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BOOK REVIEWS AND NOTICES[1]

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GENERAL

The Mycota. Vol. 7. Part A. **Systematics and Evolution.** Edited by David J. McLaughlin, E. G. McLaughlin & Paul M. Lemke. October 2000 ['2001']. Springer Verlag, Tiergartenstraβe 17, D-69121 Heidelberg, Germany. Pp. xx + 366, 217 figs. ISBN 3 540 58008 5. Price DM 379, US $ 215, £ 215.

This volume begins with an introductory chapter which discusses the nature of the fungi, and then continues with 13 other chapters which cover the parafungi (*Oomycota, Hyphochytriomycota*), protozoan non-fungi (*Plasmodiophorida*), and the various groups of *Zygomycota* and *Ascomycotina*.

Chapter 1, 'What are Fungi?', is a brilliant tour de force. It is engagingly written and persuasively argued. It provides an intellectually stimulating analysis and synthesis of fungi and fungus-like organisms which should be required reading for all aspiring mycologists (and also for those who have arrived). The author points out the basic differences between oomycetes (and other parafungi) and eumycotan or 'true' fungi, and suggests that the descriptor 'fungal' be restricted to attributes found only in true fungi, while the word 'fungoid' would be useful to describe the parafungi and attributes they have in common with fungi. He points out that organisms with a fungoid lifestyle - 'vegetatively walled, plastid-free heterotrophs'- evolved at least six times: three times in the *Chromista*, twice in a the *Choanozoa*, and once to produce the true fungi. The difficulty in defining fungi arises from the multiple origins of fungoid characters, and the subsequent multiple losses of such characters. One surprise is that the *Microsporidia* (e.g. *Nosema*, an anaerobic, intracellular parasite of insects) have now been recognized as true fungi.

Many chapters in Volumes 7A and B (*see below*) treat the available molecular data as holy writ, but in Chapter 1 of Volume 7A we are told that 'rRNA has evolved at such different rates within [the] fungi ...that the trees suffer from systematic biases as well as random noise' and 'Gross inequalities in the rate of rRNA evolution are apparent in *Zygomycetes*, *Ascomycetes*, *Basidiomycetes* and *Microsporidia*. These make the construction of phylogenies a rather speculative occupation'. The author suggests that ranking taxa by phylogenetic age or degree of sequence difference is undesirable, and he prefers to use a combination of morphology, rRNA and ecology, weighted in that order. My only substantive criticism of this otherwise outstanding Chapter is the absence of illustrations of the many diagnostic characters that are discussed in detail in the text.

Where Chapter 1 refers to *Chromista*, Chapter 2 (*Peronosporomycetes*) insists on *Straminipila* (elsewhere spelled '*Stramenopila*'). The author also manages to avoid mentioning the name by which this group is best known, *Oomycota*, until the 22nd page of the chapter. These are just two examples of how difficult it would be for the uninitiated to integrate the material presented in Volumes 7A and B with what they have read elsewhere. A positive feature of this Chapter is the extremely good set of definitions provided for technical terms. The group as a whole is also carefully delineated in Section VIII. This Chapter is quite well illustrated with a combination of micrographs and line drawings, but its value would

[1] Books for consideration for coverage in this column should be mailed to the Book Review Editor at MycoNova (address above) in the first instance. Fax: (+34) 91 857 3640. E-mail: davidh@farm.ucm.es.

have been enhanced by the inclusion of drawings illustrating diagnostic features of the more common taxa. This comment applies equally to many other chapters in the book.

Chapter 3 gives a brief description of the *Hyphochytridiomycota*, rather obscure microscopic parafungi about which little is known, as can be gauged from the facts that only two species have been studied in detail, and that it is not known whether sexual reproduction occurs in the group.

Chapter 4 covers *Plasmodiophorida*. The author tries to keep his taxonomic options open, giving alternative affiliations. I would have thought that a consideration of Chapter 1 would have provided a current and authoritative answer. In any case, the group is neither fungal nor fungoid.

Chapter 5 is largely a rerun of the last major examination of the *Chytridiomycota* by the same author (D. J. Barr) published in 1990, with the important addition of a fifth order, the *Neocallimastigales*, which are anaerobes inhabiting the guts of herbivores, and in many cases producing multiflagellate zoospores - a break with the traditional image of chytridiomycetes. Most taxa in this phylum are still based on the classic publications by Sparrow from 1960 and Karling from 1977. Here is what happened to one line in the reference section of the chapter: 'gen. et sp. nov., a chytrid' became the nonsense 'genet sp. nov. achytrid'. So much for proof-reading.

Chapter 6 covers *Zygomycetes*, and is a well-organized and comprehensive treatment, flawed only by the absence of synoptic diagnostic illustrations. I say that, because although the photomicrographs of zygomycetous structures in Figs 1-18 are good, the selection is far from comprehensive, and there is a real need for accompanying interpretive diagrams. Terms are well-defined but there are no accompanying drawings. The illustrations of arbuscules (Figs 19 and 21) fail to convey the beautiful complexity of these structures. The morphology of the *Entomophthorales* is not illustrated.

Chapter 7 is a relatively brief survey of the *Trichomycetes*, a little-known group of arthropod commensals. My only criticism is the entirely inadequate illustrations - a work of this nature calls for as full a set of diagnostic illustrations as possible. The text is a relatively minor update on the classic work by Lichtwardt of 1986.

Chapter 8 catalogues the several groups of ascomycetes without any illustrations (sorry to keep harping on this, but if nothing else, my many years of teaching inculcated the crucial need for good illustrations in all taxonomic documentation). The system adopted by the author does not match those proposed in the series Preface, or in Chapter 1, but does at least coincide with that in the volume Preface. She lists 12 features (e.g. hamathecium), in various combinations of which the orders can be separated, but the beginner will again become lost in the terminological maze, since these terms are neither defined nor illustrated.

Chapter 9 presents a very brief but wide-ranging discussion of ascomycetous yeasts and yeast-like taxa, again inadequately illustrated. An outline of the relevance of yeasts to humans is followed by explanations of yeast reproduction and the taxonomic methods applied to the group. The taxonomic discussion is appropriate for experts, but without detailed illustrations or tabular information it will be of little help to those seeking enlightenment.

Chapter 10 gives a good general account of the monophyletic *Plectomycetes* and their considerable practical importance, and has a useful plate of diagrams that gives the reader some perspective (though Fig. 4a is difficult to interpret, and some of the diagrams should be much larger, since it is impossible to resolve the asci in, for example, Figs 5 and 7). The list of genera is useful, though it would have been helpful to identify the teleomorph-anamorph pairs, where these are known. The classificatory section successfully integrates molecular and morphological information, and produces convincing alignments.

Chapter 11. The *Pyrenomycetes* are also considered largely monophyletic. The authors cogently explain the salient features of the group and give clear diagrams of representatives of the various orders. Although relatively few examples are given for each order, they are usually diagnostic, and are clearly a distillation of the authors' extensive experience and insights. I am glad the authors did not use photomicrographs, since the drawings are clear and informative. It is too bad that the controversy over the nature of the *Laboulbeniales* could not have been resolved before publication of this book (Chapter 1 places them among the *Archemycota* with the *Entomophthorales*).

