# Books Reviewed



**Positive Interactions and Interdependence in Plant Communities.** Callaway, Ragan M. 2008/ ISBN 978-1-4020-6223-0 (Hardcover) 415 pp. Springer, P.O. Box 17, 3300 AA Dordrecht, The Netherlands.

In this book, Ragan Callaway argues persuasively that ecologists have vastly underestimated the influence of facilitation and positive interactions among species in plant communities. In particular, beginning with chapter one, he forges into battle with the ghost of Henry Gleason and his individualistic view of the biotic forces responsible for structuring plant communities. Callaway makes it clear that the individualistic view is inadequate as a means to describe plant assemblages because positive interactions among species create webs of interdependence. By reviewing a century's worth of literature that spans terrestrial ecosystems across all biomes, Callaway mounts a convincing argument for facilitation as a potent force driving patterns in the succession, structure and function of plant communities.

In chapters two, three, and five, Callaway provides a comprehensive review of the mechanisms that cause direct, indirect, and species-specific positive interactions. He marshals a very large, and arguably excessive, number of examples from the literature to support each purported mechanism. Even Callaway laments that his approach is "a bit mind numbing", but he ultimately concludes that, "sometimes science by siege can make a point." Despite the tedium, these chapters should be required reading for anyone interested in studying facilitation. Callaway challenges the dogma that competition is the primary structuring force in plant communities, although he acknowledges that positive interactions are not new to ecological understanding. He further argues that a renewed appreciation of positive interactions could "catalyze new thinking about old theories." In the end we came to agree with him.

As a complement to the extensive literature review, Callaway also provides two chapters centered on e





the Stress Gradient Hypothesis (SGH), which predicts that as abiotic stress increases, positive interactions will increase disproportionately in importance relative to competitive interactions. The SGH is unfortunately the only major theoretical synthesis explored in any detail but it serves as a refreshing reprieve from the barrage of examples from the literature covered in the first half of the text. Chapter 6 provides a substantial number of thought-provoking examples of facilitation expanding species' realized niches, promoting community stability and biodiversity, impacting exotic species, and the most likely way that facilitation could cause evolutionary changes among interacting species. It was this chapter that stimulated our most thought provoking discussions of potential future research avenues.

This book is almost certainly the most extensive review of the literature on positive interactions in plant communities to date and thus a key source of references on nearly any topic regarding facilitation and its importance. For those specifically interested in facilitation, Callaway's attention to detail in these examples will be a valuable introduction to the most commonly used experimental designs and their shortcomings. To supplement his review of the literature, Callaway occasionally points out specific areas in need of further study, making this book a valuable springboard for those interested in facilitation research. Nonetheless, some of us felt that Callaway missed an opportunity in many places to identify holes in our knowledge regarding specific areas where research is most critically needed to advance the field.

We read this book as part of a graduate-level seminar course, and by the end, nearly all of us were wishing for a more synthetic approach to the topic. Our primary complaint was that the book read more like an annotated bibliography rather than a synthetic work designed to provide novel insights to community ecological theory. Perhaps this is too much to ask when the major thrust of the book is seemingly to convince ecologists that ignoring these interactions leads to scientific peril. Callaway could have made a more compelling argument if he had illustrated that facilitation is the major force influencing species composition or dynamics in communities where competition had previously been the accepted explanation. From an editorial perspective, the book had numerous typos, figures that lacked clarity, references left out of the bibliography, and an index that had too few entries to be of much value.

Initially, the book seemed like a timely and pertinent read for anyone interested in plant community ecology. However, after pouring through the exhaustive list of examples of facilitation that the balance between competitive and facilitativ interactions (Chapter 4) and how research on facilitation contributes to an understanding of a diverse range of topics in community ecology (Chapter 6). Most importantly, Callaway presents dominates over two-thirds of the text, we felt that the target audience for this book should be narrowed to scientists primarily interested in pursuing facilitation-oriented research or to community ecologists who are firmly rooted in the dogma of competition as the driving force in communities. For these groups, the book will undoubtedly provide insight into the methods used to conduct solid research in, and highlight the importance of, positive interactions in plant communities. The extensive literature review will certainly prove invaluable for this audience. For readers with a more general interest in plant or community ecology, however, we suggest reading Chapters four and six first. The introduction to the SGH and the link to larger themes in community ecology (e.g., niche space and co-evolution) will lay the conceptual foundation that gives the reader the context to understand the importance of the numerous examples of facilitation found in other chapters. We also recommend supplemental reading (e.g. Bruno et al. 2003, Brooker et al. 2008) to buttress the theory behind facilitation introduced in this text.

Despite the overall paucity of theoretical implications and syntheses, this book provides a thorough and compelling argument for the critical importance of facilitation in plant communities. Surprisingly, many ecologists still appear to adhere to the Gleasonian (individualistic) paradigm that Callaway effectively skewers. Even as recently as last year, Ricklefs (2008) argued that, "communities are not integral entities." Callaway's myriad examples assault this ideology, and will leave readers with a much greater understanding of the interdependence of species and the influential role that positive interactions play in plant communities. For this Callaway has done the field of plant community ecology a great service.

Literature Cited

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