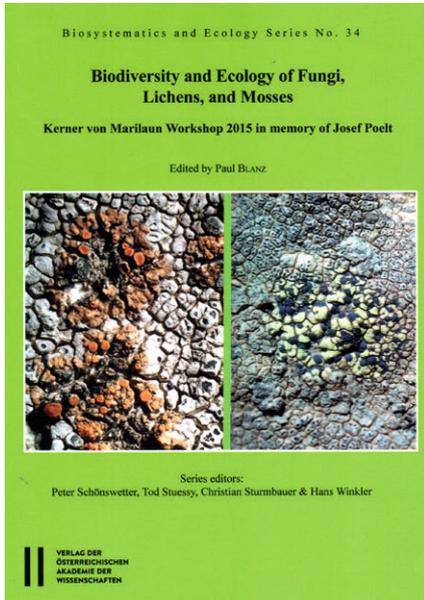


**Biodiversity and Ecology of Fungi, Lichens, and Mosses: Kerner von Marilaun Workshop 2015 in memory of Josef Poelt. Edited by Paul Blanz. 2018. [Biosystematics and Ecology Series no. 34.] Vienna: Austria Academy of Sciences Press. Pp. vi + 715, illustr. (many colour). ISBN 978-3-7001-8219-1 (pbk). Price: 90 €.**



The symposium on which this book is based was held in Graz to mark the 20<sup>th</sup> anniversary of the death of a remarkable polymath, Josef Poelt (1924–1995), a Bavarian who had professorships in

Munich and Berlin before moving to Graz in 1971. It starts with a 100-page meticulously researched and well-illustrated history of Poelt's life and research by Hannes Hertel. This is followed by 24 contributions reflecting the range of his interests, and all concern fungi (including lichen-forming fungi) and are mainly from his former students, many of whom are now distinguished researchers in their own right. The list (in alphabetical order) includes most of the best known German-speaking mycologists: †Robert Bauer, Dominik Begerow, Reinhard Berndt, Paul Blanz, Andreas Bresinsky, Peter Döbbeler, Martin Grube, Josef Hafellner, Rosemarie Honegger, Roland Kirschner, Helmut Mayrhofer, Walter Obermayer, †Franz Oberwinkler, Meike Piepenbring, and Volkmar Wirth – and his Italian close colleague Pier Luigi Nimis. All seem to have made particular efforts to make their contributions significant and fitting to the occasion. I was also pleased to see

the contributions were all in English, though this is something Poelt would have absolutely hated!

It would be too much to list all the topics here, but ones that stood out for me were those on bryophilous hypocrealean ascomycetes, lichenicolous fungi under the one name: one fungus rule, species concepts in rust fungi, host specificity in smut fungi, lichens as a microbial habitat, fossil fungi, and the ultrastructure of basidiomycetes. There is an enormous amount of information here, and if you are interested in these topics and others Poelt would have been interested do have a look at the full contents (<http://hw.oeaw.ac.at/8219-1?frames=yes>). I was pleased to see the book was available open-access.

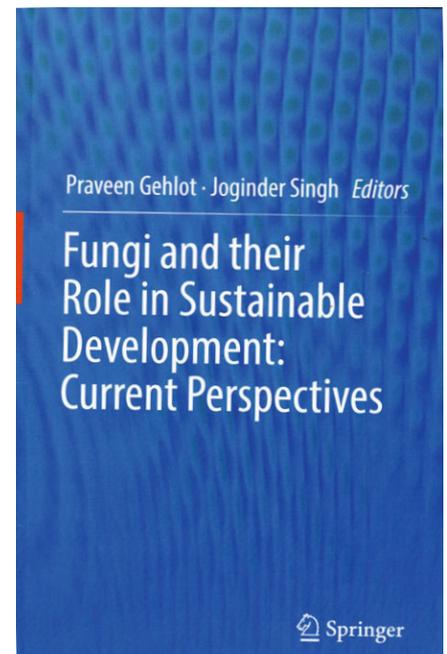
A fitting tribute to a person I feel honoured to have known and collaborated with, well-presented, carefully edited, and something of which Poelt, who was always receptive of new ideas, would have wholeheartedly approved.