Chapter 12. The *Discomycetes* are a clearly polyphyletic group. The authors present a comprehensive, but perhaps perforce rather condensed account. Useful sections cover ecology and associations, especially in lichens. The illustrations of ascomatal types are valuable, though sometimes rather too schematic to aid the student's perception of what the real thing looks like (representative generic names would also have been helpful). Various sections of text cover ascomata, asci, ascospores, paraphyses, septal structures, etc., and under *Lecanorales*, two types of asci are mentioned, rostrate and chimney, but of all these terms, only ascomata are illustrated. Good definitions, historical outlines and areas of relevance to humans are given for the various orders. When commenting on anamorphs, the

authors are rather vague. To their credit, they list the various published (printed) attempts to provide anamorph-teleomorph correlations, but not the most comprehensive compilation available, which is on the web at http://www.biology.ualberta.ca/jbrzusto/anateleo/anatel.html. It is unfortunate that the cladogram (Fig. 3) contains no fewer than 4 misspelled names, and in the description of the *Pezizales* the word 'circumscissile' is rendered as 'circumsessile.' Nevertheless, the authors have compiled a great deal of interesting information about the group, and the truly interested student can gain much from reading this chapter.

Chapter 13 *Loculoascomycetes*. Wordy descriptions of ascomata, hamathecia, and asci are deplorably devoid of illustrations. Again it is obvious that the classification presented is in process of being radically changed. The definitions of orders are expertly done, but the photographs, for example Figs. 6-11 and 12-15, almost all call for explanatory diagrams. The authors are authorities on the group, but I think they have not succeeded in communicating the essential nature of the bitunicate ascomycetes to the seeker after mycological knowledge. I conclude that a lack of truly explanatory illustrations lies at the root of this problem. Should readers have to go elsewhere to learn the nature of the ascus, or the modes of development of the centrum, in these fungi? Is there a prerequisite to this course?

Chapter 14. Anamorphic fungi: a group of asexual 'states' forever in taxonomic limbo. And yet it persists, expands, becomes ever more important, and has even been given unnecessary and misleading names such as *Fungi Imperfecti* and (even worse because of its pretence of being a real taxon) *Deuteromycotina*. I have been professionally involved with anamorphic fungi for many years, so was particularly interested in this Chapter. It is very thoughtfully written, and although the illustrations cover only a tiny percentage of the anamorphic spectrum, they present important examples. Table 3, detailing the subdivision of older genera called for because both ascomycetous and basidiomycetous affinities had been discovered, would have benefited from some accompanying illustrations, as would Table 4. A plate explicating the various kinds of conidium ontogeny and secession would also have been helpful, since readers may be unprepared for such words as rhexolytic (explained in Chapter 10) and will not see its alternative, schizolytic. It would also have been helpful to have some direct consideration of the several ways in which catenate conidia (those in linear series) arise. The various kinds of conidiomata (synnemata, sporodochia, pycnidia, acervuli, and intermediates) could have been more clearly described and illustrated. However, there are excellent selections of illustrations covering many of the other categories discussed. I would like to have seen a more comprehensive plate of drawings associated with all of the 16 identified groupings (to be fair, many of them already have such plates). I am glad that the authors did not use photomicrographs, but chose clear, unequivocal line drawings. This chapter shines in its extensive documentation of the links between anamorph and teleomorph, an aspect not adequately covered in several other chapters (though the web site mentioned above under Chapter 12 is not included). I am glad that the authors give their blessing to the abandonment of anamorphic taxa above the generic level, especially the misleading *Deuteromycotina*, since these always pretended to natural qualities they did not possess. A few obscurantist words like 'acropleurogenous' (apical and lateral) and 'micronematous' (inconspicuous or poorly differentiated) linger. Despite my various carpings, this is a fine chapter that can be read with profit by most mycologists.

Throughout this volume one encounters terms that are familiar only to the cognoscenti, and I for one wish that the authors/editors had provided an introduction to such features. The chapters frequently provide a fine analysis of a group, but the only one to provide a truly illuminating synthesis (Chapter 1) proffers a system so different from those adopted elsewhere in the two volumes that the uninitiated reader is sure to be confused, and perhaps discouraged.

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The Mycota. Vol. 7. Part B. **Systematics and Evolution.** Edited by David J. McLaughlin, E. G. McLaughlin & Paul M. Lemke. October 2000 ['2001']. Springer Verlag, Tiergartenstraβe 17, D-69121 Heidelberg, Germany. Pp. xx + 259, 120 figs. ISBN 3 540 66493 9. Price DM 279, US $ 159, £ 96.

The classification of fungi is in a state of flux. Molecular data are undermining many traditional categories, and major realignments are becoming routine. This volume comes long before the completion of the re-evaluation, so the categories recognized are not necessarily permanent, as is recognized in the volume preface (wherein the only really unfortunate choice is the recognition of the artificial group *Pseudomycota*, comprising phyla from two different kingdoms).

Perhaps the most serious deficiencies in this book are: (1) the interim state of the fungal classification presented; and (2) the paucity of good illustrations (though this varies from chapter to chapter - a stronger editorial hand would have helped tremendously). The first could not have been avoided except by delaying publication of the volume even further. The second could and should have been remedied.

Chapter 1 presents a succinct summary of the extremely polyphyletic basidiomycetous yeasts. Yeast morphology has arisen time and time again in basidiomycetes - in the rust fungi, the smut fungi, and the *Hymenomycetes*. '*Sporobolomyces*' is represented in all four major clades of urediniomycetous yeasts. '*Cryptococcus*' is represented in all four clades of hymenomycetous yeasts. Such conclusions essentially make mincemeat of the extant classification. Chapter 1 (as well as several others) has minor problems with typos and misspellings such as 'heterogenous', 'flaired,' 'similary,' 'Sakaquchia.' A few binomials are not italicized, while other ranks, such as Urediniomyceetes (sic), and ordinal names are inappropriately italicized. Microbotryales is used instead of *Microbotryum*. Otherwise, this chapter is a stimulating contribution.

Chapter 2. The name *Urediniomycetes* was introduced afresh in 1995 as a monophyletic taxon containing rust fungi (*Uredinales*), *Auriculariales, Septobasidiales, Platygloeales*, some smut fungi, jelly fungi and even a few former hyphomycetes and an 'ascomycete.' This Chapter is inevitably a pot pourri of information. The sheer diversity of morphology, methods of sporulation and habitat is dizzying. The current classification is chaotic. So what holds the group together? DNA sequence data, wall carbohydrates, simple septa, absence of Woronin bodies and of membranous septal pore caps. Microscopic characters seen through the light microscope are no longer helpful - including basidium and basidioma morphology (other Chapters show such statements to be true of several major fungal groups). It is very disappointing that in this Chapter, and many others, there are not more illustrations showing the range of morphology and reproduction of the several component groups. How, in their absence, are students of mycology going to come to grips with the new paradigm? *It appears that morphology will remain important in the discovery and description of new species, but will not suffice to place them in higher taxa*. That statement is becoming a generalization applicable throughout wide swathes of the fungal classification, and has tremendous ramifications.

Chapter 3 covers the *Ustilaginomycetes*. Not all smuts belong here, since some are now placed in the *Urediniomycetes* (!), but the *Exobasidiales* have a new home here. As now constituted, the class may have phragmobasidia or holobasidia, with spores discharged or not. This is a good chapter, which explores most of the angles.

Chapter 4, like many others, uses ultrastructural characters to redefine *Heterobasidiomycetes*, recognizing two subclasses, the *Heterobasidiomycetidae* - *Ceratobasidiales, Tulasnellales, Dacrymycetales* and (most) *Auriculariales*, and the *Tremellomycetidae* - *Tremellales* and *Christianseniales*. There are fine illustrations of basidial and some ultrastructural characters.

