ELSEVIER

GfÖ Ecological Society of Germany, Austria and Switzerland

Basic and Applied Ecology xxx (2017) xxx–xxx

Basic and Applied Ecology

www.elsevier.com/locate/baae

BOOK REVIEW

The Theory of Ecological Communities. Monographs in Population Biology 57, Mark Vellend. Princeton University Press, Princeton, NJ, USA (2016). 248 pp., $49.95, ISBN: 9780691164847 (Hardback), 9781400883790 (eBook)

A productive concept, or "theory" in ecological jargon, strikes just the right balance between abstract universality and specific applicability. Too abstract, and ecologists will ignore it as too aloof; too specific, and it will not cross sub-disciplinary boundaries and fade away. Darwin's Theory of Natural Selection fits this bill, as does MacArthur & Wilson's Island Biogeography. Will Vellend's Theory of Ecological Communities become one of these few just-the-right-level-of-abstraction-theories? It will not, as Vellend admits right away, as he considers "only" what he calls "horizontal communities" (such as guilds, vegetation, and excluding consumer-resource interactions, mutualist networks, and food webs). Yet, his ambition is to offer a high-level unification of the processes in such communities, containing all existing theories as special cases. Four higher-level processes are all it takes to describe the ecology of horizontal communities, Vellend claims, and those are modelled on the highly successful four higher-level processes of population genetics: selection, drift, speciation (mutation in genetics) and dispersal (gene flow).

A substantial part of this book is devoted to convincing the reader that such a high-level approach is useful. To do so, Vellend runs through the "history of ideas in community ecology" and dwells on the importance of theory for generalising ecological understanding (including some practical modelling in R, much too short to be of any use). While these first 100 pages are offering little new to the practicing ecologist, they culminate in a list that represents the essence of the usefulness of Vellend's high-level approach: a four-page table of theories, concepts and effects explained through the four above-mentioned processes or their interplay. The Janzen–Connell effect as well as the intermediate-disturbance hypothesis is essentially selection-driven, Island Biogeography a mixture of drift and dispersal, while Hubbell's neutral theory throws in speciation for good measure. This table is essential for understanding the ambition of Vellend in this book (and other publications): identify common ground in community ecology, before getting bogged down in case-specific detail. For me, this table brought this message home clearer than all previous chapters together. Appetite thus wetted, part three provides detailed predictions for the effects of each of the four high-level processes, and the evidence for them. These chapters are assiduously compiled if tenuous to read. Many of the predictions of the actions of selection, ecological drift, dispersal and speciation are near-trivial (e.g. "smaller community size is associated with lower local diversity", p. 139), but they are important, even crucial for this book: Vellend demonstrates that many ecological "laws" can be derived from his four high-level processes, without need for mechanistic details.

The final part of the book is an appeal to using the high-level approach, it is the easiest to read, and the part where Vellend becomes most critical of some existing hand-waving "theories". For example, he encourages textbooks not to dwell on the existing 120 low-level explanations for patterns of species diversity, but rather on how they all work through the four high-level processes. He presents examples of muddled writing and muddled thinking, and how this confuses readers. Vellend ends on a call for structured syntheses, experiments and observational studies to test the missing evidence for his high-level predictions. Community ecology may thereby become an orderly, systematic research field, and the approach may be expandable into other fields of ecology as well.

This book is a curious stepping-stone edifice. It is authoritative, substantial and rich enough to convince the reader to think and work more along the "higher-level processes"-framework. Yet of all its chapters only those on predictions and evidence are worth returning to (8–10, plus Table 5.1). The rest of the book is worth reading, but does not deliver anything new. It is a book that needed to be written to change the way we do community ecology for the better, but an actual textbook for the next generation of astute ecology students will still have to be produced, and why not by Vellend himself?

Carsten F. Dormann
Freiburg, Germany
E-mail address: carsten.dormann@biom.uni-freiburg.de

http://dx.doi.org/10.1016/j.baae.2017.01.003
1439-1791/