

## **RADICAL SOLUTIONS TO OLD PROBLEMS**

Author: HULL, DAVID

Source: BioScience, 52(3) : 299-303

Published By: American Institute of Biological Sciences

URL: [https://doi.org/10.1641/0006-3568\(2002\)052\[0299:RSTOP\]2.0.CO;2](https://doi.org/10.1641/0006-3568(2002)052[0299:RSTOP]2.0.CO;2)

---

BioOne Complete (complete.BioOne.org) is a full-text database of 200 subscribed and open-access titles in the biological, ecological, and environmental sciences published by nonprofit societies, associations, museums, institutions, and presses.

Your use of this PDF, the BioOne Complete website, and all posted and associated content indicates your acceptance of BioOne's Terms of Use, available at [www.bioone.org/terms-of-use](http://www.bioone.org/terms-of-use).

Usage of BioOne Complete content is strictly limited to personal, educational, and non - commercial use. Commercial inquiries or rights and permissions requests should be directed to the individual publisher as copyright holder.

---

BioOne sees sustainable scholarly publishing as an inherently collaborative enterprise connecting authors, nonprofit publishers, academic institutions, research libraries, and research funders in the common goal of maximizing access to critical research.

---

## RADICAL SOLUTIONS TO OLD PROBLEMS

**The Poverty of the Linnaean Hierarchy: A Philosophical Study of Biological Taxonomy.** Marc Ereshefsky. Cambridge University Press, New York, 2001. 316 pp., illus. \$65.00 (ISBN 0-521-781701 hard cover).

In his book, Ereshefsky's goals are both scientific and philosophical. The scientific goal is to provide a balanced and accurate discussion of biological systematics—the nature of species taxa, the species category, and the relationship between phylogeny and classification. His philosophical objective is to urge a temperate version of pluralism. He also makes two extremely radical proposals. In keeping with his pluralism, Ereshefsky suggests that systematists should not limit themselves to the construction of a single classification but should produce a half-dozen or so different classifications, each with its own theoretical foundation. In addition, he thinks the Linnaean hierarchy should be abandoned.

Ereshefsky's philosophical preference for pluralism motivates much of what he has to say on scientific issues. He thinks the world is constituted in such a way that it can be subdivided in several different ways, all of which can be equally legitimate. With respect to biological systematics, pluralists maintain that more than one legitimate species concept and way of classifying the resulting species exist, while monists keep striving for one—and only one—preferred classification and species concept. As things now stand, the literature on the species category supports Ereshefsky's pluralist inclinations. Systematists have set forth numerous different definitions of the species category—22 at last count!

A preference for monism does not require a blanket rejection of the multi-

plicity found in nature. For example, one might define the species category in terms of a single factor, such as cohesion, but acknowledge the existence of several mechanisms that contribute to this cohesion. Similarly, a preference for pluralism does not require a blanket tolerance for any and all explanations of natural phenomena. Ereshefsky spends a large part of his book distinguishing between promiscuous and discerning pluralism. Some species definitions are worth pursuing, but others are not.

Ereshefsky suggests four primary criteria for choosing among species definitions: empirical sensitivity, internal consistency, intratheoretic coherence, and intertheoretic coherence. Empirical sensitivity means merely that empirical data can affect the probability assigned to an hypothesis—not an overly stringent requirement—but the emphasis of the other three on the role of theories in classification is sure to be rejected by numerical pheneticists and pattern cladists, who want classifications to be as free of scientific theories as possible. A promiscuous pluralist might find theory-neutral classifications to be scientifically acceptable; Ereshefsky does not.

Ereshefsky provides an even more convincing case for biological taxa, species taxa in particular. There is no such thing as the essence of any one species—no essence of *Bos bos*, *Drosophila melanogaster*, or *Homo sapiens*. Prior to 1859 systematists were essentialists. They thought all taxa could be distinguished in terms of characteristics that are severally necessary and jointly sufficient for membership. If these characteristics are mapped onto some sort of character space, clear gaps between species should emerge, a few monsters notwithstanding. Even before the acceptance of evolution, systematists had to struggle to treat all taxa as if they had sharply defined boundaries in character space. After 1859, systematists could understand why the boundaries between so many species are so fuzzy. At any one time, species can be found in various stages of speciation. The more gradual this process is, the greater the problem.