Chapter 5 recognizes 8 major clades of *Homobasidiomycetes* - polyporoid, euagaricoid, boletoid, thelephoroid, russuloid, hymenochaetoid, cantharelloid, and gomphoid-phalloid. Just to exemplify the radical classificatory changes proposed, I will note that: (1) the agaricoid clade includes (in addition to many agarics) some *Aphyllophorales* (*Clavariaceae, Fistulinaceae, Polyporaceae* and *Schizophyllaceae*), plus *Lycoperdaceae*, *Nidulariaceae* and *Tulostomataceae*, and a few *Paxillaceae*; (2) the boletoid clade includes forms which are poroid, gilled, resupinate, sequestrate, hypogeous, and even some puffballs; and (3) the thelephoroid clade includes forms which are corticioid, clavarioid, pileate pored, pileate toothed, pileate smooth/wrinkled, and pileate gilled. These examples show how thoroughly the fungal spectrum has been dismembered and reassembled. It will be a while before the full impact and implications of this reorganization can be assimilated and adopted by the mycological public and the popular literature (e.g. field guides). This chapter is particularly disappointing in terms of illustrations, with only one plate showing a range of basidiomata with which all mycologists, including amateurs, are already familiar. However, the authors do discuss a number of interesting aspects, such as anamorphs and biological associations, that are not dealt with in other chapters.

Chapter 6 presents a logical survey of the problems and practices involved in the naming of fungi, and broaches changes, some of which may have radical effects.

Chapter 7 is a routine discussion of the culturing and preservation of fungi.

Chapter 8 presents useful mathematical methods for planning and optimizing taxonomic projects, with recommendations for appropriate software.

Chapter 9 gives a rather theoretical discussion of mechanisms of speciation in fungi.

Chapter 10 presents a really useful assessment of the relative merits of different molecular characters in establishing both phylogenies and the timing of the divergence of major groups. Some of the

conclusions are rather counterintuitive, and it will be interesting to see if future fossil discoveries and additional molecular data support these ideas. As the authors conclude 'sequences from more genes and characters of all other types will be welcome'. That may be seen in retrospect as the understatement of the year.

All of this leaves me wondering about the target readership of this volume. Specialists in each group will already have seen most of the ideas aired in the literature. Non-specialists will search in vain in several Chapters for illustrations to illuminate the often extremely confusing changes being proposed. Students (especially those with a bit of mycology under their belts) may be excused for throwing up their hands in dismay. Those new to the discipline won't have a clue what the fuss is all about.

Given the rather alarming number of typos, egregious errors and peculiar English usage in some Chapters, the general paucity of expository illustrations (and the often inappropriate use of SEMs, which frequently present information in a form not readily assimilable unless accompanied by interpretative diagrams), and the extremely uneven quality of the chapters, I am reluctant to recommend the book to the general mycological public, unless they insist on having a precis of an interim, and often confusing, stage in the development of mycological systematics.

Michael Ondaatje recently remarked that 'As a writer, I find that the last two years of any book I work on [are] given over to editing it'. After considering the taxonomic confusion that suffuses Volumes 7A and B, I felt that the Editors might have taken this advice to heart. I suppose that, since the publishers do not pay their authors, they must to some degree take what is provided. But many aspects of these volumes could have been greatly improved by firm editorial hands. Volumes 7A and B provide only an interim snapshot of an evolving intellectual process - the development of a renewed phylogenetic and classificatory system for the fungi. Given that this kind of compilation is carried out only every two or three decades, it might have been better to wait another 5-10 years until more data were available on which to build the new scheme, and to produce more comprehensive and profusely illustrated accounts of the major groups.

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The Fifth Kingdom. By Bryce Kendrick. February 2001 ['2000']. Focus Publishing/R. Pullins Company, P.O. Box 369, Newport, MA 01950, USA. [Orders: Focus, c/o Publishers Business Services, Box 390, Jaffrey, NH 03452, USA.] Third Edition. Pp. xii + 386. ISBN 1 58510 022 6. Price US $ 40, CAN $ 60.

It is a pleasure to introduce a new edition of this now established text. The first edition appeared in 1985, when the idea that the fungi should be regarded as a kingdom distinct from plants, animals, protozoa and bacteria was really starting to take a hold. The work was so popular that a second edition was released in 1992; this was subsequently reprinted twice. So much has happened in mycology in the 1990s that this third edition was becoming a necessity. I warmed to the new edition immediately as the cover bears a colour photograph of the lichenized agaric *'Omphalina' ericetorum* (the issue of the correct generic name notwithstanding!).

It starts with just over a page hard-sell as to why everyone should study fungi, with questions that bring fungi into the very heart of human concerns. At the same time, there is an appeal to personal environmental action to stop the loss of biodiversity and protect our environment. Yet first and foremost a textbook has to appeal to its intended student audience, and so I market-tested it with Peter Váczi, a final-year undergraduate at the University of P. J. Šafárik at Košice in the Slovak Republic who chanced to be working with me in Madrid when the third edition appeared.

Peter's comments summed up the essence of *The Fifth Kingdom*: 'Very easy to read, and when you start you don't want to end !'; 'Encyclopedic coverage of every side of mycology, not only taxonomy but also ecology, physiology, genetics, etc.'; 'All the time there is some story'; 'Illustrations of life-cycles in different groups welcomed'; 'Many line figures are included throughout'; 'Clear figures which are much better than photographs'; 'Information on where you find fungi in everyday life'; and 'Generally useful for ordinary people who would find sections such as that on biocontrol intriguing'. Bryce's enthusiastic and honest style, not papering over gaps and uncertainties, should also be mentioned. The classification adopted has been updated, with protozoan and chromistan fungi treated in a chapter entitled 'A mixed bag'. There is no separate chapter on conidial fungi, something now routine but pioneered by Bryce in the first edition back in 1985.

A list of 'Further reading' follows each Chapter, but facts are not generally referenced in the text itself. While this means that the sources of many of the fascinating 'tit-bits' cannot be easily identified, it does make the whole easier to read.

There is a glossary and a rather full index, actually fuller than intended in my copy as there are two versions of 'j' through 'z' - the second occupies the last 13 pages of the book but appears to be from an earlier version of the text as the page numbers are out of step. An irritation until one learns to ignore the latter version, but showing that even the most experienced mycologists can have lapses.

This edition is a considerable leap forward from the second, the more so as there is an accompanying CD-ROM with over 1100 colour pictures, a remarkably extensive glossary, and the ability to switch around and marvel at the fifth kingdom. The CD-ROM (see *Mycotaxon* **78**: 506, April-June 2001) is available from Mycologue Publishers (8727 Lochside Drive, Sidney by the Sea, BC V8L 1M8, Canada; US $ 55 or CAN $ 80 for individual use; US $ 135 or CAN $ 200 for library/laboratory yearly licences US $ 270 or CAN $ 400 for class/lecture use).

My one regret is that while the results of molecular phylogenetics are incorporated through the classification used, only one molecular tree appears - and that showing the relationship between kingdoms. This is certainly something to be addressed in any fifth edition as such a framework will be expected by many of today's generation of students. 'Alexopoulos' (i.e. C. J. Alexopoulos, C. W. Mims & M. Blackwell, *Introductory Mycology*, 4th edn, John Wiley, New York, 1996) clearly has a rival, but I suspect that *The Fifth Kingdom* will prove to be more popular amongst beginners and less advanced students - especially if they have access to the CD-ROM.

