

Book Reviews

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Comparative Biogeography: Discovering and Classifying Biogeographical Patterns of a Dynamic Earth.—

Lynne R. Parenti and Malte C. Ebach. Berkeley, CA: University of California Press, 2009. xiii+292 pp. ISBN 978-0-520-25945-4. \$39.95, £27.95 (hardcover).

Biogeography is an ancient and a composite discipline that suffers periodical crises and renewals, pushed sometimes from the side of geography and sometimes from the side of biology. The current explosion of different approaches and methods, coupled with an enormous diversity of computer programs and applications, including geographical information systems, tend to exasperate some scholars (e.g., Tassy and Deleporte 1999) and to delight others (e.g., Posadas et al. 2006). The latter authors interpret the proliferation of methods as a symptom of the rapid advance of the discipline, even appealing to desirable paradigm shifts. Textbooks trying to systematize the evolution of the discipline lag behind, trying to synthesize the diversity of this vast subject (e.g., Lomolino et al. 2010, in its 4th edition; Cox and Moore 2010, in its 8th edition). Others try to concentrate on specific (and deeper) aspects of the discipline, as is the case in the new *Comparative Biogeography* of Parenti and Ebach.

Many books dealing with complex subjects are, at first glance, also complexly organized and not designed in a user-friendly way. For *Comparative Biogeography*, this is far from the case: thinking of graduate and undergraduate students, as well as colleagues who will surely enjoy the text, the book has a clean and an elegant design. One can acknowledge the dedicated work of the production team, also the suggestion to the authors to write “clearly and economically” (p. xiii). Figures, tables, and boxes are perfectly accommodated to the text.

The book encompasses 10 chapters. Sections are not numbered but are adequately listed in the contents and at the beginning of each chapter. Every chapter has also an Overview at the beginning and at the end a Summary, Notes, and a short bibliography for “Further Reading.” The full bibliography spans 22 pages at the end of the book, after a useful glossary. The bibliography encompasses a good balance between classical and most recent references. The book closes with an Index that includes the methods cited, the principal concepts, and classical works, as well as all cited authors.

The book goes deep into the history and the theory of biogeography as well as into the practice of the discipline via specific methods. After the Preface, Acknowledgements, and a short Introduction, the book is organized into three parts: one for the history and

the theory, one for the methods, and the third for the implementation of those methods.

The Introduction (Chapter 1) announces the main goals of the book as well as the way in which it is organized. The reader rapidly learns that one of the main goals is to clarify widely used and misused concepts in biogeography; for example, in this introduction, we learn the difference between cladistic and gradistic classifications (p. 7).

Chapter 2 chronicles the history and development of comparative biogeography, emphasizing the rise of main ideas and concepts that today most of us do not even think about: like the difference between a “biogeographical map” and a “geographical distribution map” (Box 2.3). These are not arbitrary decisions: the authors base their decisions on the history of the concepts, best supported and illustrated with tables and classic figures and maps, like the “First Biogeographical Map” of Lamarck and De Candolle (p. 23). The authors expose and discuss concepts like “area homology,” a concept developed from the vast work of Leon Croizat. The adequate understanding of this concept is vital for biogeography (e.g., Morrone 2001) and to establish a comparative biogeography as proposed by the book’s authors.

Chapter 3 deals with the main components of biogeography (i.e., “Building blocks”), which are “endemic areas” and “areas of endemism.” Here, we are advised of one of the most challenging proposals by the authors: “To treat endemic areas as units of classification, we must establish an area taxonomy that allows us to communicate our concept of an area to other biogeographers” (see also Ebach et al. 2008). Most probably, a taxon that is endemic to South America might not be found in the whole South American continent. On the contrary, should a taxon that is more widespread in South America be considered “more American” than the first one? Or, shall we work on better definitions and descriptions of the areas of endemism we identify? The authors propose the International Code of Area Nomenclature (ICAN), a code that aims “to stabilize the names of areas in biogeographic analysis” (Box 3.1).

Chapter 4 looks at the other building blocks of biogeography: the biotic areas and the homologous relationships of their endemic areas. The chapter revises concepts like area homology/analogy and geographic paralogy, foreshadowing the methods while discussing the interpretation of polytomies in areagrams.

Chapter 5 serves as the connection between the theoretical and methodological parts: although analyzing biogeographic processes, it still does not jump fully

into methods. As in the preceding chapters, the authors define misleading concepts like “areagrams” versus “taxon/area cladograms.” Special attention is paid to the traditional contest between vicariance versus dispersal models.

Chapter 6 goes deeper into the methods and applications (Tables 6.1 and 6.2). This book is not a manual for the many computer programs available but rather, a good overview of the most suitable methods for the diverse questions that have been proposed by many different authors since the 1970s.

Chapter 7 explains how the systematic biogeographic method works, describing in detail the diagnosis of the study areas and the work with areagrams and taxon-area cladograms (TACs). Emphasis is placed on the difference between areagrams and TACs: the former summaries of area relationships without information about taxon relationships, whereas TACs are treated as phylogenetic trees containing areas and taxa at the terminal branches. As already noted for Chapter 6, the book describes the methods but does not aim to provide detailed instructions for the use of the specific programs. Nevertheless, the reader might find useful basic instructions, like the ones provided in Box 7.5, for subtree analysis “step-by-step.”

