# The Molecular Organography of Plants

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actual microorganisms. Surely, many readers would find the diversity of microbial life, including various sizes, shapes, and appendages, to be captivating and motivating. Moreover, such images would nicely emphasize important themes raised in the book, such as convergent evolution.

I should also note that there are a number of appendixes. Perhaps a couple of them will be useful to a reader, though I fail to see how a two-page description of calculus (without a figure illustrating the derivative as the rate of change) is useful to anyone, or how a reader could benefit from a three-page description of the Navier-Stokes equation, which applies to any Reynolds number (and not simply to "high" Reynolds numbers, as the title of the appendix implies). It did not help that in the latter appendix, the only two numbered equations (A.11.1 and A.11.2) both had misprints.

A number of topics involving the mechanical world of microorganisms are not mentioned at any length in the book—biofilm formation; adhesion of bacteria to surfaces; "gyrotaxis," which refers to the swimming of bottom-heavy algae that are able to orient in a flow; and the movements of multicellular Volvox—though Dusenbery does discuss simple orientations by distributed mass density. Nevertheless, the range of coverage and topics that are included is very large, and the author provides plenty of material for a curious reader or a university course. I am confident that readers interested in biomechanical themes will enjoy *Living at Micro Scale* because of the elegance with which Dusenbery weaves the concepts of classical physics into a quantitative characterization of the world of microorganisms.

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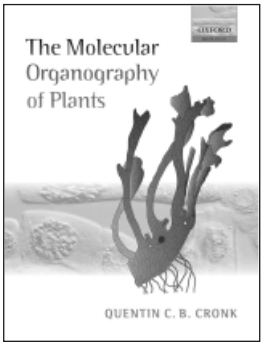
## FITTING PLANT GENES TO SHAPES

**The Molecular Organography of Plants.** Quentin C. B. Cronk. Oxford University Press, 2009. 288 pp., illus. $70.00 (ISBN 9780199550364 paper).

*The Molecular Organography of Plants* seeks to integrate the genetic findings of the last 20 years with morphological and evolutionary botany of the previous 100 years. Its author, Quentin C. B. Cronk, of the University of British Columbia, is a classically trained botanist and evolutionary biologist who has more recently worked in the integrative field of plant developmental evolution, making him well suited to write this text. The book's primary emphasis is morphological diversity and evolution, using the relevant developmental genetic work to highlight particular points or themes. In this way, it serves as a bridge between purely morphological works, such as Adrian Bell's invaluable *Plant Form*, and model system–centric developmental genetic texts, such as Leyser and Day's *Mechanisms in Plant Development*.

Cronk's approach is fundamentally morphological, and tracks the major




organ systems: stems, roots, leaves, sporangia, and sporophylls. First, however, he gives a very useful overview of plant evolution and general evolutionary concepts (e.g., homology, heterochrony). This chapter lays a foundation for the rest of the book by covering the positions of major fossil taxa in the context of current phylogenetic hypotheses, and how they influence ancestral character state reconstruction. In addition, it establishes the historical perspective that is a consistent thread throughout. I particularly enjoyed the discussion of the different approaches to the problem of seed plant relationships taken by E. J. H. Corner and K. R. Sporne, and of what the first angiosperm may have looked like (issues that remain with us to this day). Cronk displays a sense of history and humor that is both entertaining and refreshing.

Each successive chapter follows a similar path, considering the possible origins of fundamental structures, their evolution in land plants, their various diversifications, and a relatively brief overview of their genetic underpinnings, often with useful findings or speculations on how these genes may have contributed to the evolution of the structure. I found the figures to be excellent overall, including the line drawings and color plates. Cronk goes to considerable lengths to introduce a wide variety of terminology, both developmental and anatomical. I might quibble with some of the uses—can we really say that mosses have protosteles? I've always considered the use of stele to be restricted to taxa with true vasculature, but that is part of the charm of botany—there is always room for variation in usage and interpretation. A more unfortunate mix-up occurs in the second chapter, where the words anticlinal and periclinal are reversed; I'm sure that the typo will be corrected in future editions, and as the terms are used properly elsewhere in the book, I imagine most students will properly reorient themselves.

