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A world of opportunists, the parasitic plants (Book review)

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subject elsewhere. Contrast the deleterious effects of fragmentation documented in this volume with the usual solution offered for the "Tragedy of the commons" (Hardin, Garrett, 1968. *Science* 162:1243–1248) in introductory conservation textbooks, which is the assignment of natural resources to individual owners who then have an economic motivation not to overuse (overgraze) them. In the mesic climate of Hardin's original example, the common grazing land could be divided into portions that could each support one cow throughout the year; this approach is not possible where rainfall is sparse and spatially or temporally variable or where some of the grazing land is snow covered part of the year.

Chapter 3 by Coughenour is a good introduction to the ecology of large herbivores (primarily ungulates) in arid and semi-arid temperate and tropical regions for anyone whose training has focused on other sorts of herbivores and ecosystems and/or whose previous experience has been in more mesic regions.

Chapter 14, one of the few chapters to present original quantitative results, includes a new measure of environmental heterogeneity for continuous rasters rather than for maps of discrete patches. Interestingly, the authors use this new method to quantify heterogeneity in access to infrastructure (measured as light intensity and road density) as well as heterogeneity in elevation and NDVI (Normalized Difference Vegetation Indices, i.e., "greenness").

This volume is dedicated to James Ellis, who until his untimely death in 2002 was P.I. of the NSF Biocomplexity grant acknowledged by each of the book's chapters. The book itself is a testimonial to his ability to assemble and guide an impressively multi-national team. Kenya is represented by 14

authors, mostly affiliated with International Livestock Research Institute in Nairobi, Kazakhstan, Mongolia, and the United Kingdom, each provided one author, and three authors are affiliated with CSIRO Sustainable Ecosystems (Australia). Most of the U.S. authors are affiliated with the Natural Resources Ecology Laboratory of Colorado State University, Fort Collins, as was James Ellis.

Finally, a disclaimer: substantial portions of most of the chapters in this book fall into the fields of geography, political science, or other social sciences rather than biology. They therefore fall outside my professional expertise as an ecologist and rangeland biologist and so I defer to appropriate social scientists as to their accuracy. However, the information, arguments, and conclusions in the "social science" portions of this book seem reasonable to me. These portions are straightforward and quite readable for biologists without advanced training in these fields. Very little social science jargon is used. In fact, I would recommend this book to ecologists who have not had much exposure to the social, political, or economic aspects of rangelands, as an introduction to these subjects.

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A world of opportunists, the parasitic plants

Heide-Jørgensen, Henning S. 2008. **Parasitic flowering plants**. Brill, Leiden, The Netherlands. xiv + 438 p. \$148.00, ISBN: 978-90-04-16750-6 (acid-free paper).

Key words: haustoria; hemiparasitism; holoparasitism; host-parasite interactions; parasitic plants.

All kingdoms of life from Archaeobacteria to Animalia exhibit organisms with a parasitic approach to living whereby they opportunistically acquire resources from a host. Plants are no exception. Approximately one percent of documented flowering plants, or ~4500 plant species, distributed across the globe are parasites. One of the first comprehensive books on parasitic plants, Job Kujit's classic, *The biology of parasitic flowering plants* (1969. University of California Press, Berkeley, California), is the inspiration for *Parasitic flowering plants*. Since the publication of Kujit's book, a number of texts have been written about weedy parasitic plants or particular topics on parasitism in plants, such as anatomical structures. *Parasitic plants* (Press, M. C., and J. D. Graves, editors, 1995. Chapman and Hall, New York) is one of the few books written since Kujit's work that integrates a wide body of knowledge about the basic biology of parasitic plants. Press and Graves' edited book is written primarily from a technical standpoint and addresses an audience of researchers and academics. Lacking

from the literature is a modern book on parasitic plants that is interesting to researchers, yet accessible to everyday readers. In the preface of his new book, Henning S. Heide-Jørgensen sets out to instill in both novice and expert readers an appreciation for the world's parasitic plants. By and large Heide-Jørgensen accomplishes this goal.

Parasitic flowering plants begins with the first of eight chapters by distinguishing parasitic plants from plants that might be incorrectly considered parasitic such as epiphytes, mycoheterotrophs, and carnivorous plants. Chapter 1 also distinguishes between stem vs. root parasites and hemi- vs. holoparasites and briefly describes the anatomical structure plants use to parasitize host plants, the haustorium. Then Heide-Jørgensen launches into an overview of the twenty families of plants with parasitic species. This overview consists of three chapters, comprising nearly three-quarters of the book. Recent molecular studies have moved many parasitic plant species into different families. Specifically, many species previously in the Scrophulariaceae are now in the Orobanchaceae. This work provides a timely synthesis of these recent taxonomic re-classifications. Throughout these chapters considering taxonomy there are interesting tangents on seed dispersal, pollination, and the cultural significance of parasitic plants that maintain the reader's attention despite a bombardment of scientific nomenclature.

