

Book reviews

Evolution and Speciation of Island Plants. Tod F. Stuessy and Mikio Ono (eds). Cambridge University Press, Cambridge. 1998. Pp. 358. Price £50.00, hardback. ISBN 0 521 49653 5.

Oceanic islands have provided a rich source of material for the development of our knowledge on the evolution of biological diversity. Wallace and Darwin first described, in an evolutionary context, patterns of variation in the form, the distribution and the abundance of species on islands. This diversity has stimulated the interest of many a biologist during the 20th century. In plant evolutionary biology, despite the diversity of island systems discussed 25 years ago by Carlquist (1974), the centre of attention has often been limited to the Hawaiian archipelago, about which we have learned a great deal. How refreshing then to read in this book about patterns and processes on a range of different groups of islands. In this volume, Stuessy and Ono have brought together a series of papers on the evolution and speciation of plants on islands across the full breadth of the Pacific Ocean, with the emphasis on the Hawaiian, Juan Fernandez and Bonin islands. The 13 different chapters are based on papers presented at the XV International Botanical Congress in Yokohama (Japan). Their viewpoint is that 'island archipelagos may rightly be considered as one of the best places on earth to understand origins and elaborations of biological diversity' (p. xiii). Their purpose is to bring together work on different island systems across the Pacific Ocean to provide an up-to-date [in their terms (p. xiii) 'new'] view of island plant biology. To round it off they include two general chapters and one on how to progress from the knowledge we now have.

The book starts in Hawaii. In the plants that have been disseminated to these islands, chromosome evolution is rare (chapter 1); what variation is observed reflects that in related groups in continental areas. Although the potential importance of natural selection for chromosome evolution is discussed it would also have been interesting to compare such chromosomal stasis with data on the lack of genetic divergence but extreme morphological diversity described in the subsequent chapter on Hawaiian Asteraceae.

Then we get to the Juan Fernandez islands. Although studies are fewer in number than in the Hawaiian archipelago, it is nevertheless clear that speciation is initiated by geographical isolation on different islands. As on Hawaii, related island plants show few genetic differences despite marked morphological and ecological diversity. It is also illustrated how various interacting factors determine species diversity on these islands; differences in land area being of only superficial importance to diversity levels.

Back across the Pacific we then discover work on what may be to many readers new islands. On the Bonin (Ogasawara) islands, once again species pairs show high genetic identities, despite marked morphological diversity. Almost drowned by a

rather speculative discussion is the idea that pollinator faunas on islands may restrict the evolution of strictly dioecious populations and favour the maintenance of cryptic dioecy (where each sex maintains the morphological structures of the opposite sex). There is evidence from other island groups that cryptic dioecy may be a common feature of dioecy on oceanic islands (e.g. Humeau *et al.*, 1999) and thus worth comparative study, particularly in view of the high percentages of dioecy on some oceanic archipelagos.

Finally, we emerge from the mass of detail on particular groups (an extreme example is in chapter 1 where a single table covers 19 pages) to discover that two important characteristics of plant diversity may have little to do with evolution on islands. Chromosomal stasis is argued to be a general phenomenon on islands, as hinted at earlier in the book. There is also detailed evidence that secondary-compound diversity on islands shows little difference to that on continental areas. These are very interesting and provoking results for anyone who has thought about plant evolution on islands. Given the clear and manifold ecological roles of plant secondary compounds I heartily agree with the conclusion that on islands, and even in the absence of some herbivores, secondary compounds are likely to be maintained for other purposes. The chapter is heavy going, but the conclusion makes it worth wading through the details.

Despite being rather detailed and often speculative, this book is a worthy addition to the literature on plant evolution on islands. A general theme is the occurrence of low levels of genetic divergence in species pairs that show marked morphological diversification: speciation may well occur rapidly on islands. At least in this book, the Asteraceae are the champions of such divergence, and one is left wondering why this family is so predisposed to diversification on islands. This book illustrates the immense diversity of forms that have evolved in island plants and the possible processes involved. It is thus ideal for graduate students setting out to discover new and exciting patterns of variation on islands. Unfortunately, at £50 a shot, they may have to borrow it!

References

- CARLQUIST, S. 1974. *Island Biology*. Columbia University Press, New York.
- HUMEAU, L., PAILLER, T. AND THOMPSON, J. D. 1999. Cryptic dioecy and leaky dioecy in endemic *Dombeya* spp. on la Réunion Island. *Am. J. Botany*, in press.

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