BOOK REVIEW

Thomas Laessoe and Jens H. Petersen. 2019. **Fungi of Temperate Europe.** (ISBN-13: 9780691180373, hbk). Princeton University Press, 41 William Street, Princeton, New Jersey 08540, U.S.A. (**Orders:** press.princeton.edu). $145.00 US/£120.00, 1,708 pp., 7,000 color illustrations, 7½" × 11½".

This two-volume, visually stunning tome, is the most comprehensive illustration of fungi from temperate Europe, defined as extending from northern Norway to the Alps. The authors are well respected, experienced mycologists. Thomas Læssøe currently works at the Department of Biology & Globe Institute, University of Copenhagen. He spent time as a senior scientific officer at the Royal Botanic Gardens, Kew and associate professor at the University of Copenhagen. Jens H. Petersen taught mycology at Aarhus University for more than 20 years and authored *The Kingdom of Fungi* (Princeton Press) highlighting his skills as an exceptional photographer and graphic designer. Together they created the online identification tool MycoKey (www.mycokey.com) and developed the concept of identification wheels. This tool and the outstanding photography forms the backbone of these books. Over 150 photographers contributed images to this enterprise.

Mushroom identification has always been challenging. Dichotomous keys, traditionally used in botany are notoriously difficult to write and use for most fungi. Synoptic keys have improved, but the identification wheels conceived by these authors elevates synoptic keys to a new level. They are visually intuitive allowing one to rapidly place a species in the most likely genera.

The focus of these two volumes is macro-fungal identification and illustrating the fungal diversity of this European region. Volume 1 covers the gilled mushrooms, while volume 2 handles the rest, including a few moulds, mildews, lichens, myxomycetes and others. These are not field guides. Their size and weight precludes any possibility of taking them into the field. Rather they will find their niche on the bench or table, near the microscope, after returning with a collection. While they will be most useful to European mycologists—both amateur and professional—many people worldwide with a serious interest in mushrooms will appreciate the wealth of information and the outstanding quality of the production and the photographs.

The first 40 pages is an excellent, albeit brief, overview of fungal biology and basic information about identification. The paragraphs on documentation, if followed by a collector, will be greatly appreciated by herbaria/fungaria. An identification wheel of pragmatically organized morphological 'form groups' leads into the heart of these volumes—the illustration and description of over 2800 species with more than 7000 exquisite photographs. The quality of these should be the benchmark for all mushroom photography. The wheels used for each major groups or genus include a wide variety of critical identification features, such as gross morphology, spore print, spore morphology, habitat, odor, taste, etc. The description accompanying each photograph is both succinct and precise, sometimes mentioning related look-alike species. Ecological relationships are often alluded to, but not in much detail. Unlike most botanical treatises, range maps are not provided, although common locations are hinted at.

These are not foraging guides and there is no discussion about edibility or toxicity. A small number of species have inconspicuous icons indicating whether they are considered edible or toxic. Perhaps with an overabundance of caution *Amanita muscaria* is labeled as lethal, even though fatalities are exceedingly rare, and *Tricholoma equestre* is noted to be extremely poisonous. It is still widely eaten in Europe, with growing evidence that it seldom results in rhabdomyolysis unless prodigious quantities are consumed. No mushrooms should be consumed in very large amounts.

Additional features include a helpful glossary, extensive index, and 370 scientific literature citations.

Despite the broad taxonomic coverage, the authors rightly acknowledge that it is far from complete. New technologies, such as DNA analysis, proteomics and epigenetics will continue to refine the taxonomy and our understanding of phylogenetic relationships and fungal evolution. But at this time these two volumes are a tour-de-force, deserving a place in every biology department and library or on the shelves of anyone serious about mycology. At $145 for both volumes, they are worth every cent.—*Denis R. Benjamin and Billy Stone, Botanical Research Institute of Texas, Fort Worth, Texas, U.S.A.*