Chapter 8 initiates the third and last part of the book, named “Implementation.” This chapter is “a biogeographer’s guide to geology,” and in my opinion, it is the weakest part of the book. For me, with a background in geography, it is a rather superficial chapter, although for nonspecialist biologists, it might be of interest. Maybe in our too-specialized academic world, this chapter makes sense. Here, there is a quote of fine humor: explaining to the reader the best way to fossilize . . . (see Box 8.2).

Chapter 9 goes further into the implementations, using Pacific biogeography as a case study, which has “challenged biogeographers for over two centuries” (p. 213). The general biotic patterns found in this mega-basin are described, systemized, and synthesized, avoiding the traditional debate on mechanisms that “has been carried out largely without proposals of area homology” (p. 214). “To assume that oceanic islands must have been colonized by long-distance dispersal, interpret all data within that framework, and then conclude that long-distance dispersal is the dominant distributional mechanism, is perhaps the most pervasive tautology in Pacific biogeography” (pp. 214–215).

To implement their comparative method, the authors identify areas of endemism around the Pacific for a vast array of taxa. They then combine these data with geological limits and features through time (applying the systematic biogeographical approach; see [Morrone 2009](#)). The raw data of area relationships are the phylogenetic analyses of taxa in areas of endemism. The approach proposes area homologs and their combinations and synthesizes them into an area classification or general pattern.

The last chapter (Chapter 10) covers suggestions and prospects about the future of the discipline. Recognizing that biogeography is so heterogeneous in methods

and practitioners that some people have spoken about an “identity crisis,” the authors are rather optimistic about its strength to act as a “truly integrative science” between “taxonomy, systematics, paleontology, geology, ecology, and evolutionary biology” (p. 239). They defend the independent nature of biogeography, as a discipline that has shaken the foundations of biology and geology, for example, by “providing the crucial evidence in support of evolution and continental drift” (p. 240). Compared with other related disciplines, biogeography just needs to refine its crucial question: “Taxonomists ask: What is a taxon?; biogeographers ask: What is an area?, a purely biogeographical question, but one that not all biogeographers ask” (p. 243).

The book is very readable and harbors nice passages of fine humor, which are much welcome, especially when most textbooks, in an attempt to improve credibility, tend to be exasperatingly “serious,” and some of them definitively boring. This is not the case here: for example, on page 36, the discussion centers on the teleological explanations of the stripes of a melon; and on page 42, the consequences of finding a troop of kangaroos in the English countryside are discussed. (That, believe it or not, is the recommended collective noun.) The style does not damage the seriousness of the book, which is reflected in the careful revision of the theory, methods, and their implementation in current biogeography.

Skepticism might arise regarding the ICAN because, contrary to a taxonomic classification, a classification of areas is intrinsically scale dependant: that is, changing our point of view will change the classification, challenging the universal value of the classification. The underlying intention of the classification is just better communication; or is there something like a “natural” classification of areas? Classification of taxa seems to be intrinsically more natural than classification of areas. This uncertainty does not diminish the high value and necessity of a more systematic scheme of area classification. “Classifications of areas, like classifications of taxa, communicate our knowledge of relationships” (p. 236). But how to do this in the practice? It seems to be still a matter of discussion—maybe the subject for the next book by the authors?

This is not the first book by either of the authors: this is just the most recent contribution from two biogeographers who have constantly followed, and to some extent driven, the current developments in the very dynamic and ample field of biogeography. This is also not just another book on biogeography—this is a fundamental textbook. One might or might not be confident of the methods reviewed by the authors, but the single global vision of the whole artillery of methods gives us a better panorama of the state of the art of the discipline. Future developments in the fields will greatly benefit from the content of this book, and the implicit suggestion to go back to the original sources, an exercise that is rarely undertaken by students applying new methods without much questioning of the theoretical background of any group of methods.

Conflicting viewpoints abound in biogeography, including in this journal, which has been a long-term tribune for the discussion and advancement in this field (e.g., Rosen 1978; Craw 1983; and more recently Dos Santos et al. 2008; Casagrande et al. 2009); and books like this one are helping to resolve methodological discussions by the revision of the underlying assumptions and theoretical aspects that have not always been made explicit.

At the end of the 1970s, Nelson (1978) wrote: "Biogeography is a strange discipline. In general, there are no institutes of biogeography; there are no departments of it. There are no professional biogeographers—no professors of it, no curators of it. It seems to have few traditions. It seems to have few authoritative spokesmen." Nowadays, we seem to have moved on from Nelson's scenario: the advances in the field, encompassing theory, methods, and data accumulation have been exponential. Some authors are positive regarding this explosion, others are more cautious, and several are rather negative, talking about a "mess of methods." Indeed, one of the main concerns of Parenti and Ebach is that "whatever biogeography now constitutes, it is not consistent and does not form a readily recognizable research program" (p. 47). It seems to me that the authors have taken a big step toward the integration of biogeography as an independent and mature discipline: as a Big Science (Box 10.3).

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Andrés Moreira-Muñoz, *Institute of Geography, Pontificia Universidad Católica de Chile, Santiago, Chile; E-mail: asmorej@uc.cl.*