

## BOOK REVIEWS

**Evolution and Speciation of Island Plants.** Edited by Tod F. Stuessy & Mikio Ono. Cambridge: Cambridge University Press. 1998. xv + 358pp. ISBN 0 521 4963 5. £50.00 (hardback).

Oceanic islands have provided many classic studies of evolutionary radiations and biogeography (for recent reviews see Wagner & Funk, 1995; Quammen, 1996; Givnish & Sytsma, 1997). They are especially attractive for such studies because their generally short and readily dated lifespans, discrete physical boundaries and impoverished biotas containing a large proportion of endemic species reduce the range of credible hypotheses available to explain any particular set of biological observations. In this edited volume, originally conceived at the 1993 International Botanical Congress, 18 authors from North America, Eastern Asia and Chile address a wide range of evolutionary questions posed by the well-known floras of Hawaii (surprisingly covered in only two chapters) and the less well-known floras of the Juan Fernandez Islands (three chapters) and islands of the Southwest Pacific (five chapters).

As in most edited volumes the chapters vary appreciably in length and rigour. Baldwin is able to exploit a diligently accrued body of data on Hawaiian *Asteraceae* to argue for ten original immigrant species and to infer specific evolutionary mechanisms. Focusing on the Juan Fernandez Islands, off Chile, Crawford *et al.* also offer several lines of evidence for *Asteraceae* phylogeny. Stuessy *et al.* usefully compare the biogeography of the two similarly sized main islands of the Juan Fernandez group, noting the relative rarity of dispersal events where migrants leapfrogged the landward island to immediately reach its seaward twin. Ito *et al.* use the Bonin Islands to reinforce the mainstream view that island species possess on average lower genetic diversity than their continental equivalents. Setoguchi *et al.* present a nicely illustrated and well supported biological interpretation of the mangrove genus *Crossostylis*, noting considerable infraspecific lability in floral features and inferring soil- and pollinator-induced radiations.

The three concluding chapters are more explicitly conceptual. Bohm presents a detailed (albeit qualitative) review of the biochemistry of island plants, arguing against the supposed loss of biochemical arsenals from island lineages no longer requiring herbivore deterrents and noting that the so-called deterrents may serve a range of other functions. Stuessy & Crawford then elaborate ideas expressed earlier in the volume by Carr to explain relative chromosomal stability on islands, before Stuessy joins with co-editor Ono to outline some rather predictable recommendations for the conduct of future island studies.

The most persistent evolutionary themes presented in this book, each permeating several chapters, are the lesser role played by chromosomal changes relative to speciation on continents (convincingly argued) and the presence of adaptation underlying radiations (less convincing). Directional selection is often assumed, and at least two

chapters emphasise the importance of ‘anagenetic’ speciation, thereby inevitably invoking images of gradual change. Several chapters also note the existence of specific clades that show considerable morphological divergence but negligible molecular divergence, though sadly no chapter explicitly compares morphological and DNA sequence phylogenies for the same range of species.

When these various assertions are compared with the evidence presented, a degree of wishful thinking soon becomes apparent. No authors apply quantitative tests of adaptive hypotheses – selection is simply taken as read, as is so often the case in such studies (Bateman, 1999). And to me, the ambiguous phrase ‘anagenetic speciation’ would mean a taxonomist arbitrarily dividing into species at a specific point in time a lineage that is presumed to show directional evolutionary change. But in the absence of fossil evidence, how can ‘non-dichotomous’ speciation be proven when extinction is commonplace on islands, potentially removing one branch of any dichotomy? And the observed paucity of chromosomal change in no way automatically translates into gradual evolution – modern reworkings of saltational evolutionary theory no longer demand the vast chromosomal rearrangements beloved of Goldschmidt (1940). Rather, saltation requires only miniscule sequence changes in the key developmental genes that underlie major phenotypic features but are not routinely used for phylogeny reconstruction. More broadly, morphology changes only during speciation events but most phylogenetically utilitarian genes change largely between speciation events (Bateman, 1999), hence the major morphological divergence but minor divergence in plastid genes, ITS and allozymes observed by various authors of this volume. The most logical inference is that the radiations they describe are too recent and too rapid to be readily detectable by DNA base-pair substitutions.

