

## Book review

### **Fungi of Temperate Europe**

THOMAS LÆSSØE & JENS H. PETERSEN

Princeton University Press, Princeton (New Jersey, USA) and Woodstock (Oxfordshire, UK), 2019; 1715 pp. (Vol. 1, pp. 1–813; Vol. 2, pp. 815–1715), approx. 10,000 illustrations (colour photos and line drawings of microscopic structures), hardcover; ISBN (of the two-volume set) 978-0-691-18037-3 (Translated from the Danish original *Nordeuropas svampe*, published by Gyldendal Forlag, Copenhagen, 2019)

Voluminous illustrated compendia are always gratefully appreciated by a large community of mycologists. Since their preparation is a difficult task for each author or team of authors (who have to possess really great knowledge to reliably elaborate characteristics of fungi of various groups), such work is extraordinarily time-consuming and is not rewarded with an impact factor, hardly anybody is currently willing to commence such work and – what is more important – to complete it in the form of a useful publication. Even if somebody does, the author usually focuses on mycobiota of a particular region and often prefers to prepare such books for the mycological community in his country. From the Czech Republic and Slovakia we can mention *Přehled hub střední Evropy* (Overview of Central European Fungi, Holec et al. 2012) with colour drawings, and *Ottova encyklopedie hub* (Otto's Encyclopaedia of Fungi, Hagara 2014) with photographs, but such publications written in local languages are obviously useless for other mycologists.

Detailed monographs exist for particular genera or fungal groups (series like *Fungi Europaei*, *Poroid Fungi of Europe*, etc.), and also the monumental four-volume *Pilzkompendium* by Erhard Ludwig, covering a large proportion of European agaricoid fungi, must be mentioned, but a comprehensive overview for the whole of Europe has been lacking. Thus, the most commonly used compendium covering the majority of macrofungal groups in Central Europe remained *Pilze der Schweiz* (Breitenbach & Kränzlin 1983–2005), available in German, English and French.

The Danish authors Thomas Læssøe and Jens H. Petersen became famous twenty years ago by issuing *MycKey* – a progressive product in its time, bringing together descriptions, photographs and illustrations in electronic form, and enabling identification based on combinations of entered characters. The authors have continued their work and followed this approach in a comprehensive two-volume set compiling current knowledge of temperate European fungi, published recently. To be accurate, temperate zone in the sense of this book covers most of the European continent from the boreal to the nemoral zones, i.e. excluding the arctic zone in the northernmost part of Europe (area of the tundra biome), the entire Mediterranean and the steppe regions of south-eastern Europe (Black Sea coast, SE Ukraine and southern Russia).

The *MycKey* concept is apparent from the 'fungal wheels', pie-chart-like schemes comprising representatives of particular fungal groups, dividing them according to different characters. They appear at all levels, from the highest level (distinguishing basic groups of ascomycetes, basidiomycetes and asexual fungi according to type of fruitbody or spore production), through mid-level (e.g. different groups of agarics according to spore-deposit colour and features of fruitbodies) to the lowest level, presenting divisions of groups into genera and introducing particular sections. Besides the above-mentioned features, the wheels contain microscopic characters (spores and hymenial elements) as well as ecological characteristics of particular groups (white- or brown-rotters, parasites, symbionts). Part of the wheel is an 'Other similar fungi' sector, linking it to pages where groups of similar (and potentially confusable) fungi are presented. They can generally be a very good tool for basic identification of unknown species, which redirects the reader to the appropriate section of the book (but of course,

a monograph dealing with a concrete genus may subsequently be necessary). As a gift for all readers, the wheels are freely available at [http://www.mycology.com/Downloads/FungiOfTemperateEurope\\_Wheels.pdf](http://www.mycology.com/Downloads/FungiOfTemperateEurope_Wheels.pdf).

For each species, a brief description, ecological characteristics, similar species and distinguishing features, and a short note on distribution and phenology (generally in Europe, not in detail) are presented. Despite being brief, the species characteristics fit very well, demonstrating the authors' enormous field experience (e.g. typical smell in many corticioids). They often also contain many novel or less known information (e.g. *Polyporus umbellatus* as a parasite on honey fungi). Apparently, large fungal online datasets have been used to evaluate the occurrence in particular countries (United Kingdom, the Netherlands, etc.). We can mention here only a few useful factual additions: in Central Europe, *Hygrophorus camarophyllus* (p. 175) could be confused with *H. marzuolus*, *Boletus pinophilus* (p. 771) can also occur with broadleaved trees (*Fagus*, *Quercus*), *Amylocystis lapponica* (p. 890) has a highly diagnostic chemical odour. In the whole set, typographical errors (or cases of incorrect grammatical gender) in the names occur very sparsely. In a few cases, epithets need correction: *Crepidotus subverrucispermus* (p. 91) should be *C. subverrucisporus*, *Hygrocybe cinnabarina* (p. 156 below) should be *H. coccinea*, and *Hortiboletus engelii* is the correct name for *H. englerii* (p. 787 above) and *H. engleri* (p. 787 below).

