Medieval Flower Book (2007)," "Flowers of the Renaissance (2011)," "Flower: Paintings by 40 Great Artists (2012)," "The Golden Age of Flowers: Botanical Illustration in the Age of Discovery 1600-1800 (2013)," and "The Magic of Birds (2014)."

Fisher's Acknowledgements reveal that she relied heavily on Diana Everett's salient 2013 volume, reviewed in these pages (Bedigian 2014), from which she acquired 11 illustrations of tulips in their natural habitats, as well as substantial scientific details. The contents include wild tulips; Turkish tulips; the economics of "Tulipomania," during which the frenzy that rare tulips inspired among ostentatious collectors caused an economic bubble; links with artists' tulips, and literature that tulips have roused, from Dutch Masters to Alexandre Dumas' novel, "The Black Tulip." Botanists, florists, plant hunters, and nurserymen are all are counted in brief.

Fisher's book joins the ranks of numerous other writings about tulips aimed at amateurs; a subject search of non-fiction titles in WorldCat® related to tulips uncovers 781 books, 85 serials, and 7 articles. Fisher's *Tulip* contains 107 illustrations, 104 in color, reproduced on high-quality paper stock, printed and nicely bound in China; it closes with a short Timeline beginning with the year 1070 AD when Seljuk Turks began to conquer eastern Anatolia, creating the first ceramic tiles that feature tulips, simultaneously with the Persian poet Omar Khayyam's compositions of verses in his *Rubaiyat*, the first literature to mention tulips. Fisher's *Tulip* can appeal to weekend gardeners, horticulturalists, and history buffs who admire or grow this fashionable flower.

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Literature Cited

Bedigian, D. 2014. Plant Science Bulletin 60(3): 170-172. The Genus *Tulipa*. Tulips of the World. Diana Everett. 2013. Kew Publishing, Royal Botanic Gardens, Kew.

SYSTEMATICS

The Botany of Mangroves, Second Edition

P. B. Tomlinson
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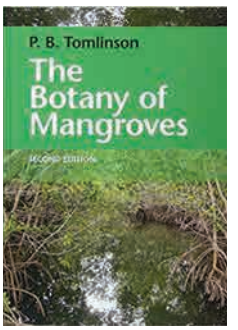

Thirty years ago, I wrote my first grant proposal to study mangroves and began an odyssey through mangrove ecology that continues to this day. Six months earlier, P. B. Tomlinson had published *The Botany of Mangroves*, which, despite scant reviews (I can only locate two: one written by Ong Jin-Eong [1987] for *Trends in Ecology & Evolution*, and the other by Alwyn Gentry [1987] for *Annals of the Missouri Botanical Garden*), was welcomed worldwide as the go-to reference for floristics, biogeography, and especially its unified treatment of, and identification guide to, "true" mangroves and mangrove "associates." Although not a formal taxonomic monograph, the first edition of *The Botany of Mangroves* more than fulfilled its intended goal of introducing mangroves and mangrove ecosystems ("mangal") to a much broader audience of scientists, foresters, conservation biologists, and restorationists. I relied heavily on *The Botany of Mangroves* to ground my fanciful proposals in the reality of working in dense Belizean forests of "walking trees."

The first edition of *The Botany of Mangroves* was re-issued in a paperback edition (1994) with minor updates in a seven-page Appendix. Now, nearly a quarter-century later, the second edition provides more comprehensive updates to chapters in the first section ("General Account") on biogeography, shoot and leaf systems, structural biology, and interactions with people. Most notably, this first section includes a new first chapter—"Historical Prelude"—reviewing Georg Everhard Rumpf's (a.k.a. Rumphius; 1627–1702) early description of 19 species of true mangroves ("*Mangium legitimum*") from the Dutch colony of Amboina (now Ambon Island in Indonesia). The material in this chapter is based on Beekman's (2011) six-volume translation of Rumphius' *Herbarium Amboinense* and is a most welcome introduction to the long history of botanical explorations of mangroves (summarized in Kathiresan and Bingham, 2001). Rumphius, Tomlinson, and all other students of mangroves recognize that "mangrove" is not a taxonomic grouping, but an ecological one that provides seemingly endless opportunities for studying convergent evolution.

In terms of literature review and synthesis, however, the other 10 chapters in the first section leave much to be desired. As in the first edition, and reflecting the author's expertise in anatomy, physiology, and functional morphology, ecology and conservation are given short shrift. A thorough review of mangrove ecology and conservation—of which >10,000 articles have been published since 1987 alone—deserves its own book, which remains to be written (excellent reviews of that literature, uncited in *The Botany of Mangroves*, include Kathiresan and Bingham, 2001; Walters et al., 2008; Feller et al., 2010; Sandilyan and Kathiresan, 2012; and Lopez-Angarita et al., 2016). At the same time, the still-burgeoning literature on other aspects mangrove "plant science"—more than 1000 articles published 1987–2015—is only cursorily reviewed; for his updates of new but basic information, Tomlinson apologetically (p. xii) relies on only a few dozen primary articles or reviews published in the last 15 years.

