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Book review

Pitcher Plants of the Americas, Stewart McPherson. The McDonald & Woodward Publishing Company, Blacksburg, Virginia, USA (2006). viii + 320 pp., ISBN 0-939923-74-2, US \$34.95 (paperback), ISBN 0-939923-75-0, US \$44.95 (hardcover)

When I first heard of this book I was skeptical for several reasons. First, I already had nine books on carnivorous plants in my library and wondered how this one could be any different. But what self-respecting botanist can resist any book on carnivorous plants?

I'll start with a few random observations. Although the printing date is November 2006, I believe that this book was not actually released until early 2007. Also, the cover photos are different on the hardcover and softcover editions. The former shows a stand of *Darlingtonia californica*; whereas, in the latter, the same picture is muted in the background with an inset of *Sarracenia leucophylla* as the focal subject. I liked both versions. My review copy was the softcover, which was bound well (10 sewn quires glued to the cover) with high-quality paper and excellent color reproduction.

Ten percent of the book is devoted to introductory material where the taxonomy of carnivorous plants is summarized in a brief but succinct fashion. The general introductory descriptions of the included genera appear to be fine. There is a table that provides a taxonomic outline of carnivorous plants worldwide. Although the table conveys the "accepted" classification as suggested by recent summaries (e.g., APG II, 2003), there is no reference to that or any other contemporary systematic study. In general, the Bibliography is top-heavy with fairly dated citations. Of the 75 cited references, only 18 of them (less than 25%) have been published within the past decade. I have no objection to citing older literature unless it has been done at the expense of pertinent recent literature, which appears be the case here. I expect that most readers of this book already will be well-versed in the historical literature dealing with carnivorous plants, and would probably benefit more from an overview of the recent systematic literature on the subject. As one example, it is now clear that Droseraceae, Drosophyllaceae, Nepenthaceae (and Polygonaceae) occur within a clade that is distinct from the "core" Caryophyllales and have been assigned either to the "noncore" Caryophyllales or to Polygonales (e.g., APG II, 2003; Judd et al., 2002; Soltis et al., 2005). This slight but important distinction completely escapes the reader, who simply sees the families assigned to Caryophyllales.

Moreover, the next section on the evolution of the American pitcher plants suffers substantially from a failure to incorporate recent literature. The author essentially concludes (pp. 22–23) that the lack of fossil evidence precludes an elucidation of phylogenetic information for the group, which therefore must be based on an evaluation of their contemporary biology and distribution. Nothing is further from the truth, given the virtual explosion of phylogenetic information on carnivorous plants that has resulted from numerous intensive molecular phylogenetic studies. Again, this oversight can be linked directly to the failure to consult critical literature. For instance, it was odd to see a fairly lengthy discussion regarding the possible relationships of genera in Sarraceniaceae as hypothesized on the basis of non-phylogenetic methods. Nearly seven pages are spent debating whether it is Heliamphora or Darlingtonia/ Sarracenia that represents the most primitive element in the family. Ironically, neither case is correct. In actuality, there have been several molecular phylogenetic studies of Sarraceniaceae that clearly resolve Darlingtonia as the sister genus to a clade consisting of Heliamphora and Sarracenia (Albert et al., 1992; Bayer et al., 1996). Case closed. These studies appeared in high profile journals and I cannot understand how any carnivorous plant enthusiast could possibly be unaware of this information.

The majority of the book (roughly 73%) provides comprehensive overviews of the five included genera (Brocchinia, Catopsis, Darlingtonia, Heliamphora, Sarracenia), each within a separate chapter. Immediately, the novelty of the present book materializes. I am familiar with only one other major reference on carnivorous plants (Cheers, 1992) that includes all five genera; however, that work dedicated a total of only eight pages to Brocchinia, Catopsis, and Heliamphora combined. Another reference (Pietropaolo and Pietropaolo, 1993) provided somewhat better coverage (six pages) of Heliamphora. The present work provides vastly improved accounts of these genera by devoting 20 pages to the two species of Brocchinia, 12 pages to Catopsis (monotypic) and 90 pages to the 15 species of Heliamphora. To round things out there are 22 pages on Darlingtonia (monotypic) and 90 pages on Sarracenia (eight species). Treatments of the latter two genera are comparable in scope (i.e., 14 and 130 pages, respectively) to a recent overview of North American carnivorous plants (Schnell, 2002).

Obviously, page count alone is a crude quantitative comparison and provides nothing in the way of a qualitative assessment of content, which I will summarize next. In each chapter there is an overview of the genus followed by individual accounts of each species. A similar format is used for each genus. There is a statement regarding the etymology of the name followed by a general overview of the taxonomy, ecology, reproductive biology, trapping mechanisms, etc. A section entitled "plant structures" describes both vegetative and reproductive morphology and is accompanied by a line drawing. The habit line drawings are not bad, but they are tersely labeled and lack a scale. There also is a drawing of the pitcher in longitudinal section, with a few general details labeled. Again, no scale is provided for size reference. There is a summary of the distribution that is accompanied by an attractively shaded color map. However, I could not find any indication describing how these maps were constructed, i.e., whether they were specimen based, literature based, observational based or prepared otherwise. The habitats are described in fair detail.

