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Book Review

Multiplicity in Unity: Plant Subindividual Variation & Interactions with Animals

C. M. Herrera. The University of Chicago Press, Chicago, 2009. x + 437 pp. Price US$40.00 (paperback). ISBN 9780226327945.

The implications of modularity for plants have been recognized for a long time. As Herrera points out in the first chapter, Theophrastus identified reiteration of modules in plants two thousand years ago, and agronomists and horticulturalists have grappled with the 'problem' of within-plant variation for decades because of practical reasons. The analysis and understanding of within-plant variation is a prime example of the substantial contribution that applied disciplines (e.g. horticulture, forestry) can make to disciplines that are more theory driven (e.g. plant ecology, evolutionary biology), a link that has huge latent potential to add value to science, but is seldom exploited.

Herrera acknowledges at the start of *Multiplicity in Unity* that his approach is not theory driven, but descriptive instead and aimed at defining the problem as a foundation for further theoretical development, particularly in terms of understanding the evolutionary aspects of within-plant variation. The focus on plant-animal interactions is mainly because that is a field with which Herrera is most familiar, but the concept of within-plant variation could presumably be extended to any interactions between plants and other organisms that operate at the appropriate scale. In the first two-thirds of the book, Herrera goes to great trouble to describe the problem and its mechanisms, using a wide diversity of examples, combined with his own extensive insights emerging from a career devoted to understanding the problem. The depth of treatment of the topic is ample. *Multiplicity in Unity* is one of those books that is a good example of how decades of work on a particular question by a visionary leader and co-workers can generate a rich contribution to a niche in science.

Generally, most of the chapters include sections on variation in leaves, flowers, fruits and seeds. Because my own interest is the interaction between trees and mammal herbivores, my attention soon turned to picking out the sections about leaves in the first half of the book, but my real interest was the last few chapters that focus specifically on plant-animal interactions and the evolutionary aspects of within-plant variation in traits. Herrera's attention is mainly on insects, rather than mammals, which he explains as an outcome of mammals generally taking bites at scales larger than single organs. I would not agree entirely because several small and medium-size antelope do pick individual leaves or fruit from certain woody species, for example, duiker, steenbok, impala and goats, and I suspect that skirting the plant-mammal interaction is partly an artefact of the generally much greater attention paid to insect herbivores, particularly in Europe and North America, for obvious reasons. The relationship between scales of within-plant variation and scales of mammal herbivore foraging are still quite unclear and need to be further elucidated, if for no other reason than to define the relationship and refine sampling and data analysis methods. As such, Herrera does offer practical and comprehensive overviews of techniques that would be useful for anyone planning a study of within-plant variation.

Throughout *Multiplicity in Unity*, the ubiquity of greater within-plant than among-plant variation is stressed (ad nauseum) and the value of variance as a useful trait in its own right in addition to trait means is emphasized. The message could probably have been delivered in a much shorter book. The text is loose and long winded in places and some concepts are hammered home repeatedly from one chapter to the next, which prompts one to soon start skipping paragraphs or pages if one reads the book from beginning to end. The upside is that one can just as well pick one or two chapters to read and get the gist. The reference list alone occupies a substantial fraction of the book (78 pp., 17%), but is a useful resource in itself.

The chapter headings are exaggerated with long subtitles, presumably intended to highlight the key focus of each chapter, but I feel the 'take-home' message in each subtitle could have been reserved for a summary at the end of each chapter, yielding space on the Contents page for listing the subheadings in each chapter. On summaries, some chapters have them explicitly, but not all do, which is unfortunate – anyone browsing the book with a view to buying it could be swayed by having the chance to glance through a summary at the end of each chapter and get a good idea about the scope of the book. Nevertheless, Herrera has accomplished an impressive feat in producing a landmark book that is rich in information and insight. First impressions may suggest a specialist audience, but *Multiplicity in Unity* is worthwhile prescribed reading for anyone studying or teaching topics in plant-animal interactions, as well as anyone working in the field of plant functional traits, because it covers such a fundamental concept, acknowledgement of which is long overdue.

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