plurality of species concepts, and the problems that are caused by the continued use of the Linnean form of hierarchical classification. In fact, the provoking conclusion of Ereshefsky is that the Linnean hierarchy has to be replaced by a more adequate form of classification.

The first part of Ereshefsky's book deals with possible ways of classifying objects and their adequateness for biological taxonomy. The main options found in the history of philosophy are grouping by means of the essential properties of kinds (e.g., Aristotle), by means of property clusters (e.g., Wittgenstein's family resemblance), or by means of the causal relationships between members of a kind (e.g., genealogy). This menu of philosophical options is followed by a very good overview of the main schools of biological taxonomy, their motivating arguments, and their critiques of other approaches. Ereshefsky shows that essentialism and cluster analysis do not provide convincing approaches to the classification of species, mainly because species and higher taxa are historical entities that change their properties. Instead, the third option—the historical approach that groups entities according to their causal relationship and their genealogy—is the appropriate one for biological systematics. Given that this result itself is not surprising—it represents the current biological orthodoxy—Ereshefsky could have offered a more elaborated discussion and argument. He rather briefly gives only one reason for preferring the historical approach, namely the idea that it alone can give an evolutionary explanation for the distribution of traits. In addition, Ereshefsky's claim that Richard Boyd's 'causal-homeostatic' treatment of natural kinds is a cluster analysis approach and cannot take genealogy into account is in my view based on an uncharitable reading of what Boyd is committed to. The following discussion about whether species are individuals is more insightful. Ereshefsky makes clear that an answer to this question depends on the understanding of the concept of an individual and that prominent notions of individuality used by biologists and philosophers of biology probably apply only to some, but not all species. Finally, he argues that the historical nature of taxa does not mean that biology is radically different from the physical sciences as regards explanation and the existence of laws.

The second part of Ereshefsky's treatment is devoted to species, more exactly, to the question of whether there are different types of species categories that bring about different classifications of the biological world. Ereshefsky opts for pluralism; the existence of different species concept should not be expected to result in the true and unique account of species. His argument is ontological. There are several distinct forces that shape the history of organisms: inbreeding, common ancestry, and ecological selection. These different forces partition the tree of life differently. For this reason, different species categories are equally real. Ereshefsky compares his account critically with other pluralist positions and counters charges against species pluralism. A

whole chapter is devoted to the objection that pluralism admits virtually any species concept. Based on Larry Laudan's notion of normative naturalism, Ereshefsky shows that pluralism is compatible with having standards of adequacy for approaches to species and systematics. Ereshefsky argues that for all taxonomic schools the aim of classification is to provide taxa that allow for the greatest number of biological generalisations. Then he gives a list of rules that any taxonomic approach has to meet, in particular empirical sensitivity, non-ambiguity, coherence with other scientific theories, and coherence with evolutionary and systematic biology. While these criteria seem to be important, Ereshefsky does not give a real argument that shows why specifically these criteria further the above stated aim of classification. The discussion of pluralism concludes with an interesting assessment of six prominent species concept with respect to Ereshefsky's four main criteria.

The first two parts of Ereshefsky's book are very philosophical in nature. Even though this does not hold for the last part, it is probably the most interesting and important part. Here Ereshefsky discusses the usefulness of the Linnean hierarchy. The main features of the Linnean tradition of classification are the rules that a taxa has to be assigned a Linnean rank (such as class, order, or genus), and that the names of taxa often reflect this rank (by means of a suffix or the binomial convention of including the genus into the species name). Ereshefsky describes Linnaeus' original system and his main motivations for his taxonomic method. Crucial for Linnaeus was his essentialism that provided the basis for his way of assigning organisms to taxa, e.g., by means of the features of their fructification structures. In addition, his creationism supported his belief that the number of genera was relatively small, so that every biologist would be able to know all genera and their taxonomic position by heart. Later biologists abandoned these ideas and methods but retained the basic Linnean hierarchy. Ereshefsky describes how the Linnean way of classifying was modified with the emergence of evolutionary theory and, in the 1970s, of the cladistic school of taxonomy.

Ereshefsky points to several problems that the reliance on the Linnean hierarchy brings with it. In particular, with the demise of essentialism there is no fact of the matter as to whether a taxon is an order or a family, and the fact that a group of birds is a family does not mean that it is comparable to other taxa that are considered as families. Consequently, the requirement to assign any taxon to a pre-established Linnean level (class, order, ...) leads to fruitless debates rather than informative classifications. In addition, the convention of including the rank in the name requires change of the very name in the (quite frequent) case of the reassignment of a taxon to a different level. To solve these problems, Ereshefsky proposes a post-Linnean taxonomy, based partially on existing non-Linnean suggestions from the biological literature. His approach consists of eleven recommendations. In particular he proposes the use of a numerical or indentation system, that tells whether a certain taxon is part of another taxon, but without saying that one taxon is a *family* contained in an *order*. As there are no specific overall ranks, taxa names do not reflect any rank at all. Thus, Ereshefsky abandons both the distinctive features of the Linnean hierarchy. In addition, he has suggestions about how to proceed with existing names and what to do in the case of the discovery of whole taxa. Finally, Ereshefsky compares his system with the most sophisticated existing Linnean approach—Edward Wiley's annotated Linnean system proposed in the late 70s. Ereshefsky argues that Wiley's account still inherits some main drawbacks of the Linnean tradition. In addition, his system is purely cladistic. While Ereshefsky's post-Linnean approach takes cladistic considerations seriously it serves also some needs of other schools of systematics, such as evolutionary taxonomy.

Ereshefsky offers an interesting discussion of biological systematics that is nicely and clearly written. Even though his aim is not to give a detailed historical treatment of taxonomy, his book makes clear that the original beliefs that motivate scientific standards are subject to radical change and that this can call former standards and methods into doubt. Ereshefsky exposes serious problems that are brought about by the continued use of the Linnean hierarchy. He makes a convincing case for an alternative way of classifying species. It remains to be seen whether abandoning the Linnean hierarchy currently in use is practically feasible.

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