Each species is depicted in one or more photos (most of the total of 7,000 taken by Jens H. Petersen, but 1,300 photos provided by 158 other authors from across Europe). In many cases, the main photos are complemented with insets showing young fruitbodies or details of some structures (hymenophore, pileus surface, etc.). All photos, regardless size of the depicted objects (the books contain also fungi forming fruitbodies less than 1 mm – cyphelloid fungi and various groups of ascomycetes), are equipped with a scale bar.

Regarding the taxonomy, the authors have adopted a modern concept, accepting recently recognised (and exceptionally not yet formally described) species, respecting protected names of pleomorphic fungi (e.g. hypocreoid fungi in the genus *Trichoderma*), and splitting many traditional genera into recently established smaller ones, corresponding to particular lineages, as well as shifting some species to other genera (e.g. poroid species traditionally belonging to *Polyporus*, now classified in *Lentinus*). This approach has only one disadvantage – since new, not yet well-known names are often used, we would have appreciated inclusion of older, better known names as synonyms (e.g. the synonym *Polyporus ciliatus* for *Lentinus substrictus*).

In contrast to this, the basic arrangement of the book is strictly practical, following 'form groups' based on types of fruitbodies and partial structures (hymenophore). For example, poroid species of the mentioned genus *Lentinus* are separated from the gilled ones, while phylogenetically distant fungi are clumped (e.g. *Coltricia* and *Favolaschia* with stipitate polypores; section 'Truffles' comprising true ascomycete truffles, hypogeous basidiomycetes, and even *Endogone* and *Glomus* species). This is a very useful approach, especially for those who are not familiar with the laborious identification of genera with traditional dichotomous keys. Moreover, 'twins' of morphologically similar species are usually presented on facing pages, which enables rapid comparison. A positive fact is also that the texts on phylogenetically related fungi (dissimilar in shape, hence described in other sections or even in the other volume) refer to each other by reciprocal links. For practical use, it would be more convenient to have had a partial index of species in the first volume, but this shortage provides only minor discomfort.

What makes this work unique is that it includes also groups standing on the boundary between macro- and micromycetes, which are usually not presented in common atlases and identification handbooks. The books contain excellent macrophotographs of some common hyphomycetes, synnematal and sporodochial fungi, rusts, smuts and mildews, as well as zygomycetes forming sporangia visible to the naked eye. One can find here even some representatives of rarely depicted groups, like *Laboulbeniales* and *Kickxellales*, and the overview is completed by common species of lichens and slime moulds. We can thus conclude that the overall coverage is very wide and balanced, with very few genera of large mushrooms missing (we have been able to detect just one gilled genus missing – *Musumecia*). Many extremely rare and seldom depicted species are shown (e.g. *Geastrum*

*flexuosum*, *Leucogyrophana lichenicola*, *Leucopaxillus nauseosodulcis*, *Mycorrhaphium pusillum*, 5 species of *Pseudobaesopora*).

In general, the graphical quality is superb and is certainly one of the main merits of the book. Most of the pictures are very esthetical – for users of Mycokey, Petersen's ability to photograph even tiny details in breathtaking quality is well known and reaches a new level in the present books. At the same time, mostly perfectly developed, fresh and 'typical' fungal objects are depicted. Among the thousands of photos we have encountered, only very few images show less characteristic fruitbodies, e.g. *Dacryobolus karstenii* (p. 1017 – untypical, stale fruitbody), *Ramaria stricta* (p. 1139 below – very richly branched and stout fruitbodies), *Geastrum minimum* (p. 1249) and *G. corollinum* (p. 1250; both representing old weathered fruitbodies), *Lycoperdon excipuliforme* (p. 1241 middle left – untypically spiny fruitbody). We think that the picture of *Albatrellus confluens* (p. 830) includes fruitbodies of *A. ovinus* (maybe for comparison, but not mentioned). Also the print quality and colour rendering is very good. A few photos, however, have an unnatural bluish hue (e.g. *Lentinus tigrinus* – p. 80 above, *Tricholomopsis rutilans* – p. 236 below, *Asterophora parasitica* – p. 281, *Oudemansiella mucida* – p. 301, *Rhizomarasmius setosus* – p. 304, *Marasmius rotula* – p. 312). The picture of *Hygrophorus lindtneri* (p. 171) shows an undesired colour shift.

In conclusion, *Fungi of Temperate Europe* represents an excellent 'all-in-one' handbook for field research, comprising all groups of fungi commonly studied by field mycologists. Of course, considering the weight of the two books (5.3 kg in total), mycologists will probably not carry them in the field all day, but we warmly recommend the publication as a basic illustrated compendium for evening identification during multi-day research and for rough identification of unknown fungi (instead of consulting series of monographs), as well as a basic identification handbook for educational excursions, where the wide scope of this publication, intuitive step-by-step identification using fungal wheels, and the large number of illustrations will be highly appreciated.

To sum up, every mycologist in Europe can now have an excellent guide for all fungal groups, covering most genera of macrofungi, with short apt descriptions and superb photos, available at a very reasonable price.

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