

The grouping of the papers into 18 sections is necessarily somewhat arbitrary (as Takahata warns in the preface), because some papers deal with more than one subject. Moreover, the sections disrupt the chronological order of the book. Although inconvenient at times, the arrangement is ultimately helpful in putting the papers in a larger context. The sections can be read in any order. Takahata has also provided a list of Kimura's major publications (totaling 161) at the end of the book. The papers that Takahata chose to include in this collection represent a good selection of Kimura's most famous and most cited papers.

The casual reader should be forewarned: Kimura's papers are not easy reading. Most papers contain a substantial amount of math. A knowledge of elementary calculus is necessary but rarely sufficient for understanding some of the more complicated results. Fortunately, Kimura usually strove to make his main conclusions clear in words as well as equations. Readers may also be comforted by the knowledge that as a young student, Kimura had difficulty understanding mathematical population genetics (Kimura 1985).

This volume is likely to be a useful reference for both theoretical and empirical population geneticists, although the latter are certainly likely to find much of it challenging. As an empirical population geneticist, I would have preferred additional commentary, explanation, and background material relating to each section. I suspect that this sentiment may be shared even more by those whose primary work is outside of population genetics. However, at \$29.95 the paperback is reasonably priced and serves a useful function for the specialist in bringing together the major papers of an extraordinary population geneticist.

MICHAEL W. NACHMAN
Section of Genetics and Development
Cornell University
Ithaca, NY 14853

References cited

Calder N. 1985. The lottery of life: changing views of evolution and human progress. Pages 443-454 in Ohta T, Aoki K, eds.

Population genetics and molecular evolution. Berlin (Germany): Springer-Verlag.
 Kimura M. 1968. Evolutionary rate at the molecular level. *Nature* 217: 624-626.
 ———. 1985. Genes, populations, and molecules: a memoir. Pages 459-481 in Ohta T, Aoki K, eds. *Population genetics and molecular evolution*. Berlin (Germany): Springer-Verlag.
 Provine WB. 1990. The neutral theory of molecular evolution in historical perspective. Pages 17-31 in Takahata N, Crow JF, eds. *Population biology of genes and molecules*. Tokyo (Japan): Baifukan Co. Ltd.

THE FASCINATION OF FLOWERS

Diversity and Evolutionary Biology of Tropical Flowers. Peter K. Endress. Cambridge University Press, Cambridge, UK, 1994. 511 pp., illus. \$84.95 (ISBN 0-521-42088-1 cloth).

Floral biology and pollination are among the most appealing areas of biology, touching the lives of nearly every human being. For some, perhaps most, individuals the fascination with flowers is casual—admiring a lovely bouquet of posies or receiving a childhood lecture on “the birds and the bees.” Others may seek a more detailed understanding of flowers, making their own investigations by watching flower visitors in gardens or in nature or by watching a television program on natural history. Then there are those of us who make our livings studying, teaching, researching, and writing about flowers. Peter Endress's detailed and scholarly book is likely to be of interest primarily to the latter group. Nonetheless, the non-professional botanist and the casual browser are likely to appreciate the beautiful line drawings and the fine scanning electron micrographs.

Diversity and Evolutionary Biology of Tropical Flowers contains detailed descriptions of every sort of variation in every floral part, many of which may be new even to some botanists and ecologists (e.g., polysporangiate anthers). Endress uses examples from tropical families, including many genera unfamiliar to a primarily New World botanist—I came away with a much wider appreciation for tropical plant diversity than I had before reading this book. Endress also does an im-

pressive job of bridging the German-English terminology barrier, orienting the reader on the concepts of *gestalt* versus *bauplan*. He clarifies the usefulness of the term *blossom* to describe a structure that functions as a flower but organizationally may really be an inflorescence (e.g., *Poinsettia cyathia*) or part of a flower (one-third of an *Iris* flower).

This work is an admirable combination of anatomy, morphology, taxonomy, and ecology; after reading it, specialists in each of these areas are likely to have a heightened awareness of the implications of aspects of various features in the other disciplines. Endress's book presents the anatomy relevant to pollination and fertilization in much greater detail than does A. J. Richard's *Plant Breeding System* (1986). The literature review is extensive, relevant, and remarkably complete; especially useful is the citation of many classic and current works in German and French. The current relevance of Endress's book is enhanced, as well, by reference to many up-to-date works in English and many personal communication citations in the text.

Endress leads the reader on a tour through the floral parts, from the outside in. He then examines the arrangement of the structural units which leads to categorization of floral structures into different morphotypes (e.g., trap flowers and flag flowers). The discussion of pollination (from biotic to abiotic) follows naturally, offering interesting detail on each taxonomic group. This coverage of pollinators is useful because “bee pollination” encompasses many different groups of bees that visit flowers for different reasons just as “beetle pollination” includes flowers with vastly different attractants and rewards for curculionid weevils and carrion beetles; flower specialized for different groups of bees (or different kinds of beetles have different morphologies and are not all described by simply designating them bee flowers (or beetle flowers). Lepidoptera pollination is adequately discussed, giving attention in turn to hawkmoths, settling moths, and butterflies. Thrips, birds, bats, and nonflying mammals are included as well, with recent refer-

ences to newer studies. The book's focus then shifts to special differentiations associated with pollinator attraction and reward (showy parts, pollen, nectaries, oils, and resins); Endress also covers an interesting topic that has received some recent attention—floral color change. These chapters are not as exhaustive in detail as either of two classics (Faegri and Van de Pijl 1979, Proctor and Yeo 1973), but they succinctly summarize what one needs to know to understand the morphology of flowers of tropical plants. Endress's book is a long-needed complement to those classic works, which focus primarily on temperate taxa. Floral differentiation associated with breeding systems is reviewed, and the chapter on anthesis has an interesting section on flower longevity.