Micologia 2000. Edited by Associazione Micologica Bresadola. December 2000. Fondazione Centro Studi Micologici dell' Associazione Micologica Bresadola, P.O. Box 296, I-36100 Vicenza, Italy. [Orders to Associazione Micologica Bresadola, Via A. Volta 46, I-38100 Trento, Italy.] Pp. 712. ISBN not indicatd. Price Ll 125,000, € 64.56.

This book is intended to be a mycological celebration of the new millenium. Its realization has involved 90 contributors drawn from 22 countries who together have produced a volume of 56 articles in a variety of European languages. The topics vary enormously in scope, and it is regrettably impractical to mention each. The range is from accounts of individual species of interest to monographic revisions and molecular or incompatibility studies. Perhaps the most important systematic papers are: a revision of *Calloriopsis* and *Gelatinopsis* (with the new genus *Hyalorbilia*) by H.-O. Baral & G. Marson; a molecular and chemotaxonomic study of *Leccinum* showing the genus to be polyphyletic and needing to be restricted to sects. *Leccinum* and *Scabra* by M. Binder & H. Besl; a checklist of African polypores south of the Sahara with 317 species, 32 % of which are endemic, by L. Ryvarden; a survey of boletes in south-east Asia by R. Watling; a revision of *Incrupila* by A. Raitviir; a survey of *Exobasidium* species in Switzerland by B. Ing; a 102 page account of 85 species of pyrenomycetes occuring on dung in Italy with keys, illustrations, full descriptions, and synonyms by F. Doveri, G.Cacialli & V. Caroti; and a beautifully illustrated survey of the truffle genera *Terfezia* and *Tirmania* by, naturally, A. Montecchi.

The whole is well-illustrated by top-quality colour photographs and also coloured drawings, and extremely well-presented. The editorial team are to be congratulated, although I was sad to see *Lactarius* 'Pers. ex Gray' (not 'Pers.' or 'Pers. : Fr.') in the title of one article in such a prestigious publication - does it have to take 20 years or more for mycologists to understand changes made in the *Code* ? Notwithstanding such minutiae, what a way to celebrate the turn of the century ! The whole enthuses with an energy and passion for fungi, and the excitement of discovery. It is also a blend of the amateur and the professional, and forges links across national and lingusitic boundaries. Further, it is gratifying to see the vision of such a work coming from an independent centre and association of mycologists, and it will be interesting to see how the association itself develops in and responds to the challenges of this new century.

Biodiversity and Biogeography of Australasian Fungi. Edited by Tom W. May & S. L. Farrer. 2001. [Australian Systematic Botany 14 (3).] CSIRO Publishing, 150 Oxford Street, P.O. Box 1139, Colingwood 3066, Victoria, Australia. Pp. 184. ISSN 1030 1887. Price A $ 75.

This special journal issue is based on papers presented at the IUMS 9th International Congress of Mycology held in Sydney in 1999. Ten papers are included which vary considerably in their depths of

treatment, but which together provide a valuable snap-shot of where we are in our understanding of the Australasian mycobiota.

The whole starts with a particularly valuable overview of the history of exploration of fungi in the continent by T. W. May which points out how much there is to know, with 310 non-lichenized species being described as new since 1997. Sadly, the author seems not to appreciate that lichen names are fungal names and comments that 'the integration of lichens into the fungal kingdom has been advocated' (p. 336) but seems content with the fact that they are excluded from the *Fungi of Australia* series ! Such an approach seems antiquated and means that lichens are not accorded a separate article in the issue. K. D. Hyde reports that 1657 non-lichenized ascomycetes have been reported, estimating that this number may represent only 1.1 % of an estimated 150 K present. In the case of *Rhytismatales,* P. R. Johnston reports that while 82 species are formally named, a further 31 are known but undescribed or unreported - something indicative of our current lack of knowledge. K. Vánky illustrates his system of smut classification by Australian examples in a paper that seems somewhat misplaced in the series. Very much in keeping with the theme, however, is C. Grgurinovic's survey of the situation in several agaric groups: recent studies have raised the number of *Amanita* species known from 79 to 117 in Australia, of *Hygrophoraceae* from 37 to 57 (35 species new to science), and in the case of *Mycena* species being discovered belong to at least four hitherto unrecognized sections in the genus. R. Watling notes that there are 126 named and 53 unnamed boletes in Australia, and estimates that we do not yet know half of those present. The *Aphyllophorales* are surveyed by P. K. Buchanan, who suggests that endemism might be higher than usually expected in these fungi in Australasia. However, it is perhaps the truffle-like 'sequestrate' fungi that reach the zenith of endemism amongst the macromycetes in the region; N. L. Bougher & T. Lebel note that 294 species from 83 genera are know known in Australia and New Zealand, but estimate that these represent only 12-23 % of the 1278-2450 that may actually be present. The situation in 'Fungi anamorphici' is covered by E. H. C. McKenzie - what a phrase to be avoided despite its use in the *Fungi of Australia* and a 'defence' presented here; a table lists 48 genera which are currently endemic in the continent, but does note examples where further species of genera described from the region have later been found elsewhere. The final paper by G. H. Fleet considers yeasts which are evidently still largely unstudied in natural habitats in the region.

In summary, a great initiative which does much to place our knowledge of Australasian fungi in perspective. But further, through its publication in a non-mycological journal it should do much to emphasize how little is known of the Australasian mycobiota to a wide range of 'botanists' in the region.

Fungi of the Caribbean: an annotated checklist. By D. W. Minter, M. Rodríguez Hernández & J. Mena Portales. 2001. PDMS Publishing, 1 Ridgeway Road, Isleworth, Middlesex TW7 5LB, UK. Pp. 946. ISBN 0 9540169 0 4. Price US $ 100.

Weighing in at 2.79 kg, this is the heaviest single mycological volume I have encountered for some time. It represents the culmination of work by numerous mycologists, especially in Cuba and Trinidad and Tobago (portraits in colour of many of these conclude the volume), who endeavoured to catalogue all fungi (in the wide sense, also including lichens) in the region on the basis of published records and herbarium collections. The information was compiled in a database and this work has been produced from the computerized records. The number of records included is a staggering 149 785; these represent 11 268 species. For each species details of the place of original publication of the name, the number of records, the date of the first record, localities, substratum (including host), collections with material (acronyms and accession numbers), and bibliographic records. Synonyms are given under accepted species names and also cross-referenced. Several indices follow: taxonomic (by kingdom, phylum, order, family, etc), country (with individual islands listed separately where appropriate), associated organisms, and substratum. The bibliography is impressive to say the least. This book will now be the basic reference work for Caribbean fungi, and a landmark in our knowledge of fungi of the region. While it will have omissions, especially from collections whose records could not be accessed and incorporated, it provides a starting point for those working in any aspect of mycology who wish to know what is recorded, when, where, and on what in this biogeographically complex region. It is also pleasing to see the close co-operation developed between mycologists in the UK and Cuba in particular which, with funding from the UK Darwin Initiative, made this project realizable. It is to be hoped that such collaboration will continue now this book has appeared and that the databases on which it is based will grow through the years ahead.

ASCOMYCETES

Truffes d'Europe et de Chine. By L. Riousset, G. Riousset, G. Chevalier, M. C. Bardet. 2001. Institut National de la Recherche Agronomique and Centre Technique Interprofessionnel des Fruits et Legumes, Paris, France. [Obtainable from INRA Éditions, RD 10, F-78026 Versailles Cedex, France.] Pp. 184. ISBN 2-7380-09328. Price Ff 295(€ 44.97) [+ postage and packing Ff 30].