Treatments for each species (and subordinate taxa) in the genus then follow. First, the original citation is provided for the species name (I checked several of these using the International Plant Names Index, IPNI, website and they were accurate. One minor irritation was the use of "ssp." as an abbreviation for "subspecies". I don't know why people opt to use this form rather than the preferred "subsp.", which avoids confusion with other abbreviations. Again, there is a brief explanation of the name's etymology, which is followed by a description of the vegetative morphology that avoids technical botanical terminology (e.g., "seed pod" rather than "capsule"). Distribution maps similar to those used for the genera are included for most species. However, these use inconsistent coding, which can be confusing, especially for Heliamphora, where each map shows the Guiana Highlands as a green-shaded region and each species' distributional "range" as a red dot or dots. Unfortunately, none of the captions explains what the colors or symbols signify. Because the distributions of species in other genera are indicated by shading and not by dots, I wonder how many readers initially will presume that every species of Heliamphora has an identical distribution (and wonder what the dots mean). The treatments for Darlingtonia, Heliamphora and Sarracenia species tended to contain more extensive lifehistory information, which is not surprising given they are much better known. Generally, the species accounts convey a wealth of useful life-history information. Although it was difficult to evaluate, I presumed that much of that information was novel and based on the author's extensive field work.

But what would a book on carnivorous plants be without color photographs? If you have read Darwin's (1875) *Insectivorous Plants*, then you might agree that he could have used a bit of help in this area. The photographs in the present book are numerous and stunning. Apparently the illustrations represent the cream from a collection of 35,000 original photographs taken by the author on the subject. Nevertheless, he also includes a few carefully credited pictures taken from other sources. Overall, the book is extremely well-illustrated and nicely conveys the habits, habitats and beauty of this group of plants. Surely in this case, a "pitcher" is worth a thousand words (or at least a few good photos). Yet, I was immediately shaken out of my reverie when I encountered another glaring misstatement (page 55): "Relatively little research has focused on *Catopsis*, and the evolutionary relationship of the genus to other bromeliad species remains unclear." It literally took me seconds to locate several thorough accounts on the phylogenetic relationships of the genus in which *Catopsis* and *Glomeropitcairnia* resolve as a sister clade (or grade) to Bromeliaceae subfamily Tillandsioideae, with *Brocchinia* resolving as the sister group to the remainder of the family (Terry et al., 1997a,b). That sounds like fairly precise information to me. Certainly this book has its strengths and weaknesses.

The final two chapters deal with conservation issues and cultivation. I found the chapter on habitat loss and extinction to reflect a sincere conservation ethic on the part of the author, who provides the disclaimer that no pitcher plants were harmed or even collected during the preparation of the book. I liked that. There is an excellent account of the CITES regulations regarding rare plant trade and a reminder that it is "compulsory to comply" with these international laws. It was refreshing to see this approach because authors often fail to convey to the reader the importance of ensuring the long-term survival of such desirable horticultural specimens. Detailed contact information (including websites) is provided for pertinent conservation organizations and for sources of cultivated material.

I have found that glossaries often contain at least a few errors and this one is no exception. The term "annual" (p. 303) is defined as: "A plant that germinates, grows, flowers and reproduces within one year." True, however, there are many perennials that can do the same. The key distinction is that an annual lives for only 1 year. "Perennial" (p. 306) also is defined incorrectly as "A plant which lives for more than two growing seasons." Although such plants would indeed be perennials, so would those living only 2 years, i.e. strict biennials, which in reality are short-lived perennials. "Vegetative reproduction" (p. 303) is described as a process "involving no exchange of genes". In actuality, vegetative reproduction transmits an identical set of genes (barring any somatic mutations). "Cotyledons" (p. 304) are defined as "The first leaves produced after germination." However, cotyledons are present in the embryo prior to germination. Technically, the first leaves to be produced after germination are the plumule leaves. Other such errors occur, but most are similarly picky.

As I have already indicated, this book has both good and bad points. Fortunately, the good outweigh the bad. There is no question that this text represents the most authoritative treatment of this subject to date, a well-deserved accolade despite the fact that it is also the first such treatment specifically focusing on American pitcher plants. A major contribution (and principal objective of the book) is to provide an expanded knowledge base for several relatively poorly known carnivorous genera (i.e., *Brocchinia, Catopsis*, and *Heliamphora*) and to supplement information for the more familiar *Darlingtonia* and *Sarracenia*. In conjunction with the excellent photographs, the book accomplishes this objective well.

The major drawback of this book is its obsolete presentation of systematic information. One would hope that a future edition

would include a thorough rehash of the phylogenetic issues that is based upon a comprehensive survey of the pertinent literature. I would also like to see a more carefully worded glossary, better-labeled drawings with scales, and more information regarding how the distribution maps were compiled. The map captions also should clarify the nature of any symbols or shading used.

Overall, carnivorous plant enthusiasts will find this book to be a useful reference and one that is perhaps the least redundant in terms of the information contained within it. It is essential reading for anybody interested specifically in *Brocchinia*, *Catopsis* or *Heliamphora* but would be enjoyable reading for nearly anyone with a general interest in carnivorous plants.

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