**Fungi and their Role in Sustainable Development: current perspectives. Edited by Praveen Gehlot and Joginder Singh. 2018. Singapore: Springer Nature Singapore. Pp. x + 779, illustr. (some colour). ISBN 978-981-13-0392-0 (hbk), 978-981-13-0393-7 (ebk). Price: US\$ 279.99 (hbk) or US\$ 219. 00 (ebk).**

I was immediately attracted by this title, which implies it aims to address how fungi can contribute to an issue of vital and topical concern – sustainable development – and especially so as the initiative was being taken by two Indian mycologists. Further, all but three of the 39 chapters include any non-Indian authors.

The contributions are organized into five sections: Sustainable Cultivation and Conservation Strategies of Fungi (6 chapters); Sustainable Aspects of Fungi in Agriculture (12); Fungi for Sustainable Industrial and Environmental Aspects (9); Bioconversion Technologies of Fungi (6); and Modern Biotechnological Interventions of Fungi (6). These are all laudable as themes, but do the contents live up to the titles? I am sad to say I was disappointed with those in the first section as there was little on cultivation and nothing

on conservation apart from a little on maintaining *ex situ* collections of edible mushrooms. The second was more focussed in including chapters on endophytic fungi and the contribution of their natural products to plant health, biocontrol of plant pathogens by *Trichoderma*, bioherbicides for weed management, mycopesticides, arbuscular mycorrhizal fungi in disease control and further in phosphate supply and bioremediation and drought resistance, but some rather specialized ones such as disease management in chickpea and management of *Phytophthora infestans* on potato. Contributions in the third part tackle very particular topics, xylanases, bioethanol production, nutritional value of *Astraeus hygrometricus*, lipases, pigments, hypersaline fungi, carbon sequestration, and fungal products in the treatment of diabetes. The chapters in the fourth part dealing



with bioconversion lacked any on the bioconversions of waste materials, covering topics as wide-ranging as marine fungi and their applications, arbuscular mycorrhizal fungi and natural products of medicinal plants, fungi as antioxidant carriers, endophytic fungi (again!), biodeterioration of household and cultural materials, and co-cultivation to induce novel chemical scaffolds. The final group of chapters has contributions on bioinformatic approaches to understanding genome sequences, two on bioprospecting amongst endophytic fungi, bioactive potential of a cooked *vs.* uncooked unidentified *Amanita*, a discussion of

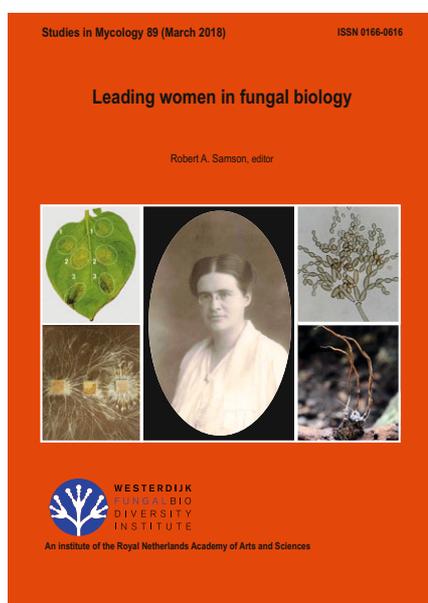
whether *Monascus* is a mycotoxin or statin producer, and fungal nanoparticles.

Most of the chapters do have interesting material, as will be evident from the preceding text, and are a mixture of original work and reviews. But they seem to have been rather shoe-horned into groups where they do not all naturally sit. The result is something of a *pot pourri*, and the book would have benefited from more broadly based overviews to start each of the five topic areas; those could have picked up aspects not or hardly touched in the specialized contributions. The contributions are nevertheless generally well-presented

and illustrated, and in some cases with particularly extensive lists of references – running to 17 pages in one! Sadly, as is so often the trend today, there is no index; at least one to the fungi mentioned would have been of value.

