Ecology, 78(5), 1997, pp. 1612–1613

Parasitic Plants

Press, Malcolm C., and Jonathan D. Graves (eds.). 1995. **Parasitic plants.** Chapman and Hall, New York. xii + 292 p. $64.50, ISBN: 0-412-37120-0.

The editors state that the purpose of this book is to focus on advancements made since the appearance of *The biology of parasitic flowering plants* (Kuijt, J. 1969. University of California Press, Berkeley, California) rather than attempt a comprehensive coverage of all aspects of parasitic plant biology. Indeed, a vast amount of information on parasitic plants has been published in the 28 years since Kuijt's monograph, and for this reason it is unlikely that any single volume could adequately encompass this literature. Furthermore, the book attempts to "provide a baseline of information to fill the gap since Kuijt's text." *Parasitic plants* has, at least to some degree, helped fill that void since very few books have appeared that summarize past work and report recent advances in parasitic plant research. In addition to the introduction to parasitic plants by Musselman and Press, the book consists of ten chapters that fall within five general areas: haustorial development, physiology, reproductive biology, genetics, and agronomy. The chapter topics are as follows: seed germination (Boone, Fate, Chang and Lynn), haustorial initiation and differentiation (Riopel and Timko), mineral relationships (Pate), carbon and nitrogen relations (Press), water relations (Ehleringer and Marshall), host-plant response to parasitism (Graves), reproductive ecology and biology (Molau), genes and genomes (dePamphilis), parasitic plants as weeds (Riches and Parker), and control of parasitic weeds (Eplee and Norris). Given space constraints, only selected chapters from each of the five areas will be discussed.

The chapter by Boone, Fate, Chang and Lynn reports recent advances made toward understanding the mechanism associated with parasite recognition of host-derived germination stimulants (xenognosins). This chapter provides an excellent review of past and recent research on strigol and a hydroquinone named SXSg (*Sorghum xenognosin* for *Striga* germination) that appears to be the natural biological stimulant. One small error is that the strigol analogues called "GR compounds" were not named for their growth regulatory activity but after Gerald Rosebery, a postdoctoral student in Johnson's lab in the mid 1970s. The physiological adaptations that allow parasitic plants to extract water, minerals, and (in some cases) photosynthates from their hosts are complex and varied among the different groups. As noted in the conclusion of the chapter by Press, carbon, nitrogen, and water relations in parasitic plants are intrinsically linked; however, information on these topics is present in four different chapters. Better integration of this information (within fewer chapters?) would have avoided redundancy and assisted the reader in locating information. The chapter by Graves explores the ecological impact parasites have on plant communities as well as host–parasite interactions such as competition for water, inorganic nutrients, and carbon. Similarly, the chapter by Pate also examines mineral composition, osmotic balance, and mineral transport between host and parasite. The opening paragraph of this chapter states that Loranthaceae and Viscaceae are "xylem-tapping species with no proven ability to abstract phloem-borne solute." That *Arceuthobium* (Viscaceae) obtains organic nutrients from its hosts was conclusively shown by O. A. Leonard and R. J. Hull (1965. Translocation relationships in and between mistletoes and their hosts. Hilgardia 37:115–153) and later by others (e.g. Rey, L., A. Sadik, A. Ferf, and S. Renaudin. (1991) Trophic relations of the dwarf mistletoe *Arceuthobium oxycedri* with its host *Juniperus oxycedrus*. Journal of Plant Physiology 138: 411–416). Confusion is introduced by statements that *Cuscuta* and *Cassytha* are holoparasites when, in fact, only some species of dodder are holoparasitic and all species of *Cassytha* are hemiparasites. The relevant series of papers on *Cuscuta* physiology by Wolswinkel were missed.

Haustorial structure and development in Santalales and Scrophulariaceae is examined in detail by Riopel and Timko. The intensive and exhaustive coverage of the topic at times makes reading a bit burdensome; however, the chapter does provide an excellent gateway to the vast and often scattered literature on this subject. Especially welcome is the treatment of the mechanism of haustorial induction—one of the fastest multicellular developmental responses known in angiosperms. Minor editorial distractions include several misspelled generic names and the treatment of familial and ordinal names in the singular (as also occurs in Chapter 7).

The chapter by Molau is an ambitious attempt to "discern general trends" in the reproductive ecology (i.e., pollination biology and seed dispersal) among all groups of parasitic plants. Indeed, this is the only chapter that attempts a broad coverage of parasites that display the entire gamut of syndromes. In so doing, taxonomic background information is included, thereby diverting attention away from the main themes. Descriptions of reproductive features often cite *Flora of Ecuador* or Kuijt (1969, see above) instead of primary monographic treatments. Attention to more recent references would have resulted in more accurate information on floral, fruit, and life history features. The chapter is replete with factual errors such as incorrect estimates of numbers of species and genera for Balanophoraceae, Loranthaceae, and Olacaceae. With reference to Olacaceae, the statement that ". . . flowers show little diversity . . ." is clearly erroneous since this family shows an incredible array of floral morphological diversity (Sleumer, H. O. 1984. Olacaceae Monograph No 38. New York Botanical Garden, New York). Similarly, there is confusion on the structure of mistletoe seeds, stamen number in *Hydnora,* host breadth in *Cytinus* and *Hydnora.* This chapter would have been greatly improved by stringent editing by experts on these diverse groups.