This book includes 29 taxa belonging to 26 species of *Tuber*, the most fascinating true truffles. Each taxon treated is given a concise description and beautiful coloured photographs of maro- and micro-characters. Although the classification of species in six groups in the book may be challenged, it does provide an easy way to recognise the species. Prior to the species descriptions and illustrations, a review is made to cover the history, taxonomic position, ascoma structures, morphological and new identification methods of *Tuber*. Two keys to most of the species in the book, and *T. himalayense* which is not included in the species accounts, are also provided.

This book has apparently been stimulated by the influx of truffles from China into the European market, yet while the title of the book implies it treats the truffles of Europe and China, only two species of *Tuber* are mentioned as occurring in the latter country. However, more than 20 species of *Tuber* have been recorded in China and about 10 can be found in the book although it does not state that eight of those occur there. While the title of the book may partly be justified because of this, the species included still are far from providing a complete overview of the Chinese true truffles.

Although the book is evidently written for French readers and is not intend to be a taxonomic reference work on *Tuber* in China, it will be good to have at hand when identifying common European species, especially those appearing in markets.

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Eine Revision der lichenicolen Arten der Sammelgattungen *Guignardia* und *Physalospora* (*Ascomycotina*). By Nikolaus Hoffmann & Josef Hafellner. 2000. [Bibiotheca Lichenologica Vol. 77.] J. Cramer in der Gebrüder Borntraeger, D-14129 Berlin, Germany. Pp. 190, figs 62. ISBN 3 443 58056 4. Price not indicated.

Another important treatment of a group of lichenicolous fungi from the Graz stable. Having revised the non-hypocrealean 1-septate hyaline spored pyrenomycetes occurring on lichens in earlier works (e.g. M. Grube & J. Hafellner, *Nova Hedwigia* **51**: 283-360, 1990), those with non-septate ascospores demanded attention. Most had been placed in the genera *Guignardia* or *Physalospora*, but as might be expected the fungi are found to belong to a diverse range not only of genera but also of families and orders. Thirteen genera are treated, either comprehensively or at leat for the simple-spored species: *Baciliopsis, Guignardia, Gyrophthorus, Lichenochora, Myxophora, Obryzum, Physalospora, Roselliniella, Sagediopsis, Telogalla, Thamnogalla, Verrucaria,* and *Zwackhiomyces*. Perhaps surprisingly, only one new genus was found to be necessary, *Telogalla* for the single species on *Xanthoria* familiar to us under the name *Guignardia olivieri*; the genus was referred to the *Verrucariaceae*. One factor restricting the number of new genera was the decision to include simple-spored species in genera formerly only with septate spores, notably *Lichenochora* and *Zwachkiomyces*.

Especially interesting was the use of *Myxophora*, a genus of *Dimeriaceae* originally described for a fungus growing on cyanobacterial films over mosses with one or more cilia on the ends of the spores; five lichenicolous species are now placed in the genus, four newly described and on lichens which have cyanobacterial photosynthetic partners. This suggests that the target for *Myxophora* is the cyanobacteria rather than the lichen fungus, quite a contrast to the situation in the lichenicolous *Dacampiaceae* where the lichenicolous fungi appear to be primarily mycoparasites of the lichen-forming fungus. It was interesting to see a second species of *Gyrophthorus* discovered, and that it was also on an *Umbilicaria* (a member of the systematically rather isolated *Umbilicariaceae*). The placement of the monotypic genus *Thamnogalla* has been a problem since I described the genus in 1980, and the families *Physosporellaceae* and *Phyllachoraceae* have been suggested in the past. Now, on the basis of ascus structure and the delicate interascal filaments and hyaline hyphal exciple, the family *Stictidaceae* (*Ostropales*) is suggested and this seems not unreasonable if it is accepted that the ascoma is an

lichen web-sites is a welcome feature, and the bibliography of cited literature is accompanied by lists of recommended further reading arranged by broad topics.

I anticipate that this book will not only be well-used by those involved in the forest health monitoring programme, but also by Spanish speaking amateur lichenologists and students engaged in biodindication studies generally.

BASIDIOMYCETES

Common Florida Mushrooms. By James W. Kimbrough. November 2000. Institute of Food and Agricultural Sciences, University of Florida Extension Services, P.O. Box 110810, Gainsville, FL 32611-0810, USA. Pp. vii + 342, 268 figs (257 in colour). ISBN 0 916287 30 0. Price US $ 19.95.

Jim Kimbrough is renowned as an enthusiastic and lucid teacher in mycology, and this delightful book shows that this reputation is well-deserved. Between 3000 and 5000 mushroom species occur in the southern states, and nearly 1000 have been described as new to science from Florida - mainly through the efforts of W. A. Murrill (1869-1957). A key feature of this work is that many of Murrill's species are illustrated in colour here for the first time. With over 8000 of Murrill's collections preserved in the herbarium in Kimbrough's faculty in Gainsville, the author has been able to ensure names were properly applied to these fungi.

The species are arranged by orders, and often families, with keys to the genera and (or) commoner species in some cases. The text for each species is bulleted to separate information on macroscopic features, microscopic ones, and notes on ecology, identification, or other features. The classification system used is conservative, maintaining a broad concept of, for example, *Agaricales* (incl. *Cortinariales*, and *Russulales*). Interestingly, no attempts to coin common names are made, something unusual in a field guide intended for amateur use but surely something that aids international communication. Notes on edibility are provided, but quite a few are prefixed with a '?' . . . There is also a recipe section juxtaposed to one on toxins, a glossary, and the expected introductory matter on general aspects and collecting.

Most of the photographs are by the author, but he has also been able to use slides from several other leading mycologists, for example Henry Aldrich, Tim Baroni, Gerald Benny, Terry Henkle, and Greg Mueller.

There is no doubt that this superbly designed and illustrated book will do much to encourage field mycology in Florida, but the text is also of international interest because of its coverage of many of Murrill's species. It will therefore be of value to those specializing in genera such as *Agaricus, Boletus, Lepiota*, and *Russula*.

Mushrooms of Cape Cod and the National Seashore. By Arleen R. Bessette, Alan E. Bessette & William J. Neill. 2001. Syracuse University Press, New York, NY 13244-5160. Pp. xiii + 177, numerous coloured photographs. ISBN 0 8156 0688 5. Price not indicated.

Mushroom guides focussing on relatively restricted areas and which are well-illustrated are a great way to make converts to mycology as they mean that a high proportion of species can be identified. This is especially so for guides dealing with areas where people spend vacations such as Cape Cod. As Arleen states in the Preface, the hope is that the guide will contribute 'to each visitor's greater understanding and appreciation of this special place' which was protected in 1961 through the actions of President John F. Kennedy.

The book starts with a paleoecological and climatalogical account and proceeds to describe the different habitats and the mushrooms associated with them in the area: pitch pine barrens, atlantic white cedar swamp, beech forest, and interdunal bogs. I was pleased to see the importance of mycorrihzas stressed, and basic information on mushroom anatomy and collection. A colour key to the major groups of mushrooms with colour photographs within the keys is a particularly neat way to aid beginners in reaching the relevant part of the text. Detailed descriptions of around 150 species follow, including microscopic information, fruiting seasons, edibility, and numerous other observations. However, it is the colour photographs of the species which follow which I am sure will receive the most attention from non-specialist users. These are generally of a good quality, but I worried a little over the colour reproduction

of *Mutinus caninus* which appears with a much pinker stalk than is usual in Europe where it tends to be more orange - but perhaps different species are really involved. Unusual for what is primarily intended as a field guide is the inclusion of two new taxa, *Boletus aurantiioruber* (Dick & Snell) stat. nov. and *B. billieae* sp. nov., but this helps emphasize to readers how little we still know of macromycetes even in the eastern USA. It is not clear, however, how many mushrooms in the area are not treated and the opportunity to include a checklist might have been considered.

