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[Book review]

Ecological Paradigms Lost: Routes of Theory Change edited by Kim Cuddington and Beatrix E. Beisner, 2005, 434 pages, ISBN 0-12-088459-3, Academic Press, hardback, US$79.95.

Ecology is a relatively young science. Within its short history, however, ecology has radiated into many well-defined subdisciplines. This diversification and theoretical development must be associated with underlying conceptual changes. Have the changes in theory happened gradually since the foundation of the field, or have they followed what is known as the Kuhnian paradigm shift (Kuhn 1962)? How much, if any, of the past works and history of ecology should modern students and scholars in the field learn? These are interesting questions, especially when we see that there is an increasing level of disconnection from foundational research in our field. If paradigm shifts occurred in ecology, i.e., if the changes have been so profound and fundamental, then perhaps it is not as important to learn the history of ecology and foundational works as it is in the case of a gradual evolution of theoretical backgrounds. This book developed out of a symposium at the annual meeting of the Ecological Society of America in an attempt to address these questions.

The book had two major goals: (1) provide an overview of the history of some traditional subdisciplines, and (2) determine whether the development of these ideas is one of paradigm shifts or one of a more gradual accumulation of smaller changes from simple to more complex concepts. This volume covers the major traditional subdisciplines of ecology: population ecology, epidemiological ecology, community ecology, evolutionary ecology, and ecosystem ecology. In each section, leading ecologists examine and provide historical overviews of major theoretical developments in each of these sub-disciplines, and a philosopher of science provided philosophical analyses for each section. Andre de Roos and Lennart Persson discuss some of the important theoretical developments that arose from simple structured population models. Jay Odenbaugh analyzes these contributions from the philosophical perspective. Hans Heesterbreek examines unstructured epidemiological models and Matt Keeling reviews the extension of these models with explicit spatial considerations. A philosophical analysis of the epidemiological ecology section is provided by James Koopman. In the community ecology section, Anthony Ives and Kevin McCann provide different perspectives on the long-standing stability-diversity controversy. Philosophical consideration for these chapters is given by philosopher David Castle. The evolutionary ecology section is covered by Robert Holt and Troy Day and by a commentary from Kim Sterelny. A nice section of the book consisted of reflections by Eric Pianka and Henry Horn on the short but distinguished career and influence of the great Robert MacArthur. In the part on ecosystem ecology, Timothy Allen and colleagues and Garry Peterson give overviews of major questions and approaches in that field of ecology. Kevin de Laplante provides a philosophical perspective on these issues.

The editors had to diversify views and widen the scope since ecologists and philosophers of science may already have opinionated perspectives about the questions addressed by the volume. For example, it is interesting that in the foreword of the book Robert Paine clearly suggested that, while agreeing that there has been continuing conceptual evolution, ecology does not map well onto the Kuhnian perspective that is based on physical sciences because ecology is nonlinear and multicausational (i.e., pluralistic). He also suggests that there is a wealth of information available if one were to engage in what he called 'ecological paleontology.' So it appears that there is a strong opinion right on the opening pages about the issues to be covered by the book: perhaps there are no paradigm shifts in ecology and one can choose to study history of the field.

At the end, there are at least three points most authors agreed upon. First, although use of the term paradigm has been increasing in ecology and evolution literature since its introduction by Kuhn (Cuddington and Beisner, 2005), it is clear that the term itself is loosely defined, especially as applied to ecology. Therefore it is challenging to define what should be considered paradigms for ecologists. Second, the view of most authors of the volume was that theoretical developments in ecology were outgrowths of older material. So perhaps no paradigm if any was lost, although there are a few

theory changes that some ecologists consider a paradigm shift. In fact, there are those who would argue that ecology has not conceptually advanced since the MacArthur era. New ideas not only gradually evolved from older materials (such as structured population models from unstructured models), but also from a merger between different areas occurring to give rise to a new subdiscipline (e.g., evolutionary ecology). Also interesting is that conceptual changes did not always drive theoretical changes. Methodological advances were also responsible for theory developments. The third and most important point is that the authors demonstrate that a historical viewpoint improves our ability to evaluate the importance of older developments and to anticipate useful new directions. Therefore, as opposed to Paine's introduction, learning the history of ecology should not be 'ecological paleontology,' but part of an educational process for all ecologists.

To my mind, it is clear that this book will provide very interesting reading not only for beginners in the field, but also for practicing ecologists, especially ecology instructors. Combined with Foundations of Ecology (Real and Brown, 1991) and Modeling Nature (Kingsland 1995), Ecological Paradigms Lost will be a valuable contribution to understanding the historical backgrounds of ecological concepts which in turn will provide us with better understanding of current theories.

References

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Bazartseren Boldgiv
Department of Ecology, National University of Mongolia, Ulaanbaatar 210646, Mongolia,
E-mail: boldgiv@biology.num.edu.mn