Nevertheless, this book does serve to show just how active and wide-ranging applied mycology is in India today, and I found that truly impressive. In view of the high price and the specializations of many of the chapters, however, I suspect that this is a case where, researchers are most likely to pay to download individual chapters online rather than to purchase the whole work.

## Leading Women in Fungal Biology. Edited by Robert A. Samson. 2018. Utrecht: Westerdijk Fungal Biodiversity Institute. [Studies in Mycology no. 89.] Pp. 301, illustr. ISSN 0166-0616. Price: Open access online.



This number of “*Studies*” is based on a selection of the presentations made during the symposium with the same name held on 30–31 August 2017 in the University of Utrecht to mark the opening of a new

wing of the Westerdijk Fungal Biodiversity Institute in Utrecht (see *IMA Fungus* 8(2): (48)–(49), December 2017). Particularly pertinent to the theme is the carefully researched historical contribution by Sara Maroske and Tom May on the first women taxonomic mycologists (pp. 63–84). It includes a table listing pre-1900 women who published new taxa in chronological order, the first being Catherina Helena Dörrien (1700–1799), an amateur living in what is now Germany, who introduced two varietal names under *Lichen centrifugus* (now *Arctoparmelia centrifuga*) in 1777. Detailed and carefully researched biographies about her and five other amateur female mycologists are provided, along with portraits, some of which must have been very difficult to locate: Marie-Anne Libert (1782–1865), Mary Elizabeth Banning (1822–1903), Élise-Caroline Bommer (1832–1910), Mariette Rousseau (1850–1926), and Annie Lorraine Smith (1854–1937).

There are nine other contributions in this number of the *Studies* addressing a diverse range of topics. All co-authored, the lead women being Martina Réblová (on segregates of *Ceratostomella*), Francine Govers (RXLR effector diversity in *Phytophthora infestans*), Meike Piepenbring (temporal fungal diversity in a forest and meadow in Germany), Vivienne Vleeshouwers (disease resistance genes to *P. infestans*), Lynne Boddy (wood decay basidiomycete dynamics), Jennifer Luangsa-ard (new *Ophiocordyceps* species), Catherine Aime (reconstruction of rust/plant evolution), Ping Zhan (*Trichophyton* phylogenetics), and Konstanze Bensch (indoor *Cladosporium* species).

The whole issue is superbly produced and illustrated as we expect from the Westerdijk Fungal Biodiversity Institute, and as with all numbers of the *Studies* since no. 80 which was issued in 2015.

## Environmental DNA for Biodiversity Research and Monitoring. By Pierre Taberlet, Aurélie Bonin, Lucie Zinger, and Eric Coissac. 2018. Oxford: Oxford University Press. Pp. xiii + 253, illustr. ISBN 978-0-19-876722-0 (hbk), 978-0-19-876728-2 (pbk). Price: £ 70.00 (hbk) and £ 34.99 (pbk).

Although only works primarily of interest to mycologists are normally featured in the “Book News” section of *IMA Fungus*, an exception is made here in view of the enormous interest in and extent of the unexplored fungal “dark diversity” being revealed through DNA recovered from environmental samples. This is such an

important topic, that mycologists involved in aspects of ecology or systematics need to understand the process, their power, and their limitations of the methods used. This work, prepared by a group of French researchers, is primarily designed to guide those wishing to use environmental DNA (eDNA) but will also be of value to all

wishing to better understand the approach when faced with interpreting papers that have employed.