The USA is well-known for its record of sponsorship of charitable activities of all kinds. This is taken a stage further here by securing sponsorship for particular photographs from a wide range of individuals and even some specialist mycological societies, a college, and a company. This is an approach that used to be not uncommon in the eighteenth and early nineteenth century but I have not seen this in any other recent mushroom book. A practice for other authors to consider ?

The Bessette's are well-recognized for their careful and authoritative work, and William Neill has detailed knowledge of the area. The work can be strongly recommended to mycologists, naturalists, and vacationers.

401 Funghi. By Antonio Gennari. 2000. Associazione Micologia Bresadola, c/o Giovanni Robich, via Orlanda 141/C, I-30030 Campalto VE, Italy. Pp. 44, 439 colour pictures. ISBN not indicated. Price Ll 57,000, €29.44.

This book has a nice appearance at a first look. Published in hard covers, on which there is a photographic taster of the two main aspects treated inside: fungal morphology and a series of peculiar developments which happen in certain fungi. The volume is composed of 18 chapters, plus a preface, a presentation, two indexes, a glossary, references and 14 cooking recipes.

The first informal chapter is dedicated to the description of abnormal forms of growth in mushrooms. Thirty pictures of very curious and rare carpophores are compared with objects, events, monstrosities, etc., in a very funny style. The introduction deals with several aspects related to the biology, habitat, anatomy, chemical reagents, macro- and micromorphology. Systematics and taxonomy are pointed to briefly, as are observations on toxicity and how to collect mushrooms in the field without causing major damage to the mycelium.

The main part of the book consists of 401 pictures of fungi, which are of a high quality, and have corresponding descriptions. For each species the scientific name, etymology, synonymy, macro- and microscopy , organoleptic features, habitat, edibility, and observations are given.

Within this album there are accounts of six new species recently published by the author: *Stereopsis reidii*, *Lyophyllum microsporum*, *Pseudobaeospora pallidifolia*, *Ramaria arcosuensis*, *Leucoagaricus aurantiovergens*, and *Mycena aurantiistipitata*. As to already described species the following are worth pointing out due to their rarity and interest: *Chalciporus rubinus* (p. 139), *Leccinum carpini* (p. 142), *Xerocomus roseoalbidus* (p. 158), *Omphalina rosella* (p. 197), *Pluteus boudieri* (p. 206), *Crepidotus subverrucisporus* (p. 213), *Pholiota nameko* (p. 245), *Hygrocybe psittacina* (p. 272), *Lepiota boudieri* (p. 330). *Tricholoma bresadolanum* (p.350), *T. joachimii* (p. 356), *T. luridum* (p. 358), *T. pseudonictitans* (p. 362), *Catathelasma imperiale* (p. 375), all species of *Camarophyllopsis* covered (pp. 390-394), *Porpoloma metapodium* (p. 397), *P. pes-caprae* (p. 398), *Agaricus menieri* (p. 409), *A. phaeolepidotus* (p. 411), *Clavaria atrofusca* (p. 448), *C. fumosa* (p. 449), *Clavariadelphus flavo-immaturus* (p.452), *Artomyces pyxidatus* (p. 462), and *Clavicorona taxophila* (p. 463).

On the other hand, some photographs are not good representatives of the corresponding species, e.g.: *Leccinum lepidum* (p. 145) looks like *Boletus impolitus* (p. 130); *Suillus bellinii* (p. 147) appears too pallid; *Entoloma lividum* (p. 199) and *E. lividoalbum* (p. 200) seem to be mistaken; *Pluteus cervinus* (p. 207) is of a poor quality; *Cortinarius caligatus* (p. 229) and *C. calochrous* (p. 230) are difficult to distinguished; *Agaricus arvensis* (p. 399) seems to be *A.. silvicola* to me; *A. macrosporus* (p. 407) and *Ramaria pallida* (p. 461) appear overexposed; and *Gyromitra gigas* (p. 492) seems to be *G. esculenta* according to its cerebriform aspect which is lacking in the former species.

The taxonomy and nomenclature are correct, according to the *Code*, except in the case of *Tuber melanosporum* (p. 511), the name normally used in commercial transactions, where *T. nigrum* has priority. There are a few orthographical errors, for instance *Pleurotus drynus* (p. 171) must be *P. dryinus*.

In conclusion, I consider this work of a great value, with important contributions, which will help both, professional and amateur mycologists. Thus, I congratulate to Dr Gennari for this achievement.

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apothecium with a narrow disc. *Lichenochora*, a generic name established by Hafellner in 1989, proves to be pre-dated by *Paralaestadia* (Sacc. & D. Sacc.) Vainio 1921; as the latter has been scarcely used and *Lichenochora* is now well-known the authors indicate that they are proposing the conservation of *Lichenochora*. The need to cast a net widely when looking for possible synonyms is well-made again here by the discovery that *Guignardia fimbriatae* is a synonym of the coelomycete *Lichenosticta alcicornaria*!

The whole work is carefully presented with full descriptions and discussions, and especially fine line-drawings (although I suspect some justifiable and understandable artistic licence with the 'neat' peridial cells in some). There are also 24 photographs, mainly of sections of ascomata, some rather lacking the quality that otherwise characterizes the work, although ones shows the fungal hyphae in and around algal cells in *Mastodia tesslata* particularly well. There is a single key, information on 15 excluded species, and an index including the names of hosts as well as other taxa treated.

Such painstaking revisions are the very foundation of all aspects of the study of fungi, and it is most pleasing to see the Graz tradition of critical revisions of such neglected groups being maintained into the 21st century.

LICHEN-FORMING FUNGI

A Hand Book of Lichens. By Dharani D. Awasthi. 2000. Bishen Singh Mahendra Pal Singh, 23-A New Connaught Place, Dehra Dun, 248001 India. Pp. 145. ISBN 81 211 0181 6. Price: Rs 395, US $ 20 (hardback), Rs 195 (paperback).

The lack of basic textbooks has always been a constraint to an expansion of those with an understanding of lichenology. This has been a particularly acute problem in less developed countries such as India where cost precludes the purchase of such books that are published in North America or Europe. The only previous similar text to have been published in India is *Lichens: a preliminary text* by A. Misra & R. P. Agrawal (Oxford & IBH Publishing, New Dehli, 1978) which while well-intentioned suffered from both a lack of awareness of more recent research and the quality of production.

Dr Awasthi is already well-known as the leading authority on lichens in the subcontinent, and also a monographer, but had not produced a book to introduce new students to the subject. He started work on the project to produce a student text back in 1990, and it is very pleasing that he has found time to bring this to completion since he retired from a life-time of professional lichenology. Further, conscious of his perhaps unawareness of western literature, he also enlisted the help of Professor Mark R. D. Seaward in commenting on a first draft of the entire book.

In addition to overviews of key aspects of the subject, there is also information on collecting, curating, and chemical examination, a glossary, and extensive bibliography.

While the length of time the text has been in production means that it is somewhat dated in parts, as in the section on classification where the last literature reference is to one of Tehler's papers from 1996, the work should be warmly welcomed. It merits wide use not only in the Indian subcontinent but also in other countries that do not have access to western texts.

