

— Book Review —

## “EVOLUTION OF PLANT-POLLINATOR RELATIONSHIPS” EDITED BY SEBASTIEN PATINY, UNIVERSITY OF MONS, BELGIUM

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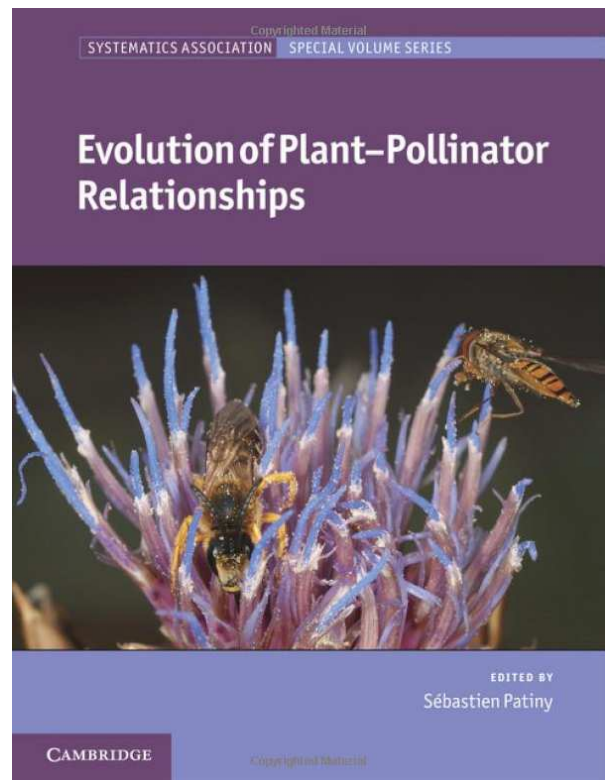
The Systematics Association has published 80 volumes promoting all aspects of systematic biology, especially in rapidly advancing areas of science where a modern synthesis is required. The series began in 1940 with a work edited by Sir Julian Huxley. The Systematics Association also organizes conferences and workshop on all branches of study within systematics. This volume began in a symposium dedicated to the evolution of plant-pollinator relationships organized as part of the SYSTEMATICS 2009 meetings in Leiden in the Netherlands. It was explicitly developed with an eye for the evolutionary aspects of modern pollination biology. Additional authors not attending the original symposium were invited to join attendees as contributing authors.

This volume was carefully and thoroughly edited by Sebastien Patiny, of the University of Mons, Belgium. Within the broad discipline of pollination ecology, the 17 chapters and their 53 contributors review and synthesize an amazing amount of new information in the field. No recent synthesis of the evolutionary aspects of pollination biology has been published since Dafni et. al (2005), Waser & Ollerton (2006), and Harder & Barrett (2006). The time was right for this contribution by the scientific experts assembled herein by Sebastien Patiny. For specialized scientific volumes such as these published by academic publishers and usually resulting from conference symposia, the only downside is its high price, making it less accessible to students and researchers less able to purchase them. Hopefully, if they haven't already, the Systematics Association could make an electronic version of this volume, e.g. an Adobe pdf electronic book available at a more modest cost. This would greatly enhance the utility, readership and value of this excellent volume on modern pollination biology by some of its most accomplished and versatile practitioners, to a much wider audience, in turn creating a greater impact factor for pollinator researchers.

I thought this review might be more useful if I included the chapter titles, their order of appearance in the volume, and their lead chapter authors. Some chapters have many authors and I have not listed all of them to save space.

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“Evolution of Plant-Pollinator Relationships”, The Systematics Association Special Volume 81, Cambridge University Press, Cambridge, UK, Published 2012, Edited by Sebastien Patiny, University of Mons, Belgium

My apologies to all their co-contributors. This compilation follows:

1. “Macroevolution for plant reproductive biologists” by Paul Wilson.
2. “Pollination crisis, plant sex systems, and predicting evolutionary trends in attractiveness” by Tom J. De Jong.
3. “Evolution and ecological implications of specialized pollinator rewards” by Scott Armbruster.
4. “Fig-fig wasp mutualism: the fall of the strict cospeciation paradigm?” by Astrid Cruaud.
5. “Fossil bees and their plant associates” by Denis Michez.
6. “Pollen evidence for the pollination biology of early flowering plants” by Shusheng Hu.