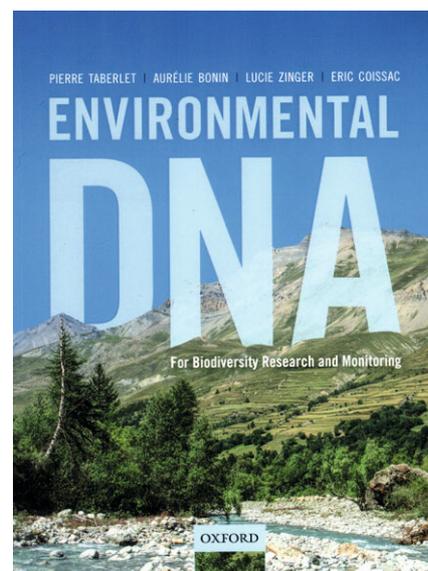
The focus is on metabarcoding, the approach that uses universal PCR primers to identify DNA in a mixture of organisms. It first discusses: metabarcode choice and design; introduces the key reference

databases; describes the processes of sampling, DNA extraction, amplification and multiplexing, sequencing; and data analysis. The book then proceeds to particular applications, including single species detection, functional diversity assessments, freshwater, marine, terrestrial, and palaeoenvironments, host-associated studies, diet analysis, and dealing with bulk samples. In a final chapter, the authors speculate on future development of the approach, stressing the need for some standardization to facilitate comparisons between different studies. They also raise questions only the future will resolve, for example the impact of new sequencing methods and integration of the data into

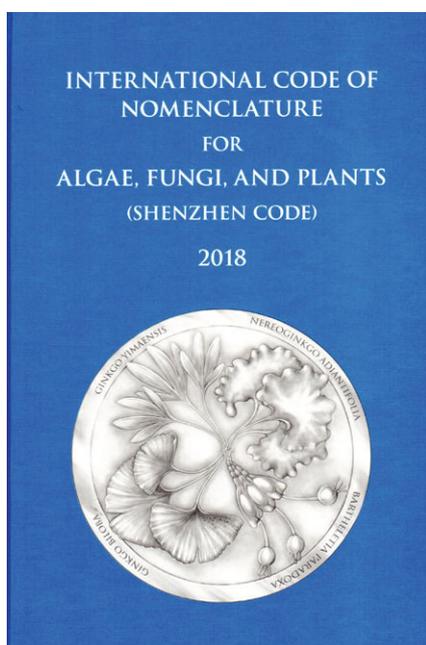
ecological models and theories.

On the practical side, an Appendix includes examples of the primer pairs available for metabarcoding target groups, with two commended for *Fungi*: Fung01 for all fungi but *Glomeromycota*, and Fung02 which is designed also to cover that phylum. For each metabarcode commended, the actual base make-up of the forward and reverse primer sequences is provided.

If you are contemplating moving into this topic, or just want to understand it better, do try and get your hands on a copy – something that might not be that easy just now as I understand the book has proved to be so popular that it is already having to be reprinted.



**International Code of Nomenclature for algae, fungi, and plants (Shenzhen Code) adopted by the Nineteenth International Botanical Congress Shenzhen, China, July 2017. Edited by Nicholas J. Turland, John H. Wiersema, Fred R. Barrie, Werner Greuter, David L. Hawksworth, *et al.* 2018. Glashütten: Koeltz Botanical Books. [Regnum Vegetabile No.159.] Pp. xxxviii + 254. ISBN 978-3-946583-16-5 (hbk). Price: 58.00 €, US\$ 69.60 (hbk), open access online.**



After each six-yearly International Botanical Congress, a new edition of the *International Code of Nomenclature for algae, fungi, and plants (ICN)* is published which

incorporates changes approved by the Nomenclature Session of that Congress; it is available for purchase as a hard copy, or can be accessed free of charge online (<https://www.iapt-taxon.org/nomen/main.php>). Mycologists may like to note the basidia and teliospores of *Bartheletia paradoxa* on *Ginkgo biloba* incorporated into the cover design. This version of the *ICN* supersedes the previous edition, which should no longer be consulted as changes were made in numerous provisions. The Previous *ICN* was the one which arose from the Melbourne IBC in 2011 and was published in 2012. The key alterations made to the Melbourne Code in Shenzhen that relate particularly to fungi have been described elsewhere (Hawksworth *et al.*, *IMA Fungus* 8(2): 211–218, December 2017) so are not repeated here.