Following the taxonomic overview, the remaining four chapters of the book focus on the physiology, ecology, control,

and evolution of parasitic plants. In my opinion, these are the chapters that will most easily entice the broadest group of readers because they provide the context for studying parasitic plants. Chapter 5 traces parasitic plants from germination and host recognition to the formation of the haustorium and the physiology of water relations. The large collections of high-quality photographs taken by microscope that appear in this section help the reader to visualize the establishment of the parasite on the host. The next chapter considers the ecology of interactions between host plants and non-host organisms such as pollinators, seed dispersers, and herbivores. A description of vegetation types where parasitic plants occur is also included. Chapter 7 identifies the relatively few, though heavily studied, species of parasitic plants harmful to agriculture and forestry, along with methods on their control. The final chapter unifies all the ecological information on the various taxa from an evolutionary perspective. The book closes with an acknowledgment of the need to conserve the world's unique parasitic plants.

Parasitic flowering plants has three primary strengths. First, the book has over 495 color pictures and illustrations. These pictures both instill an appreciation for the beauty of parasitic plants and reinforce the concepts that the book presents. These pictures along with the text truly inspire a fascination of the parasitic flowering plants of the world. Second, throughout the text there are charming pieces of information on the cultural and medicinal significances of parasitic plants. These anecdotes keep the reader interested despite the somewhat repetitive descriptions of different families in the taxonomic chapters. Third, the inclusion of a glossary of technical terms that is referenced throughout the text provides definitions of technical terms used. This glossary is especially instrumental in making the book available to a broader audience.

There are a few alterations that might improve the book. First, the organization of the material in the book may not grab the readers' attention and provide enough background in the beginning. After a brief introduction to parasitic plants, the

book focuses for quite some time on taxonomy. Given that the purpose of the book is to inspire an appreciation for parasitic plants in a wide group of people, moving the last four chapters from the end to the front of the book would provide more context to readers to ensure that they understand why parasitic plants are so captivating. Second, the book needs better editing. At times there are several misspelled words on a single page, or all of the symbols given in a figure legend are not actually included in the figure. These typographical errors tend to detract from the contents of the book. Third, there are unfortunately no footnotes or within-text citations referencing the selected literature at the end of the book to direct readers to further information. In particular, when the book describes the modes of seed dispersal for an entire genus, such as *Pedicularis*, it would be helpful to know if such extensive research really has been done on all of the species within the genus. Better documentation of references to assert the facts presented would strengthen this work.

Parasitic flowering plants fills a gap in the literature by providing a comprehensive overview of parasitic plants that is accessible to both researchers and everyday readers. On the whole, *Parasitic flowering plants* accomplishes Heide-Jørgensen's goal of instilling an appreciation for parasitic plants in a broad audience through the book's plethora of colorful pictures, interesting anecdotes, and synthesis of the large body of information on parasitic plants. This work truly inspires an admiration for the diversity of forms and unique ecology and evolution of this world of opportunists, the parasitic plants.

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Noninvasive survey methods for carnivores: Don't touch!

Long, Robert A., Paula MacKay, William J. Zielinski, and Justina C. Ray, editors. 2008. **Noninvasive survey methods for carnivores**. Island Press, Washington, D.C. viii + 385 p. \$90.00 (cloth), ISBN: 978-1-59726-119-7 (alk. paper); \$45.00 (paper), ISBN: 978-1-59726-120-3 (alk. paper).

Key words: carnivores; conservation biology; mammals; noninvasive methods.

Among ecologists, most mammalian predators are considered the top of the "charismatic megafauna" list. Thus, a book focused primarily on methods for surveying these animals may elicit some negative responses from ecologists studying those animals with less "appeal." This view, however, does not change the basic fact that predators, by and large, have lower densities, are more endangered, and are more difficult to detect than other species of comparable size. When an animal species is difficult to find and trap, and endangered to boot, it becomes important to find ways to study them that have both high rates

of detection, and little impact on individuals and populations. That, in essence, is where this book comes in.

First, I would like to state that much of my research has been on rodents. As anybody who studies rodents knows, the standard methodologies (e.g., mark-recapture and captive studies) are highly invasive. Therefore, it was with much interest, but also with a certain amount of skepticism, that I approached this book. I should state that the interest was justified, but the skepticism was not.

The entire book was well written and easy to follow. The methods for noninvasive surveys were, in every chapter, well explained, and accompanied by clear drawings (a highly effective tool that is underutilized in the professional literature of field biology) and informative photos. The multiple examples of utilization of each method are also invaluable, both as proofs of concept and as variations on the different themes. Add comparisons of strengths and weaknesses of methods and variations in methods, and even lists of materials that are needed and predicted costs, and this book becomes, in my humble opinion, an invaluable resource for studies of mammalian carnivores.