One response to this problem is to acknowledge vague boundaries by treat-

ing taxa names as cluster concepts. The goal is still to draw boundaries between taxa in character space. The only difference is that these boundaries are vague. An organism need not exhibit *all* of the characteristics of its species *fully* developed in order to belong to that species; it must exhibit only enough of the most important characteristics developed to a reasonable degree. The choice between taxa as essential natural kinds and as kinds with vague borders can be decided empirically. All one must do is map character distributions onto some sort of a grid. If sharp gaps between most species appear, then essentialism might just be appropriate for dealing with species. However, if in most cases species graduate into each other, then cluster analysis of some sort would be preferable. The latter alternative seems to be the case.

Ereshefsky rejects essentialism with respect to taxa for empirical reasons. Characters simply do not covary the way essentialists require. He also rejects species as gradually changing clusters, but for more theoretical reasons. If species are to be the things that evolve, then descent takes priority to character distributions, no matter what these distributions turn out to be. Advocates of “polythetic” taxa are right about how traits cluster in character space, but they are wrong in treating such traits as primary. What really matters is not character space but physical space. Species as evolving lineages are located in space and time. Hence, they are best construed as “individuals.” Ereshefsky agrees with the preceding arguments but distinguishes between a weak and a strong sense of individuality. In a weak sense, species as lineages are located in space and time and therefore must be distinguished from other such lineages. However, they need not be internally cohesive. Many species exhibit such cohesiveness, and just as many lack it.

One of Ereshefsky’s most radical suggestions is that systematists should produce a variety of alternative classifications—one systematically related to phylogenetic development, another that organizes organisms in ecologically meaningful ways, and so on. The response of most systematists to Ereshefsky’s call for

the construction of several alternative classifications is likely to be pragmatic. “We currently do not have enough systematists to produce a single, coherent, inclusive classification, let alone a half-dozen different classifications. And if things continue the way that they are going, we will have even fewer systematists in the future. The Natural History Museum in Washington will soon be nothing but another Disney World.” The most that systematists can hope to do is to provide alternative classifications of very restricted bits of the natural world. More than one inclusive classification is simply not feasible.

Ereshefsky takes his second radical thesis to be so important that he entitles his book *The Poverty of the Linnaean Hierarchy*. Even though he views the “Linnaean system as the backbone of biological classification and much of biology” (p. 3), he thinks that it should be junked, a view shared by several highly respected systematists. When Darwin introduced his theory of evolution in 1859, he was met with opposition from a variety of quarters. His theory raised challenges to all sorts of deeply entrenched beliefs, but on one score, evolution fitted neatly into the received views at the time—the appropriateness of the Linnaean hierarchy for biological classification. All that was necessary was to substitute *splitting* for *subdivision* and *ancestors* for *archetypes*. The fundamental character of the Linnaean hierarchy is subdivide, subdivide, subdivide, whereas that of evolution is split, split, split. What could be easier than overlaying the traditional atemporal classifications of Aristotle and Linnaeus with phylogeny?

As long as the connection between classification and phylogeny was taken to be impressionistic at best, no conflicts arose. The integration of muck into gook is not likely to give rise to sharp conflicts. But as classifications were made more quantitative (a partial legacy of the numerical taxonomists) and the connections between phylogeny and classification more explicit (one effect of cladistic analysis), the conflicts between splitting and subdividing became clear. It is easy enough to draw a tree that depicts two species evolving from a third

species, the common ancestor, but the conversion of that tree into a cladogram or a classification has proven to be extremely problematic. The same can be said for the depiction of other relationships, such as the representation of hybrid species.

Time and again, difficulties that have arisen with respect to representing phylogeny in a classification have been traced to the limitations of the Linnaean hierarchy. Hence, if systematists really want to produce classifications that exhibit some precise relationship to phylogeny, they must abandon the Linnaean hierarchy. Ereshefsky is well aware that systematists are not about to do that, but at the very least they need to realize how much discord results from the structure implicit in the Linnaean hierarchy.

Ereshefsky tries very hard to be clear and fair to all sides, and he succeeds to an amazing degree. If you want to understand the reasons for all the hubbub in systematics over the past 40 years or so with a minimum amount of labor, Ereshefsky's book is the place to begin. As I read this book, I was repeatedly taken aback by how straightforward so many of the issues seem in retrospect. All I can say is that they did not seem that way to me at the time. Could we have made them as clear back in the bad old days as Ereshefsky makes them appear today if only we had tried harder? I don't think so.

DAVID HULL

*Department of Philosophy*

*Northwestern University*

*1818 Hinman Avenue*

*Evanston, IL 60208*

*(E-mail: d-hull@northwestern.edu)*