An important innovation in the Shenzhen *ICN* is that the material which relates only to organisms treated as fungi for nomenclatural purposes is placed together in a separate Chapter F. Material in that

Chapter can now be changed by the action of an International Mycological Congress (IMC), and some modifications were consequently made at IMC11 in Puerto Rico in July (see May *et al.*, *IMA Fungus* 9(2): (xv)–(xxi), December 2018). A revised version of Chapter F will appear in *IMA Fungus* in 2019, and also replace that in the online electronic version of the whole *ICN*. Mycologists do, however, need the full *ICN* for the numerous provisions that cover all organisms within the remit of the *ICN*.

All dealing with the nomenclature of fungi consequently need to have a hard copy of the *ICN* near their desk and (or) an electronic one on their PC. Versions are being prepared in different languages, and that in Spanish is already available (and is also free online). Mycologists also need to be aware of changes already made in Chapter F at IMC11 as actions taken there, as at IBCs, are immediately effective in advance of the formal publication of the revised Chapter F.

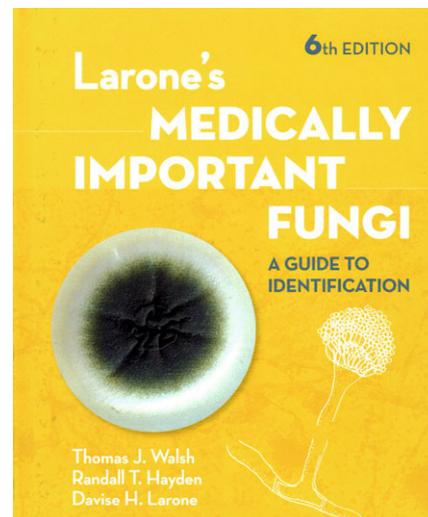
**Larone's Medically Important Fungi: a guide to identification. 6th edition. By Thomas J. Walsh, Randall T. Hayden and Davise H. Larone. 2018. Washington, DC: American Society for Microbiology. Pp. xxvi + 523, illustr. (incl. 28 pp. of colour photographs). ISBN 978-1-55581987-3 (hbk), 978-155581988-0 (ebk). Price: US\$ 125.00 (hbk and ebk).**

This well-established manual has really withstood the test of time, evolving through the last four decades. It first came out in 1976, and the edition previous to the new one, the fifth was published by the American Society of Microbiology in 2011. This record demonstrates that it fulfills a real need amongst medical mycologists; indeed, it is referred to in the Preface as an “esteemed, beloved, and time-honored book” (p. xvii). This is perhaps in no small measure because the authors are all hospital or medical college based and at the sharp-end of diagnosis of conditions due to fungi. They take a pragmatic approach and have endeavored to provide a manual that provides as much as possible to make this a one-stop-shop for clinicians and laboratory technicians – taking them as far as they can and then with information on how to proceed with “rare or atypical fungi”. Indeed, guidance on the use of reference laboratories and how to safely package and transport material appears right at the start of the book, followed by sections of safety procedures to be followed and taxonomy and nomenclature. I was pleased to see the issue of the need to be aware of cryptic species being flagged up, and that the one-name-one fungus decision had been embraced, albeit with the common misunderstanding that this was effective from January 2013 rather than the actual date of July 2011.

