



## EVOLUTION

## EVOLUTIONARY THEORY: A HIERARCHICAL PERSPECTIVE.

*Edited by Niles Eldredge, Telmo Pievani, Emanuele Serrelli, and Ilya Tëmkin. Chicago (Illinois): University of Chicago Press. \$105.00 (hardcover); \$35.00 (paper). vii + 385 p.; ill.; index. ISBN: 978-0-226-42605-1 (hc); 978-0-226-42622-8 (pb); 978-0-226-42619-8 (eb). 2016.*

This important edited volume offers a look at the current state of play in research on the hierarchical expansion of evolutionary theory. The book contains 14 essays, with a few written by philosophers, and more by scientists. Niles Eldredge contributed an introduction, which offers an overview of the history of hierarchical thinking in evolutionary biology and paleobiology, while Telmo Pievani wrote the conclusion. The volume is organized into three parts, with orienting remarks at the beginning of each part written by the other two editors, Emanuele Serrelli and Ilya Tëmkin. Part 1 focuses on developing an abstract characterization of hierarchy theory; Part 2 explores “hierarchical dynamics”; and Part 3 takes a hierarchical perspective on macroevolution. Overall, the book is very much in the spirit of other recent calls for a revised or expanded evolutionary synthesis.

Many of the papers engage in some way with two of Eldredge’s ideas. The first is the *sloshing bucket model* of evolution, which treats ecological disturbances as akin to shaking or jolting a bucket of water. The bigger the external disruption, the bigger the resulting biological slosh. The second idea is that the biological world forms a *dual hierarchy*. On one hand, there is a temporal genealogical hierarchy (having to do with information transmission) and, on the other, there is an ecological or economic hierarchy (having to do with the flow of energy through a system). These ideas get a lot of attention, but there is very little discussion of any potential problems with them.

The volume would be stronger if it had included some dissenting views, or at least more indication of where and why certain aspects of hierarchy theory might be controversial. Does anyone disagree with the sloshing bucket model? If so, why? Are there any cases that do not fit the model well—cases where the evolutionary bucket was jolted but the biological water did not slosh? Or cases of biological sloshing that were not caused by an external jolt? Including some critical assessment of Eldredge’s work might be more of a tribute to him than presenting such consistent enthusiasm for his ideas.

Having said that, a number of the papers in this volume deserve careful study. For example, Daniel McShea’s paper (Chapter 4) is an ambitious attempt to use hierarchical thinking to shed some light on old puzzles about biological teleology. Pievani and Andrea Parravicini (Chapter 8) offer a clear overview of multilevel selection theory, and explore the connections between multilevel selection and Eldredge’s dual hierarchy picture. Warren Allmon (Chapter 11) has a welcome discussion of what the terms “tempo” and “mode” actually mean. In one of the more empirical papers, Carlton Brett et al. (Chapter 12) argue that the fossils of the Middle Devonian Hamilton Group in upstate New York afford evidence of niche conservatism, which they then connect to the sloshing bucket model. Peter Roopnarine and Kenneth Angielczyk (Chapter 13) examine the stability of biological communities both before and after the Permian-Triassic mass extinction. These papers—and some of the others, too—deserve much more attention than I can give them in this brief review.

Not all of the papers are so helpful. Jon Umerez (Chapter 3) offers a highly abstract discussion of the nature of hierarchical levels that does not make much contact with biological details. Mihaela Pavličev et al. (Chapter 9) introduce a puzzling notion of “cultural epicycles” to help explain human cultural evolution. Taken together, though, the papers collected here, especially those in Part 3, do go a long way toward demonstrating the fruitfulness and the richness of hierarchical thinking about evolution.

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## EVOLUTIONARY BIOLOGY: BIODIVERSIFICATION FROM GENOTYPE TO PHENOTYPE.

*Edited by Pierre Pontarotti. Cham (Switzerland) and New York: Springer. \$179.00. ix + 409 p.; ill.; index. ISBN: 978-3-319-19931-3 (hc); 978-3-319-19932-0 (eb). 2015.*

This volume is derived from the 2014 Evolutionary Biology Meeting in Marseille, France. To quote from the preface, “The goal of this annual meeting is to allow scientists of different disciplines, who share a deep interest in evolutionary biology concepts, knowledge and applications, to meet and exchange and enhance interdisciplinary collaboration” (p. v). This volume presents 20 of the more than 100 presentations. According to the editor, “This book will give the reader an overview of the state-of-the-art research in the evolutionary biology field” (p. v). Although I agree that the volume presents a very diverse set of topics in evolutionary biology, the level at which each chapter is directed at those already working in the particular area discussed in the chapter and is unlikely to be readily accessible to those outside the