7. "Pollinator mediated floral divergence in the absence of pollinator shifts" by Allan Ellis.
8. "Animal pollination and speciation in plants: general mechanisms and examples from the orchids" by Florian Schiestl.
9. "Why are floral signals complex? An outline of functional hypotheses" by Anne Leonard.
10. "A survey on pollination modes in cacti and a potential key innovation" by Boris Schlumpberger.
11. "Zygomorphy, area, and the latitudinal biodiversity gradient in angiosperms" by Jana Vamosi.
12. "Ambophily and super generalism in *Ceratonia siliqua* (Fabaceae)" by Amots Dafni.
13. "Structure and dynamics of pollination networks: the past, present, and future" by Jens Olsen.
14. "Pollinators as drivers of plant distribution and assemblage into communities" by Loic Pellissier.
15. "Effects of alien species on plant-pollinator interactions: how can native plants adapt to changing pollination regimes?" By Gideon Pisanty.
16. "Pollen resources of non-*Apis* bees in southern Africa" by Michael Kuhlmann.
17. "Advances in the study of the evolution of plant-pollinator relationships" by Sebastian Patiny.

The 17 chapters fall into a series of parts which could be described as: 1) the evolutionary biology of pollination which integrates modern phylogenetic thinking and new analyses; 2) the evolution of pollination "syndromes", floral displays and reward systems; and finally 3) the evolutionary features of pollination networks and network analyses. The first few chapters help us to recast concepts in macroevolution, including bringing modern phylogenetic concepts and analyses to pollination studies. While discounted by some, the conceptual framework of pollination syndromes is used to good advantage by many of the book's authors. Moving to the level of communities, several contributors have analyzed assemblages of flowering plants and their pollinator guilds using the modern analytic perspective gained by network analyses. These additional new techniques are valuable additions to the venerable study of plants and their pollinators. We can look forward to many exciting new advances in the years ahead. This volume will serve as a reference and guide for many years to come.

Several chapters will have lasting value, while serving as templates for further work and collaboration around the world. One of these is the exhaustive and masterful chapter on "Fossil bees and their plant associates" by Denis Michez, Maryse Vanderplanck and Michael S. Engel. Their

exhaustive table 5.1 runs for an entire 22 pages detailing every known bee body fossil along with their taxonomic affinity, deposit locality, age and citations. Here are also intriguing conclusions and speculations about which ancient plants these bees may have visited. This is possibly the first comprehensive summary of bee and plant adaptations in the fossil record, the palaeocology of bees and plants. This chapter will be of great interest to pollination biologists, entomologists, botanists and palaeoecologists around the world. Similarly, the wonderful chapter on "Pollen evidence for the pollination biology of early flowering plants" by Shusheng Hu, David L. Dilcher and David Taylor is equally scholarly and exhaustive in its coverage and interpretations of its topic on the earliest pollinator relationships of the flowering plants. It is the only record of which I'm aware, which summarizes the pollen records during the Cretaceous. This was a period when we first had fossilized pollen for 10 or 15 million years prior to finding angiosperm macrofossils. Finally, for evolutionary ecologists, I found the chapter on "Why are floral signals complex? An outline of functional hypotheses" by Anne Leonard, Anna Dornhaus and Daniel Papaj to be an especially exciting and novel approach to examining the complexity of floral signalling to their animal pollinators. They break down their analyses into various functional ideas comparing and contrasting content-based and efficacy-based hypotheses. They also address ways that flowering plants may have used uncertainty reduction around these complex floral signals.

In summary, I cannot recommend this edited volume highly enough. I congratulate Sebastien Patiny for the thankless job of organizing and editing chapter authors (like herding cats) into such a masterful and exciting volume as "Evolution of Plant-Pollinator Relationships." This book has a prominent place in my library and I refer to it frequently for guidance and inspiration. I know that all of my pollination ecology colleagues will find it equally valuable.

## REFERENCES

- Dafni A, Kevan P, Husband BC (2005) Practical pollination biology. Enviroquest Ltd., Cambridge, Ontario, Canada.
- Harder LD, Barrett SCH (2006) Ecology and evolution of flowers. Oxford University Press.
- Waser NM, Ollerton J (2006) Plant-pollinator interactions: from specialization to generalization. University of Chicago Press, Chicago.