BOOK REVIEW

Blüte und Frucht. Morphologie, Entwicklungsgeschichte, Phylogenie, Funktion, Ökologie. 2nd, fully revised edition. Peter Leins & Claudia Erbar. Stuttgart: E. Schweizerbart'sche Verlagsbuchhandlung (Nägele u. Obermiller). 2008. xii + 412 pp., 258 illustrations, 3 tables. ISBN 978 3 510660 46 9. €49 (hardback).
doi:10.1017/S0960428609000080

This book is ambitious as it aims to cover almost every aspect of flowers and fruits: their morphology, ecology, development, function and phylogeny. It is now in its second edition, awaiting a translation into English.

Leins and Erbar claim to continue the legacy of Jean-Baptiste Payer, a 19th-century floral morphologist who produced an extraordinary work on floral development in 1857 (*Traité d'organogénie comparée de la fleur*). The book consists of several chapters, without clear numbering and with no major headings. It could be grossly divided into a morphological part (floral structure), followed by adaptations to pollination, and finally adaptations to seed dispersal. In an appendix, the major orders and families of APG II (Angiosperm Phylogeny Group, 2003) are listed with their floral formulae. This is a welcome addition not present in the first edition.

The concept of the book is a progressive approach to flower structure and reproductive mechanisms. It starts with a description of the genetic background to flower development, then moves on to floral initiation up to maturity and pollination syndromes, and ends with seed formation and dispersal. The illustrations are mostly excellent, largely drawn from the long and prolific research of the authors and their students stretching back over four decades. The use of tables to summarise information throughout the book is helpful and makes the book a practical source of data.

Although the book is well written and easy to use, with clear and concise information, the choice of sources is rather selective and often 'in house'. This leads to some chapters appearing overly detailed, including superfluous statistical data (e.g. seed distribution), while others appear rather short (e.g. a single page on floral symmetry). The authors list a number of references at the end of each chapter without having referred to them in the text. Although this facilitates reading, one has to guess about the origin of sources. For example, the only reference to the *Loasaceae* is to the authors' own floral developmental studies, with no reference to Larry Hufford's extensive studies on the family (e.g. Hufford, 1990).

The book begins with general information about life cycles, including a general account of the origin of flowers. The section on floral development is strongly infused by the authors' own research, perhaps at the expense of other evidence and sources. Some earlier strong assumptions about the evolution of the androecium have been weakened. However, I like the chapters on the development of floral cups

and the floral axis where it is shown that floral development is a determining factor of mature structures and how subtle changes early on can have a profound influence at maturity. The material on seed formation lacks illustrations of the development of seeds and seed structure. The chapter on inflorescences is limited; no aspects of growth patterns are discussed, nor is there any discussion of bracts versus bracteoles. As mentioned, the section on symmetry is short, despite this representing one of the major elements of floral morphology, and several essential references are missing (e.g. Endress, 1999). No reference is made to review studies of staminodes by Walker-Larsen & Harder (2000) and Ronse De Craene & Smets (2001).

There is an abrupt transition from the floral descriptive part to the function of flowers. The authors present good examples and illustrations of different pollination strategies, such as dichogamy and herkogamy. Mechanisms of secondary pollen presentation in *Campanulales* are also well explained, based on the authors' research, but at the expense of comparable explanation of other groups. The chapter on co-adaptations of flowers to pollination relates to many different flower types that have evolved in response to specific pollinators. There is a good overview of flower types but it is built up in a confusing way, mixing form, chemical properties, colours, smells, etc. The distinction between different modes of dispersal appears superfluous and often refers to adaptations of fruits and seeds. There is (too) much terminology about fruit types, making this chapter over-complex.

The appendix is very useful, although some symbols are not always consistently used in floral formulae (e.g. *Schisandraceae* $P\infty A\infty$ against *Trimeniaceae* P0–21 A7–17).

In conclusion, the book is strongly infused with the research of Leins and Erbar, which is extensive and scientifically sound. Despite some shortcomings this is a comprehensible introduction to flower and fruit morphology, recommended for general reading and the mature student.

References

Angiosperm Phylogeny Group (2003). An update of the Angiosperm Phylogeny Group classification for the orders and families of flowering plants: APG II. *Bot. J. Linn. Soc*. 141(4): 399–436.

Endress, P. K. (1999). Symmetry in flowers – diversity and evolution. *Int. J. Pl. Sci*. 160(6) (Suppl.): S3–S23.

Hufford, L. D. (1990). Androecial development and the problem of monophyly of Loasaceae. *Canad. J. Bot*. 68: 402–419.

Ronse De Craene, L. P. & Smets, E. F. (2001). Staminodes: their morphological and evolutionary significance. *Bot. Rev*. 67: 351–402.

Walker-Larsen, J. & Harder, L. D. (2000). The evolution of staminodes in angiosperms: patterns of stamen reduction, loss, and functional re-invention. *Amer. J. Bot*. 87: 1367–1384.

L. Ronse De Craene