BOOK REVIEWS

Flora Malesiana, Series I. Volume 18. Apocynaceae (subfamilies Rauvolfioideae and Apocynoideae). D. J. Middleton. Leiden: Nationaal Herbarium Nederland. 2007. iv + 474 pp. CD-ROM with keys constructed in LUCID PHOENIX by H. Nooteboom. ISBN 978 90 71236 65 5 (NUR 941). €65 (paperback).
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This volume consists largely of an excellent descriptive account of the 43 genera and 295 native species of *Apocynaceae* subfamilies *Rauvolfioideae* and *Apocynoideae* in Malesia. These two subfamilies comprise *Apocynaceae* in the traditional sense, i.e. prior to the inclusion of the more derived groups formerly placed in *Asclepiadaceae*. The synonymy on page 1 reflects the modern, wider family circumscription, but the description that follows is limited to variation encountered within the two subfamilies treated in this volume. The Flora account is based largely on the series of revisions by Leeuwenberg and his students in Wageningen, and continued in more recent years by David Middleton. Generic and specific concepts mostly follow these revisions, but recent molecular evidence supports the recognition of *Amphineurion* (A.DC.) Pichon as distinct from *Aganosma* (Blume) G.Don and the resurrection of *Micrechites* Miq. as distinct from *Ichnocarpus* R.Br. In addition, the treatment of *Chilocarpus* Blume presented here differs markedly from that published by Leeuwenberg.

The systematic section starts with two artificial keys to genera – the first to genera native in the region, the second concerning commonly cultivated exotics not covered in the first key. It would have been preferable for the second key to have included all of the cultivated genera, despite the small element of duplication this would have involved. Keys to both genera and species are well constructed, with clear, contrasting, and easily observed characters. In the largest genus in the Flora area, *Alyxia*, regional keys are presented facilitating the identification of species in each of six major geographic subdivisions of the area.

Other valuable aids to identification include the excellent line drawings – although some of the trends in floral and fruit morphology that would have been apparent had a phylogenetic sequence of genera been adopted are obscured by the strictly alphabetic arrangement.

In addition, a number of valuable and potentially diagnostic characters or ecological preferences are outlined in the introductory chapters. A separate section to highlight some of these 'spot characters', as in the excellent Flora of Thailand *Apocynaceae* account (also written by David Middleton), would have assisted users to narrow the choice of likely genera.

The volume is accompanied by a CD-ROM, prepared by H. Nooteboom independently of D. Middleton, that contains electronic versions of the printed

keys, and photographs of many species from the region. The keys are enhanced by line drawings illustrating many of the characters used, but the line drawings are not always as informative as they should be – the one used to illustrate the 'small intrapetiolar stipule-like structure in the axil of the petiole' of *Tabernaemontana* does not show the structure clearly, and is more likely to confuse than help the user. A couple of unfortunate glitches in the electronic key reduced its value considerably. Couplets with ranges of numerical values are unintelligible as the dash between figures was lost somewhere along the line. There is a useful geographic filter to isolate, for example, only those species occurring in New Guinea. This was welcome, but could not be used in conjunction with the main key and, although there is a facility to skip a couplet, the benefits of multi-access key design were not realised.

Photographs illustrate and supplement the key, with many more available on the CD, but there is unnecessary replication with two or more near-identical images of several species. Labelling could be more informative – two slightly out-of-focus images, labelled Alstonia scholaris1_DM and Alstonia scholaris2_DM, turn out to be close-ups of the whorled leaf petioles of this species. Since I am more familiar with the highly derived flowers of subfamily *Asclepiadoideae* than those of this group of *Rauvolfioideae*, I initially interpreted the images as some strange floral structure. These images would be more accessible if reduced in number, and labelled more accurately.

Despite such niggles, this volume represents an invaluable guide to this important group of plants in SE Asia, and is recommended enthusiastically.

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Ecology and Evolution of Flowers. Edited by Lawrence D. Harder & Spencer C. H. Barrett. Oxford: Oxford University Press. 2006. xx + 370 pp. ISBN 0 19 857086 4. £37.50 (paperback).

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Flower evolution is one of the most intensely studied areas of plant biology. Thus books such as *Ecology and Evolution of Flowers*, which help frame the current state of knowledge, are particularly welcome. This authoritative volume not only provides an extensive review of the major research topics in plant evolutionary ecology, but also contributes new empirical data and theoretical considerations, whilst emphasising factors which have received little attention to date (often for practical reasons).