Part I addresses the direct microscopical examination of clinical specimens, with a tabular key to disease categories, accompanied by sketches and brief descriptions. Detailed accounts of each of

24 categories follow, including -mycosis and -osis diseases, and with information on etiological agents, sites of infection, and tissue reactions as well as morphology; each is well-illustrated by drawings and half-tone photographs supplemented by really valuable colour prints collected together in a separate signature towards the end of the book. The meat of the book, Part II, is a guide to identification in culture, with the around 150 fungi treated arranged into categories such as “thermally dimorphic” and colony colours. I was pleased to see the use of entries such as “*Fusarium* spp.” and “*Verticillium* spp.” when several taxa not easily separable by light microscopy were involved. Most accounts are full-page, and contain information on pathogenicity, growth rate (on Sabourard’s agar), colony morphology, microscopic feature, sources of further information, and line sketches and half-tone photomicrographs. The photomicrographs would have benefited from replacement by ones taken using Nomarski optics and being in colour, but on the positive side, the coloured pictures of colonies in the colour signature were good to see, though some of those of slants rather than Petri dishes appear to be of limited value.

There is no information on molecular diagnostics in the species accounts, but a helpful introduction to the various molecular approaches is provided in Part III, with an acknowledgement of the importance of sequence data for definitive identifications. Laboratory techniques are treated in a most practical way in Part IV, with information on examination, isolation,



stains, and media – including step-by-step recipes. There is also a glossary, an extensive list of references and web sites, and an extraordinarily comprehensive index.

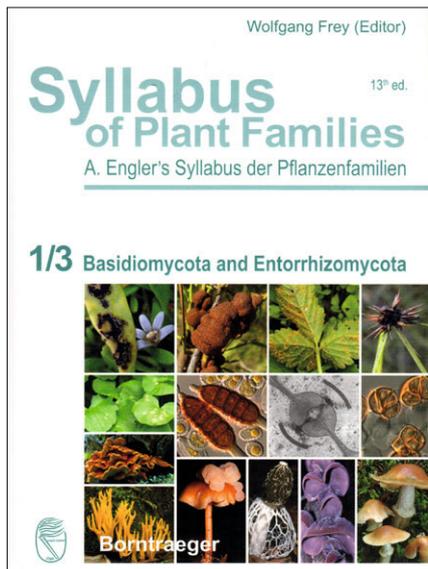
While the book does perhaps have something of a North American slant, for example not including species such as *Neotestudina rosatii*, it is by far the best book on clinical mycology I am aware of tailored for the hospital laboratory, providing a bridge between more superficial texts and the monographic approach of the *Atlas of Clinical Fungi*, the fourth online edition of which is now available by subscription and treats over 600 species ([http://shop.fungalbiodiversitycentre.com/books\\_and\\_publications/atlas-of-clinical-fungi/p-1/205.html](http://shop.fungalbiodiversitycentre.com/books_and_publications/atlas-of-clinical-fungi/p-1/205.html)). Davise Larone should be very pleased to see the work she started so long ago going from strength to strength, and continuing to fulfill a real need, as she commences her 80<sup>th</sup> year.

***Basidiomycota* and *Entorrhizozycota*. By Dominic Begerow, Alistair R. McTaggart, and Reinhard Agerer. 2018. Stuttgart: Borntraeger Science Publishers. ISBN 978-3-443-01098-0. [Syllabus of Plant Families: Adolf Engler’s Syllabus der Pflanzenfamilien, 13th edn (Wolfgang Frey, ed.), Part 1(3).] Pp. xii + 471, figs 42, col. pl. 16. Price: 139 €.**

The *Ascomycota* volume in this series appeared in 2016 (see *IMA Fungus* 7 (1): (45), June 2016). The style is essentially the

same as for that volume, with one important and most valuable improvement. In the *Ascomycota*, descriptions were given down

to the rank of family, followed by a list of included genera (with selected synonyms) with indications of species numbers. Genera



which cannot be assigned to particular families or orders are not forgotten and treated “incertae sedis”, and even fossil genera are included. While there are no keys, there are most valuable notes of the distinguishing characters even of the individual genera, along with indications of habitat and areas where they are known (in many cases to continents or countries). This makes this of pivotal importance as no such complete sets of diagnoses for basidiomycete genera have been attempted

since those included in the keys presented in Ainsworth *et al.* (1973). There are also sometimes extensive lists of “references and further reading”, mainly at the ends of the treatments of particular classes. The illustrations are superb, and include some of ultrastructural and microscopic features and not only basidiomes. Phylogenetic trees are scattered through the volume to show the relationships of higher taxa, and there is a comprehensive index down to the level of genus.