Although "molecular" is in the title, this work is not a comprehensive developmental genetic text. I don't believe it was intended as such, but sometimes I did wish that extra space were committed to a more detailed explanation of the relevant genetic pathways or hypotheses. This was especially true for me in the section titled "Molecular theories for the origin for the flower," in which a

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novel model involving *APETALA2* was proposed but not explained in enough detail for me to completely grasp it. For this reason, I think the book may be most useful for the thousands of scientists coming from the molecular genetic side of the evolutionary development (evo-devo) divide. The many botanical tidbits and morphological oddities are certain to open the eyes of biologists whose experience with plants begins and ends with *Arabidopsis* and perhaps rice or maize. For those from the botanical and evolutionary side of evo-devo, *The Molecular Organography of Plants* represents a useful starting place and will help point them in the right direction with its extensive references. I can certainly recommend it for both types of scientists, particularly at the graduate level.

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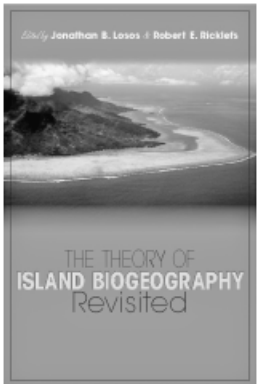
## THE GLASS HALF FULL

**The Theory of Island Biogeography Revisited.** Jonathan B. Losos and Robert E. Ricklefs, eds. Princeton University Press, 2009. 494 pp., illus. $49.50 (ISBN 9780691136530 paper).

*The Theory of Island Biogeography Revisited* is the fruit of a symposium held at Harvard in 2007 in honor of the 40th anniversary of the publication of Robert MacArthur and E. O. Wilson's *The Theory of Island Biogeography (TTIB)*. The organizers of the symposium invited a who's who of community and island ecologists. Sixteen participants produced chapters for the book; the result is a very good overview of a wide body of work that draws inspiration from, but does not necessarily directly follow, *TTIB*. The text of this new work is accessible, readable, and often engaging. I was motivated to read it cover to cover, and even to buy another copy after I misplaced my first one. I have suggested the book to my new graduate students as a font of interesting ideas for their research proposals.

*The Theory of Island Biogeography Revisited* could easily serve as the centerpiece of a graduate course, in part because of its very discussable shortcomings. The book begins with reviews of how island biogeography theory came to be (recounted by Wilson), then discusses subsequent tests of the theory (reviewed by Schoener and Lomolino and colleagues). Neither chapter explicitly states any conclusions, but Schoener's indicates that the bulk of the evidence is consistent with




*TTIB* (the glass being fairly full). Laurence discusses fragmentation effects in nature, commenting that although *TTIB* may be a conceptual Mount Everest, it is "simplistic to the point of being cartoonish" (the glass having obvious emptiness).

A second portion of the book (which is not explicitly organized in thematic sections) focuses on work that was inspired by ideas in *TTIB*. Notable among these is metacommunity theory. Hanski discusses metapopulation models beginning with *TTIB* and Levins's work from the same era, continuing through his own work. Chapters by Holt and by Terborgh examine trophic relationships on islands, going beyond *TTIB*'s emphasis on species counting. A third part deals with community assembly. Simberloff and Collins review the notions of assembly rules and checkerboard distributions in a chapter redolent of the late 1970s (except for want of a companion chapter by Diamond). Hubbell contrasts predictions from neutral theory and from Tilman's R* theory, testing them against his Barro Colorado Island data (there is no matching piece from Tilman).

The lion's share of *The Theory of Island Biogeography Revisited* is devoted to reviews of evolutionary effects on islands. Several chapters pertain to the dynamics of colonization, speciation, and hybridization—illustrated by the birds of the Galápagos (by the Grants, framed as an homage to "Ed Wilson the Naturalist"), birds of the Lesser Antilles (Ricklefs), as well as anoles of the Antilles and snails of the Galápagos (Losos and Parent)—or discuss islands more generally (Clegg, and Gillespie and Baldwin).

Although the chapters were generally quite good, I was disappointed by the book. First, there are no abstracts. Abstracts force authors to identify their central message. The book would have been more interesting and more useful if the authors had been expected to make an identifiable conceptual advance in their chapters. Second, in a book with this title, I thought I would see tests of and successors to *TTIB*. A classic MacArthur quote is: "To do science is to search for repeated patterns, not simply to accumulate facts" (from the preface to his *Geographical Ecology*). *TTIB* presented general patterns and then proposed a mechanism that made explicit predictions about the observed patterns (variation of richness with area and with isolation) and how the patterns should look under new circumstances (e.g., during habitat fragmentation or during initial colonization of an island). The resulting statistical models accounted for quite a lot of the geographic variation in species richness. Therefore, I expected to see assessments of the limitations of *TTIB* (e.g., that *TTIB*'s scope is limited to particular archipelagos), and modified models that

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