Ecology and Evolution of Flowers is dedicated to the late David G. Lloyd, a pioneer in the development of strategic approaches for understanding the diversity of plant reproduction. Chapter 1, a tribute by the editors Barrett and Harder, takes a historical perspective by retracing Lloyd's career and assessing his major contributions to the field. The remaining 17 chapters, by eminent researchers in plant ecology and evolution, provide new insights into a diverse array of interconnected topics and

highlight areas for future work. These are divided into four sections, all of which have a brief and useful introduction by the editors.

The first part, 'Strategic perspective on plant evolution', explores different theoretical approaches for modelling plant reproductive strategies. The three chapters in this complex and often arduous section illustrate the process of theoretical development, and emphasise both the power of explicit models in generating testable hypotheses and the limitations of current methods.

Section 2, entitled 'Ecological context of floral function and its evolution', examines some of the environmental factors that can affect a plant's reproductive output. Space is given here to pollinators as well as other selective agents, both biotic and abiotic. Pollination vectors have a direct effect on plant reproduction, and the consequences of their responses are explored both theoretically using models of gene dispersal in natural and agricultural populations (chapter 5), and in the seldom explored context of plant communities (chapter 6). The relative importance of other selective agents is comprehensively reviewed in chapter 7, whilst chapter 8 considers the significance of flowering time as a reproductive strategy. It is evident from these chapters that teasing out the selective pressures on floral form is challenging due not only to the range of potential agents involved but also because of their spatial and temporal variation. In the last chapter of this section, Aizen and Vásquez lay out a conceptual framework to help identity critical attributes in the responses of plants and pollinators to anthropogenic disturbances. By exploring the explicit consequences of human activity, this chapter provides a springboard beyond academic interest into practical conservation issues.

The third section, 'Mating strategies and sexual systems', presents a good overview of the major components of mating systems. Eckert *et al.* (chapter 10) develop the enduring theme of reproductive assurance to explain the evolution of self-fertilisation. The theme of gender dimorphism is explored in chapter 11, with reference to the evolution of dioecy from gynodioecy. The effects of gene flow and migration on the evolution of sexual traits are examined by Pannell (chapter 12), who distinguishes founder events from metapopulation dynamics. Finally, Harder and Hodgins (chapter 13) discuss the maintenance and consequences of variation in floral design in heterostylous groups, illustrated by new analyses of polymorphic *Narcissus* species.

The final section, 'Floral diversification', aims to link the microevolutionary processes discussed in the previous chapters with macroevolutionary patterns. This section is the most varied of the book, covering a broad range of topics including genetics, phylogenetics and hybridisation. In chapter 14, Conner explores the effect of genetic architecture on the evolution of floral traits, but highlights the need for new insights into the molecular mechanisms underlying phenotypic variation, a sentiment echoed by other contributors. I felt that an additional chapter illustrating the power of integrating ecological studies with plant development would have added a new dimension to this book, where genetic changes are for the most part considered as a 'black box'.

The theme of pollinator-driven selection is revisited in chapters 15 and 16. The former highlights the lack of studies on local adaptation in response to spatial divergence of pollinators. The authors propose a five-step protocol to identify geographical differentiation in floral traits driven by variable selection from pollinators, using the Mediterranean *Lavandula latifolia* as a case study. Johnson (chapter 16) further expands the concept of geographical pollinator mosaic, and clearly reviews the driving factors of speciation in plants. On the broadest evolutionary scale covered in this volume, the effects of selected floral traits on species diversity are explored in chapter 17, combining existing angiosperm phylogenies with new statistical methods. It is clear that this approach still requires more basic knowledge of floral diversity (for instance there is insufficient information on pollination mode for a third of flowering plant families). The last chapter of this volume touches upon hybridisation and its consequences on floral form and function.

The authors of *Ecology and Evolution of Flowers* have produced a hefty tome, dense in style and content. Despite its comprehensive glossary and attractive colour plates, little compromise is made for those who are not familiar with the concepts of evolutionary theory. Nevertheless, it is well worth the effort. The chapters expose the numerous parameters that need to be taken into consideration, and the integrated approaches required when exploring the processes and outcomes of floral evolution. Therefore, this book is likely to be essential for those working within plant evolutionary ecology, and provides much food for thought for those interested in plant diversity.

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