The second section, occupying nearly 60% of the book, is a detailed description of the 36 families that include true mangroves (trees characteristically found growing in tidal swamps that have anatomical, physiological, and morphological specialization for living in salt water) and mangrove associates (trees and shrubs, and a few herbs, that grow in mangal but are not restricted to it). These botanical descriptions reflect systematic and nomenclatural changes that have occurred since 1987. The most notable are in the Rhizophoraceae and *Avicennia* (Avicennicaceae) and reflect Duke's (2006) treatment of Australian mangroves. A handful of hybrids, some of which were hypothesized in the first edition of *The Botany of Mangroves*, have been confirmed by molecular methods and are fully treated in the second edition. Unlike in the first edition, the treatment of each family begins on its own page, making it much easier to read. This section easily supplants that of the first edition as the standard reference for students, researchers, and practitioners working with mangroves in the field.

The Botany of Mangroves is copiously illustrated, but the numerous photographs and line drawings, so crucial to identifying, understanding, and appreciating mangroves, are a mixed bag. On the very positive side, the second edition includes an expansive section of 24 color photographic plates illustrating many aspects of mangrove flora and fauna. (Full disclosure: I took 9 of the 177 individual photographs.) Mangroves are enlivened by the stunning photographs of bark and roots; fruits, flowers, and leaves; the unusual vivipa-

rous seedlings; microscopic details of leaf and wood anatomy; and the forests and the people living and working in them. On the downside, however, the line drawings and most of the black-and-white photographs that are placed throughout the text appear simply to have been scanned at low resolution from the first edition, and then enlarged to the somewhat larger format of the second edition. The result is a substantial fuzziness and loss of details crucial for accurate identification of species. Some of the enchanting humor has been lost, too. In the first edition, but not the second, Tomlinson quoted Watson's (1928) description of *Avicennia alba* fruits as "resembling a gorged leech" that "as spent swimmers, that do cling together and choke their art."

From Nearchus and Theophrastus, through Plutarch, Abou'l Abass, and Rumphius, and down to the present day, mangroves have fascinated scholars, authors, and travelers (Kathiresan and Bingham, 2001). Rumphius (*fide* Beekman, 2011) admired the "mangi-mangi" for their ability to live in salt water and their novel anatomy and morphology, whereas Steinbeck (1951) referred to them as places of "stalking, quiet murder." Tomlinson's *The Botany of Mangroves* is a must-read for anyone starting out in studying mangroves and mangal, and a key reference for all of us actively working on these amazing plants and the ecosystems that they build.

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Literature Cited

Beekman, E. M. 2011. *The Amboinese Herbal*. An English Translation of Georgius Everhardus Rumphius (Georg Eberhard Rumpf, 1627–1702). Yale University Press, New Haven, Connecticut, USA.

Duke, N.C. 2006. *Australia's Mangroves: The Authoritative Guide to Australia's Mangrove Plants*. University of Queensland Press, Brisbane, Australia.

Feller, I. C., C. E. Lovelock, U. Berger, K. L. McKee, S. B. Joye, and M. C. Ball. 2010. Biocomplexity in mangrove ecosystems. *Annual Review of Marine Science* 2: 395–410.

Gentry, A. 1986. Review: The Botany of Mangroves. *Annals of the Missouri Botanical Garden* 74: 460–462.

Kathiresan, K., and B. L. Bingham. 2001. Biology of mangroves and mangrove ecosystems. *Advances in Marine Biology* 40: 81–251.

Lopez-Angarita, J., C. M. Roberts, A. Tilley, J. P. Hawkins, and R. G. Cooke. 2016. Mangroves and people: lessons from a history of use and abuse in four Latin American countries. *Forest Ecology and Management* 368: 151–162.

Ong, J.E. 2987. Mangrove systematics. *Trends in Ecology & Evolution* 2: 111.

Steinbeck, J. 1951. *The Log from the Sea of Cortez*. Penguin Books, New York, New York, USA.

Sandilyan, S., and K. Kathiresan. 2012. Mangrove conservation: a global perspective. *Biodiversity and Conservation* 21: 3523–3542.

Walters, B. B., P. Ronnback, J. M. Kovacs, B. Crona, S. A. Hussain, R. Badola, J. H. Primavera, et al. 2008. Ethnobiology, socio-economics and management of mangrove forests: a review. *Aquatic Botany* 89: 220–236.

Watson, J. G. 1928. Mangrove forests of the Malay Peninsula. *Malay Forest Records* 6.