An excellent summary of the growing body of molecular work that has been conducted on parasitic plants is provided by the chapter on genes and genomes by dePamphilis. This chapter mainly focuses upon molecular phylogenetic and evolutionary questions in hemi- and holoparasitic Scrophulariaceae, although reviews of work on *Cuscuta,* Santalales, etc.

are also included. Using a comparative evolutionary framework, the author illustrates how both the plastid and nuclear genomes have been substantially altered in those parasitic plants that have lost photosynthesis. This chapter is well written and contains very few typographical errors.

The treatment of parasitic plants as weeds by Riches and Parker provides a thorough and well-written discussion of those species that negatively impact timber, fruit tree, and agricultural crops. Most of the text is devoted to the root parasitic Scrophulariaceae (*Striga* and *Orobanche*) and *Cuscuta*; however, some attention is paid to pathogens in Santalaceae, Loranthaceae, Viscaceae, and even Balanophoraceae. I found the up-to-date statistics on crop losses especially useful since this information is often difficult to access. This chapter is complemented by the following one by Eplee and Norris which summarizes the methods currently being employed to control parasitic weeds.

Representing approximately 1% of the world's angiosperm species, parasitic plants are increasingly being recognized as important ecologically, genetically, and economically. To date, six international symposia on parasitic plants have occurred, yet the proceedings from these meetings are often not widely available. For this reason, *Parasitic plants* provides needed access to some of this literature. The book will find use as a reference by interested students, ecologists, plant physiologists, and scientists working in more applied, agriculturally-related disciplines.

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Ecology, 78(5), 1997, pp. 1613–1614

PRIORITIES FOR THE CONSERVATION OF NEOTROPICAL BIRDS

Stotz, D. F., J. W. Fitzpatrick, T. A. Parker III, and D. K. Moskovits. 1996. **Neotropical birds: ecology and conservation.** University of Chicago Press, Chicago, Illinois. xx + 478 p. $100.00 (cloth), ISBN: 0-226-77629-8 (acid-free paper); $37.50 (paper), ISBN: 0-226-77630-1 (acid-free paper).

When the lives of bright scientists are cut short by tragedy, entire fields of study can lose troves of information. Miraculously, botanist Alwyn Gentry and ornithologist Ted Parker had finished major compilations of their knowledge about plant identification and bird distribution before perishing in a plane crash in Ecuador in 1993. Gentry's *A field guide to the families and genera of woody plants of northwest South America* is now known affectionately as "La Biblia" to students of tropical plant taxonomy for its encyclopedic descriptions of the largest floras of the world. With the publication of *Neotropical birds: ecology and conservation,* Parker's equally vast knowledge of the habitat requirements and distributions of Neotropical birds is now available and put to use to outline priorities for the conservation of these species.

This book is based on a remarkable database of the zoogeographic and ecological attributes of the 3751 species of birds occurring in Mexico, the Caribbean, and Central and South America. Parker compiled most of the database and wrote one chapter whereas co-authors Stotz, Fitzpatrick, and Moskovits wrote and edited the other chapters. The sheer size of the database (occupying 333 pages including references and guide) is a reflection of not only the world's most diverse biome, but also the 50 total years of experience the four authors have logged in the study of Neotropical birds and their habitats. Each species is put into one of four categories of extinction risk based on an explicit list of criteria that considers habitat specificity, range, and current habitat availability. The database is well organized, with legends explaining the variables printed on each page to aid in interpretation. The database is also available separately in digital format, providing ecologists and conservationists with the grist to perform their own analyses.

Rather than focusing on the ecology of this vast fauna *per se,* Stotz et al. concentrate on using the ecological information to identify priority areas for conservation. The authors draw a picture of where Neotropical birds occur geographically and where and why they are at risk. They are interested not so much in areas where raw diversity is high as in regions that include assemblages of endemic or habitat-limited species. By combining this analysis with information on where habitat destruction is occurring, the authors arrive at their goal of listing critical areas for conservation. Interestingly, humid forests, the habitats with the highest species richness, are not high on the list of priorities in spite of widespread attention in the popular media. Also not included as high priorties are Nearctic-Neotropical migrant species, much in the news lately, which have wide habitat tolerances. Instead, the unsung Atlantic forest of Brazil, the scrub habitats of central South America, and the northern Andean montane forests emerge as the most critically endangered habitats harboring the most species at risk of global extinction. The authors argue cogently that international conservation efforts and the media should focus first on these latter areas.

The text is divided into sections on vegetation zones, bird migration, and priorities for protection. The vegetation section is a detailed description of 41 habitat types classified by the authors' subjective perception of where distinct bird assemblages occur. Each habitat type is exhaustively analyzed based on richness of species, including those at risk, and