Lichenology in Indian Subcontinent. By Dharani D. Awasthi. 2000. Bishen Singh Mahendra Pal Singh, 23-A New Connaught Place, Dehra Dun, 248001 India. Pp. iv + 124. ISBN 81 211 0187 5. Price: Rs 395, US $ 20 (hardback), Rs 195 (paperback).

This work falls into four discrete sections. First is a history of the study of lichens in the subcontinent. This incorporates a semi-autobiographical account of the author's own career in lichenology which had its origins back in 1947. The section is extremely well-referenced to Indian work and also discusses interactions with western lichenologists from Veli Räsänen in the 1940s to Mason Hale from the 1970s. The second section is a short five-page overview of lichen diversity in India, an almost impossible task in a few pages and something meriting a book in it self which only Dr Awasthi could currently attempt.

The core of this work is a new checklist. The last checklist was published by Dr Awasthi in 1965 (*Beihefte zur Nova Hedwigia* **1**:1-137, 1965) and included just over 1300 species. The new checklist, however, has over 2450 species, almost a 100 % increase over 33 years. The list is strictly alphabetical by genus, with no references to the sources of records. A list of names used in his two complimentary keys to the macro- (*Journal of the Hattori Botanical Laboratory* **65**: 207-302, 1988) and microlichens (*Bibliotheca Lichenologica* **40**: 1-337, 1991) of India and Nepal which are synonyms of taxa in the checklist is helpfully provided. The main difference is in his acceptance of many of the recent

Parmeliaceae segregates, and also some changes in pyrenolichen generic names. Twenty-one new combinations and one new name are introduced, 16 of these transfers from *Ditremis* to *Pleurotrema*.

The fourth and final section of the book provides keys to common macrolichens in India, including generic descriptions, ecological and distributional notes, and keys to species. This will be immensely valuable to Indian students who do not have access to the author's 1988 macrolichen keys mentioned above.

Dr Awasthi's contributions to lichenology, especially in the Indian subcontinent, have been immense and sustained for over half a century despite problems of isolation and access to literature. This work is in essence a synopsis of where he has taken lichenology in the region over that time. It shows what can be achieved by a determined and able systematist even without the benefit of new technologies, modern communications systems, and international travel now available, and should inspire others working in similarly isolated situations.

Epiftytiske Mikrolaver. By Vagn Alstrup. May 2001. Gads Forlag, Klosterstræde 9, DK-1157 København K, Denmark. Pp. 208, coloured photographs. ISBN 87 12 03141 0. Price DK Kr 249.

Most introductory lichen identification guides focus on macrolichens. Not so this one which covers a wide range of crustose and leprose lichens occurring on wood and bark in Denmark. The work is beautifully illustrated with photographs by Ib Søderberg, and for each species a brief description is provided, including microscopic features, and notes on its distribution inside and outside Denmark. The common names given must surely include many not previously coined in Danish.

The species are grouped into 13 categories separated by a key based mainly on superficial features, although the need for a KOH test may put off some beginners. No keys are provided within the groups, users having to rely on the photographs and text. In some, but not all, cases brief notes on the features of the genus are provided. Something not to be expected in a book of this level, but reflecting the author's interests, is the inclusion of notes on lichenicolous fungi under their hosts. This is welcome as the characters of these fungi can cause considerable confusion amongst newcomers to the subject who take fruit bodies of the invading fungus to be those of the host lichen.

While this neat little book will do much to aid the identification of microlichens on woody substrata in the country, the absence of a list of further reading or even to other Danish lichen texts and checklists may cause some frustration.

As many of the some 300 species treated are rarely, if ever, illustrated in colour, and have wide distributions in Europe or temperate regions more generally, this will be a useful adjunct to any lichenological library.

Guía de Líquenes Epífitos. By Vicent Calatayud Lorente & María José Sanz Sánchez. [2001.] Ministerio de Medio Ambiente, Madrid. Pp. 185, 108 coloured plates. ISBN 84 8014 298 7. Price not indicated.

This guide to lichens growing on trees has been produced within the framework of the Pan-European Programme for Intensive and Continuous Monitoring of Forest Ecosystems. It's purpose is to help non-specialists identify species of bioindicator value in the 53 plots in the survey that are located in Spain. One hundred and eight species are figured in exceptionally good-quality colour photographs. Most are macrolichens, but some distinctive crustose species are also covered (e.g. *Buellia punctata, Chrysothrix candelaris, Graphis scripta*). At the end of the book, the figured species recorded in each of the different 53 plots that are listed in tabular form

Keys are by growth-form and lucidly presented, and the taxa covered are arranged alphabetically in two groups. The first series comprises just the photographs but embedded amongst them are keys to species within the genera when more than one is treated. The second comprises species descriptions and discussions, including chemical tests, notes on habitat and distribution, and further an indication of sensitivity.

The taxonomy used is somewhat conservative, for example in retaining the use of *Parmelia* in the broad sense, but that is perhaps wise for users who will thus find information on the same species in earlier literature easier to locate. More recently introduced names are, however, also given as synonyms.

There is also a well-illustrated introduction to lichens and their features, including some fine half-tones, and an overview of the use of lichens as bioindicators, especially of air pollution. Information on

Setas de Madrid (y alrededores). Vol. 3. ***Agaricus* L. : Fr.** By Sociedad Micologia de Madrid. 2000. Sociedad Micologia de Madrid, Madrid, Spain. Pp. 156, numerous coloured plates. ISBN 84 607 19073 4. Price not indicated.

This is the fourth or a series of small books that started to be issued in 1997. The first was a *Guia de Iniciacion,* and the other volumes focussed on *Boletales* (1998) and *Gasteromycetes* (1999). This volume covers 52 species and varieties of *Agaricus* found in and around the Comunidad de Madrid, all illustrated by first-rate colour photographs and with full descriptions. In addition, there is a fine series of photographs illustrating features such as the type on annulus, details of the bases, and flesh (with colour changes on cutting or bruising) preceding a dichotomous key to the taxa. Information on edibility, habitats, and possible confusions with other species are provided, but interestingly common names are not provided. With such works available, it is no surprise that mycologists in this part of Spain know their mushrooms so well. Interestingly, the series is self-financing. After the first volume appeared, sales of that and each subequent volume have been sufficient to enable an additional number to be published each year. This is an approach to mycological publishing that might only work in a region where so many people are captivated by mushrooms of all kinds.

CONIDIAL FUNGI

The Deuteromycetes - Mitosporic Fungi. By E. Kiffer & M. Morelet. 2000. Science Publishers, P.O. Box 699, May Street, Enfield, NH 03748. USA. Pp. 300. ISBN 1 57808 068 1. Price US $ 85, £ 56.

Having taught fungal taxonomy for many years, I know how hard it can be to communicate the intricacies of the anamorphic fungi to undergraduates. Here is a book which attempts that feat. How well does it succeed?

The authors chose an unfortunate title, just when the consensus among most mycologists is to avoid using taxa above the generic level for anamorphic fungi, since these have no phylogenetic reality (*Deuteromycetes* is a name at the rank of class). Fortunately, the subtitle puts us back in the right frame. It would have been helpful if the authors had used the word now most widely applied to asexual reproductive phases of the *Dikaryomycota,* anamorphs.