Endress then examines selected taxa from most of the subclasses of flowering plants, ten orders in all. He combines abundant published information with first-hand observation (which resulted in the beautiful scanning electron micrographs plates and other data) to describe selected genera of each family of interest. He treats the three subfamilies of the legume family as separate families, giving many examples from each to illustrate how flower structure varies and how this variation relates to pollination and the breeding system of these plants.

For anyone involved in or contemplating research on the breeding system of plants in any of these groups, this book is a good exposition of what is known and a conduit to much important published information. Many sections reveal surprising information (e.g., Monimaceae flowers can be gall midge brooding sites and do have hyperstigmatic regions; these hyperstigmas are internal secretory areas that

can conduct pollen tubes to carpelary stigmas, perhaps serving in defense against insect infestation). It is tempting to list other bizarre and intricate phenomena I have discovered in reading Endress's book, but instead I would encourage anyone with an interest in flowers to read this exceptional work. It is already proving valuable to students and practitioners of tropical botany here in subtropical Miami and other places in the world.

SUZANNE KOPTUR

*Department of Biological Sciences
and Fairchild Tropical Garden
Florida International University
Miami, FL 33199*

References cited

- Faegri K, Van de Pijl L. 1979. The principles of pollination ecology. 3rd ed. Oxford (UK): Pergamon Press.
Proctor M, Yeo P. 1973. The pollination of flowers. New York: Taplinger Publishing Co.
Richards AJ. 1986. Plant breeding systems. London (UK): George Allen and Unwin.

NEW TITLES

- Antiviral Chemotherapy.** D. J. Jeffries and E. de Clercq, eds. John Wiley & Sons, New York, 1995. 580 pp., illus. \$175.00 (cloth).
Artificial Life. C. G. Langton, ed. The MIT Press, Cambridge, MA, 1995. 340 pp., illus. \$42.00 (cloth).
Collecting Plant Genetic Diversity: Technical Guidelines. L. Guarino, V. R. Rao, and R. Reid, eds. CAB International, Oxon, UK, 1995. 748 pp. \$120.00 (cloth).
Conservation of Fish and Shellfish Resources: Managing Diversity. J. Thorpe, G. Gall, J. Lannan, and C. Nash, eds. Academic Press, San Diego, CA, 1995. 200 pp., illus. \$35.00 (cloth).
The Desert Grassland. M. P. McClaran and T. R. Van Devender, eds. The University of Arizona Press, Tucson, AZ, 1995. 352 pp., illus. \$40.00 (cloth).
Dynamical Disease: Mathematical Analysis of Human Illness. J. Belair, L. Glass, U. van der Heiden, J. Milton, eds. AIP Press, Woodbury, NY, 1995. 220 pp. \$40.00 (cloth).
Investigating the Biological Foundations of Human Morality: An Interdisciplinary Perspective. J. P. Hurd, ed. The Edwin Mellen Press, Lewiston,



- NY, 1995. 264 pp. \$89.95 (cloth).
River, Coastal and Shoreline Protection: Erosion Control Using Riprap and Armourstone. C. R. Thorne, S. R. Abt, F. B. J. Barends, S. T. Maynard, and K. W. Pilarczyk, eds. John Wiley & Sons, New York, 1995. 755 pp., illus. \$149.95 (cloth).
What Is Life? L. Margulis and D. Sagan. Simon & Schuster, New York, 1995. 207 pp., illus. \$40.00 (cloth).

NOW AVAILABLE IN PAPERBACK

- Antibody Engineering.** 2nd ed. C. A. K. Borrebaeck, ed. Oxford University Press, New York, 1995. 390 pp., illus. \$45.00 (paper).
Aurora: The Mysterious Northern Lights. C. Savage. Sierra Club Books, San Francisco, CA, 1995. 144 pp., illus. \$20.00 (paper).
Monosaccharides: Their Chemistry and Their Role in Natural Products. P. M. Collins and R. J. Ferrier, eds. John Wiley & Sons, New York, 1995. 574 pp. \$89.95 (cloth), \$39.95 (paper).
Saving Our Soil: Solutions for Sustaining Earth's Vital Resources. J. Glanz. Johnson Books, Boulder, CO, 1995. 182 pp. \$15.95 (paper).
Storm over a Mountain Island: Conservation Biology and the Mt. Graham Affair. C. A. Istock and R. S. Hoffmann, eds. The University of Arizona Press, Tucson, AZ, 1995. 288 pp., illus. \$39.95 (cloth), \$19.95 (paper).
Stream Ecology: Structure and Function of Running Waters. J. D. Allan. Chapman & Hall, New York, 1995. 400 pp. \$95.00 (cloth), \$44.95 (paper). □