The classification of basidiomycete fungi has been transformed dramatically in the molecular era, and that adopted here is not only topical but incorporates some changes. Two subclasses are newly emended (*Gomphanae* and *Tremellomycetidae*) and Agerer introduces four new subclasses (*Cantharellomycetidae*, *Filobasidiomycetidae*, *Hymenochaetomycetidae*, and *Trechisporomycetidae*), and three new superorders (*Agaricanae*, *Phallanae*, and *Russulanae*); sadly, none of these names appears to be validly published as, while diagnoses are provided, no identifier from any of the three approved repositories of newly proposed fungal names is cited. The tendency is for most recent segregates of formerly broadly circumscribed genera such

as *Boletus* and *Hygrocybe* to be recognized, while the acceptance of families has been more conservative.

As noted for the *Ascomycota* volume, it would have been helpful to include the years of publication of the taxon names to add to the completeness of entries. And while I wholeheartedly welcome the absence of “fruit body”, I would have preferred to see “basidiome” taken up rather than the “basidiocarp” the authors adopted as the latter word still has botanical connections.

I find it difficult to believe that this book has been put together by just three mycologists. Begerow and McTaggart are given as responsible of all sections apart from *Agaricomycotina* which was evidently contributed by Agerer alone. This is a truly remarkable achievement, a landmark in basidiomycete systematics, and a work that really is a “must have” for both mycological institutions and departments as well as all basidiomycete systematists.

Ainsworth GC, Sparrow FK, Sussman AS (eds) (1973) *The Fungi: an advanced treatise*. Vol. 4 (B). *A Taxonomic Review with Keys: basidiomycetes and lower fungi*. New York: Academic Press.

## Common Zoosporic and Water-borne Conidial Fungi. By C. Manoharachary and I.K. Kunwar. 2018. New Delhi: Today & Tomorrow's Printers and Publishers. ISBN 81-7019-620-8. Pp. viii + 94, figs. Price: Rs 995.

This little book aims to provide a self-contained introduction to stimulate interest in water-borne fungi, including those associated with leaves decaying in water, primarily based on those known from Telangana and Andhra Pradesh, but also with a list of those reported from India as a whole. Manoharachary has particular experience of aquatic fungi, having largely devoted himself to them since his PhD in 1974, so was especially well-placed to produce a basic guide.

Practical accounts of how these fungi should be collected, cultured and studied are provided, including details of baiting techniques and culture media. It is unusual in that it covers not only members of kingdom *Fungi*, but also *Chromista* – including *Oomycota* so species-rich genera such as *Achlya* and *Pythium*. Keys are provided down to species. For each of the 69 species treated, the place of publication of the name is given, followed by indications of any synonyms, a short description,

collection details, and in most cases line drawings of the spores. There is also a glossary and a list of references occupying nine pages in small type.

The book is hard-bound and so well-suited to withstand the extensive use in the laboratory which the authors would clearly like to see. It should meet its objective of providing a first step to “help students, teachers and researchers to identify common aquatic fungi” (p.vi) not only in the region, but also more widely for the conidial fungi if the illustrated accounts of Ingold (1975) and Webster & Descals (1981) are unavailable.

Ingold CT (1975) *Guide to Aquatic Hyphomycetes: an illustrated guide to aquatic and water-borne hyphomycetes (Fungi Imperfecti), with notes on their biology*. [Scientific Publication no. 30.] Ambleside: Freshwater Biological Association.

Webster J, Descals E (1981) Morphology, distribution, and ecology of conidial fungi in freshwater habitats. In: *Biology of Conidial*

*Fungi* (Cole GT, Kendrick B, eds) 1: 298–355. New York: Academic Press.