Overall, this book offers much useful data and focuses on some previously under-researched archipelagos. Admittedly, it would have benefited from the greater degree of critical thinking incorporated into some other related compilation volumes – for example, that demonstrated by Givnish (in Givnish & Sytsma, 1997) and Baldwin *et al.* (1998) on evolution and Funk & Wagner (in Wagner & Funk, 1995) on biogeography. Nonetheless, this volume constitutes a valuable contribution to the continued love affair between evolutionary biologists and oceanic islands.

### References

- BALDWIN, D. G., CRAWFORD, D. J., FRANCISCO-ORTEGA, J. *et al.* (1998). Molecular phylogenetic insights on the origin and evolution of oceanic island plants. In: SOLTIS, D. E., SOLTIS, P. S. & DOYLE, J. J. (eds) *Molecular Systematics of Plants II: DNA Sequencing*, pp. 410–441. New York: Kluwer.
- BATEMAN, R. M. (1999). Integrating molecular and morphological evidence for evolutionary radiations. In: HOLLINGSWORTH, P. M., BATEMAN, R. M. & GORNALL, R. J. (eds) *Molecular Systematics and Plant Evolution*, pp. 432–471. London: Taylor & Francis.

- 
- GIVNISH, T. J. & SYTSMA, K. J. (eds) (1997). *Molecular Evolution and Adaptive Radiation*. Cambridge: Cambridge University Press.
- GOLDSCHMIDT, R. (1940). *The Material Basis of Evolution*. New Haven: Yale University Press.
- QUAMMEN, D. (1996). *The Song of the Dodo: island biogeography in an age of extinctions*. London: Pimlico Press.
- WAGNER, W. L. & FUNK, V. A. (eds) (1995). *Hawaiian Biogeography: evolution on a hot spot archipelago*. Washington, DC: Smithsonian Institution Press.

R. M. BATEMAN

---

**Microfungi on Land Plants: an identification handbook.** New enlarged edition.

Martin B. Ellis & J. Pamela Ellis. The Richmond Publishing Company Ltd. 1997. 868pp. ISBN 085546 246 9. £60.00 (hardback). ISBN 085546 245 0. £40.00 (paperback).

The first edition of this book was published in 1985 by Croom Helm Ltd, and went out of print in 1992. The new edition is a reprint of the 1985 work with 36 pages of additions and corrections incorporating 143 new descriptions, and an additional seven plates illustrating 83 further fungi. The strength of this work is its thorough treatment of the microscopic fungi involved in plant disease and decay. There are several other good books about fungi on plants in general, plant disease fungi and land-plant disease problems. Most of these publications describe symptoms satisfactorily and give some help in the identification of the fungi, but none that I know adequately covers the description of the fungi, necessitating the consultation of specialist publications. In contrast to all other publications of this kind Ellis & Ellis have produced all the line drawings (over 2200 drawings and 3500 taxa) in the book, and it is not surprising that they have developed a detailed understanding of the organisms they have drawn. In the new edition the publishers have succeeded in reproducing the drawings more clearly than in the first edition.

The major shortcoming of this book is that it is mainly focused on the land flora of the British Isles, making it less relevant for lands further away. However, the book will still be applicable to the plant genera discussed that also grow in other regions of the Northern Hemisphere.

After a foreword by David Hawksworth, a self-confessed 'ardent user' of the previous edition, and an introduction by the authors, the book deals with fungi ordered by the habitat or plant group they inhabit. Here we find plurivorous fungi on wood, bark and leaf litter, fungi specific to trees and other woody plants, and plurivorous or specific fungi on all other plants in order of their life form. I particularly welcome the inclusion of hyperparasitic fungi on rusts and powdery mildews. The treatment of host genera is not systematic but alphabetic within the life form subheading. This arrangement can make use slightly awkward when comparing fungi of a number of systematically close host genera. Descriptions are only written under