In 1979 I wrote 'It is now clear that there will be no natural classification of the Fungi Imperfecti based on conidium ontogeny'. This statement was recently quoted approvingly by Seifert & Gams (2001), writing about anamorphic fungi in Volume 7A of *The Mycota* (*see above*). It is, then, mildly surprising to discover a book which sets out to prove the opposite. The basic premises of this book, its alpha and omega, lie in development.

The translation is quirky, using such rare or unusual words as 'amerosporate' for amerosporous, 'fimicolous' for coprophilous or dung-inhabiting, 'fructiferous' for sporulating, 'gustative' for flavour, 'individualized' for differentiated or distinct, 'integuments' for skin, 'muticate' for without setulate appendage, 'mycorrhizian' for mycorrhizal, and 'telluric' for soil-inhabiting. The word 'fumagines' is used (p. 171) but not defined (I think the authors mean sooty moulds).

The first 35 pages are devoted to explaining a comprehensive (and perhaps rather intimidating) lexicon of specialized terms that apply to anamorphic fungi. While most are necessary, some, such as micronematous, semi-micronematous and macronematous, could easily be replaced by ordinary and generally understood words. The use of the word cilia on p. 21 is inappropriate, since these appendages have nothing to do with motility, and lack the 9+2 internal anatomy. The introduction of two new major categories of anamorphic fungi - hyphales and conidiomales - has a certain logic, but these are not congruent with the accepted groupings, and can only lead to confusion (especially since *Penicillium* fits into both).

Each developmental category is introduced by 'time-lapse' sketches, drawings interpreting electron micrographs, and a detailed explanatory text. A dichotomous key to genera is given, followed by plates of often rather simplified (sometimes altogether too sketchy) line drawings, pigment being indicated by rather crude stippling. Each plate is accompanied by a page of detailed legends providing such additional information about each genus as geographical distribution, substrates, holomorph and references.

Chapters 2 to 13 deal with the various developmentally defined groups. In Chapter 3 the term 'vegetative point' is used instead of the widely accepted 'conidiogenous locus.' Setae, though clearly visible in many illustrations (see Plate XH) are not defined in the glossary.

My major complaints, then, are three: (1) That in a book purportedly aimed at facilitating identification, the user is forced to use developmental characters that are often hard to observe or to interpret. This reviewer still thinks that morphologically similar forms should be grouped together, and their developmental characters sought for subsequently. In the case of isolated spores (as encountered in aerobiological studies), these characters are likely to be unavailable, and that would make this book extremely difficult to use. (2) That a significant proportion of the illustrations are too reduced and rudimentary. And (3) that the dichotomous keys have as many as 361 couplets, making them so unwieldy as to be essentially unusable.

However, with Carmichael *et al.*'s (1980) *Genera of Hyphomycetes* long out of print, and the next edition not yet forthcoming, would-be identifiers may well seek solace in this book. It has the considerable virtues of being comprehensive, and of containing vast amounts of highly condensed but useful information. Now if only all this could be put into a random-access database management program.

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Integration of Modern Taxonomic Methods for *Penicillium* and *Aspergillus* classification. Edited by Robert A. Samson & John I. Pitt. 2000. Harwood Academic Publishers, 6th Floor, Amsteldijk 166, 1079 LH Amsterdam, The Netherlands. Pp. xii + 510. ISBN 90 5823 159 3. Price US $ 95, £ 63, € 105.

On observing the title of this book, one might think that it was a handbook or manual for the identification of two relevant anamorph genera, *Penicillium* and *Aspergillus*, with an homogenous content and covering all the accepted species. However, this is not the case, nor was this intended by the editors. In fact, the book is a compilation of the papers presented in the 3rd International Workshop on *Penicillium* and *Aspergillus* held in Baarn, The Netherlands, in 1997. The contents are organised as 36 papers divided into nine chapters, and although 26 corresponding contributors are mentioned in the Preface many more authors are included in the headings to the different articles. In these workshops, organised by the IUMS International Commission on *Penicillium* and *Aspergillus*, the most important aspects of the systematic and nomenclature of these genera are addressed. The books derived from these workshops are reference points for those people interested in the taxonomy of *Eurotiales*.

Although some of the papers have been updated since their presentation, after such a long lapse of time (more than three years) some articles have inevitably become somewhat old. However, the publication of identification literature is always a welcome event, especially when such large taxonomic groups are covered.

Chapter 1 is extremely useful since it deals with some complicated nomenclature aspects of these fungi. It also includes a list of the species of *Trichocomaceae*, accepted until 1999, and their synonyms. Chapters 2, 3 and 5 include a mixture of papers, which integrate morphological and physiological techniques applied with more or less success in the taxonomy of these fungi. The synoptic computerised key provided by K.A. Seifert for the identification of *Aspergillus* works perfectly, as I have experienced. Chapters 4, 6 and 7 comprise 17 papers based on molecular taxonomy and phylogenetic analysis of both genera and their teleomorphs, although some taxa are treated more extensively than others. Chapter 8, devoted to pathogenic species of these genera includes only two articles concerning *A. fumigatus* and related species. Someone might have hoped to find some information on *P. marneffei*, the most important pathogenic species of *Penicillium*.

Overall, this is a very well produced compilation. The clarity of the text and the high expertise of all the authors guarantee the book a large audience among mycologists and other professionals interested in these common and important fungi.

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MISCELLANEOUS

Fungal Conservation: issues and solutions. Edited by David Moore, Marijke M. Nauta, Shelley E. Evans & Maurice Rotheroe. 14 June 2001. Cambridge University Press, The Edinburgh Building, Cambridge CB2 2RU, UK. Pp. x+ 262. ISBN 0 521 80363 2. Price £ 65, US $ 95.

This book, a Special Volume of the British Mycological Society, includes papers presented at two different symposia held in 1999, one by the British Mycological Society in Kew and the other during the 13th Congress of European Mycologists in Alcala de Henares in Spain. The papers from the meetings are supplemented by six invited additonal contributions. While not concerned with the systematics of fungi *per se,* systematics is the very foundation of conservation and many of the contributors are well-known fungal systematists. As the title suggests, the focus is on issues, but examples of solutions and actions drawn from a wide range of countries are incorporated. If you are active in, or wish to become active in, fungal conservation this is a book to be seen and pondered.

A Dictionary of Plant Pathology. By Paul Holliday. May 2001. Cambridge University Press, The Edinburgh Building, Cambridge CB2 2RU, UK. Second edition. Pp. xxi + 536. ISBN 0 521 59458 8. Price US $ 44.95.

It is a pleasure to report the issue of the second edition, published in hardback in 1998, in paperback. Some corrections are stated to have been made since the hardback version was published, but these must be of a minor nature as the overall pagination remains unchanged. If you don't have a copy of the hardback (now priced at US $ 120) in your departmental or laboratory library, this is a standard reference work to consider adding to the next purchase order.

The Cambridge Illustrated Glossary of Botanical Terms. By Michael Hickey and Clive King. 2000. Cambridge University Press, The Edinburgh Building, Cambridge CB2 2RU, UK. Pp. xii + 208. ISBN 0 521 79080 8 (hardback), 0 521 79401 3. Price £ 18.95 (paperback).

This glossary comprises two sections, 46 pages of definitions of terms and 127 pages of line illustrations. While most is of little relevance to the description of fungi, attention is drawn to it here primarily because of the section on leaves (pp. 101-112) which incorporates terms used for a wide variety of shapes, margins, bases, and apices. Some of these are already used in mycology, and others perhaps could be when describing spores in particular. A useful adjunct to a general botanical library and one that might be turned to when an unusual spore has to documented.