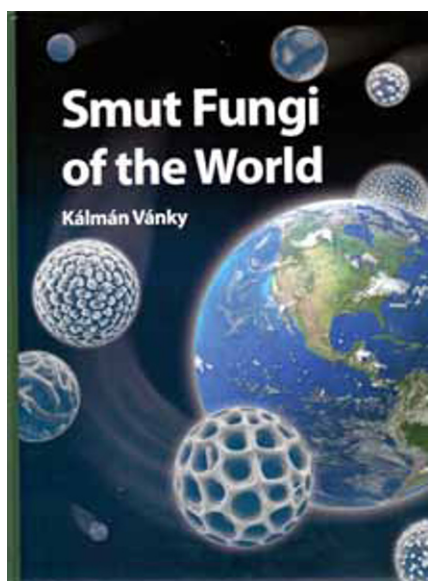


**Smut Fungi of the World. By Kálmán Vánky. 2012. ISBN 978-0-89054-398-6. Pp. xvii +1458, figs 650, micrographs 2800. St Paul, MN: APS Press. Price US\$ 499.00.**



The doyen of smut fungi, Kálmán Vánky, building on a succession of substantial and well-illustrated regional monographs, has now brought together his immense knowledge accumulated over almost half a century into this major crowning world treatment. There has been no similar attempt to draw all the data on the world's smut fungi into a single volume since that of Zundel (1953). However, unlike Zundel, whose work was largely a compilation of previously published descriptions, Vánky's monograph is based almost entirely on his personal examination of material; his own herbarium is said to contain some 21 500 specimens and 6 500 slide preparations.

The number of species accepted in the main body of the work is 1650, and these are dispersed through 93 genera. The genera are pragmatically treated alphabetically, which greatly facilitates use of the work, but an outline classification placing these in higher taxa is provided at the start (pp. ix–x), although without a simplified phylogenetic tree. Each species entry has full bibliographic details of both accepted names and synonyms, along with information on the name-bearing types and a “!” indicating collections he studied. Detailed descriptions of symptoms, anatomy, and morphology are supplemented by line drawings of infected plants, and in almost all cases by light by photomicrographs and SEM micrographs of the spores – showing the details of surface ornamentation and sculpturing so critical in the identification of these fungi. Host plants are listed by family and genus, followed by a

perhaps too brief note on distribution, surprisingly in most cases only indicating the continents in which a species is known or using words such as “cosmopolitan”. As the author surely has so much more information on rarity and distributions at his fingertips, it was unfortunate that the opportunity to cite the actual countries for all but the commonest species was passed by; elimination of the superfluous author citations after the names of the host plants (this is not a taxonomic work on plants!) could have helped the generate extra space required. The entries on both genera and species sometimes include comments, but in general these are terse notes on separations from other taxa, especially ones on the same or allied plants.

Many species are evidently rare, or at least rarely collected, 25 % of those treated having been found only once. Further, Vánky estimates the true number of smut fungi on Earth as 4500, implying that only about one third have so far been recognized. That there are many new taxa to be discovered is substantiated by 37 additions made after the work was completed; these taxa are treated more briefly in an Addendum, which also includes one new combination – the only nomenclatural novelty in the whole work to catch my eye. I was pleased to see that there was a substantial section on doubtful, excluded or invalidly published smut taxa which included full explanations on the reasons for non-acceptance. There is also a most helpful alphabetical list of plant genera with the smuts known from them, and an epithet-based index to fungal names. There is a 44-page “Selected smut fungi literature”, but no glossary nor any introductory material describing either life-cycles or spore-germination types which would have been an asset for non-specialists. It will be necessary to use this in conjunction with his superbly presented earlier account of smut genera which includes extensive introductory material and illustrations of germinating spores and a glossary (Vánky 2002). For mycologists and plant pathologists not used to working with smut fungi, the information on methods of examination he used (*cf.* Vánky 1994: 8–9) could also have proved helpful. However, weighing in at 4.21 kg, topping *The Genera of Hyphomycetes* (Seifert *et al.* 2011) at a “mere” 3.3 kg, it is unlikely to be used far from a library where his complementary texts may also be kept to hand.

Identifications are facilitated first by a key which takes each family alphabetically and has a key to the genera represented on it based on the characters of the fungi. Then, under each generic entry, there is a key to all known species of that genus, based on a combination of host plant names and morphological features of the fungi. While this may be pragmatic for the identification of known species, I would have also expected that to be complemented by a key to genera with no mention of the hosts, perhaps developed from that he previously published for European smuts (Vánky 1994) or his later world keys (Vánky 2002, 2008) with the host-based dichotomies in that also eliminated. If one of the expected 3000 or so yet undiscovered smuts is found, it will be difficult to place it in a genus in the absence of such a fungus-character-based key.

That Vánky has been able to generate such an extraordinarily full monograph, published in his 82<sup>nd</sup> year, is both a major service to mycologists and plant pathologists worldwide, and at the same time a tremendous and extraordinary personal achievement. This is especially so as he trained and practiced as a physician, developing an interest in smuts as an amateur in his home country of Romania, obtaining a PhD in Uppsala in 1985 (Vánky 1985) while still working as a physician, but then devoting himself fully to them on moving to Germany in 1986. This is a landmark publication, destined to be the major reference work on smut fungi for decades to come, and a must-have for all key mycological and plant pathological libraries – despite the unavoidably high price.

Seifert KA, Morgan-Jones G, Gams W, Kendrick B (2011) *The Genera of Hyphomycetes*. Utrecht: CBS-KNAW Fungal Biodiversity Centre.

Vánky K (1985) Carpathian *Ustilaginales*. *Symbolae Botanicae Upsalienses* 24 (2): 1–309.

Vánky K (1994) *European Smut Fungi*. Stuttgart: Gustav Fischer Verlag.

Vánky K (2002) *Illustrated Genera of Smut Fungi*. 2<sup>nd</sup> edn. St Paul, MN: APS Press.

Vánky K (2008) Taxonomic studies on *Ustilaginomycetes* – 28. *Mycotaxon* 106: 133–178.

Zundel GL (1953) *Ustilaginales of the World*. [Contribution no. 176.] University Park, PA: Department of Botany, Pennsylvania State University.

**Atlas of Soil Ascomycetes.** By Josep Guarro, Josepa Gené, Alberto M. Stchigel, and M. José Figueras. 2012. ISBN 978-90-70351-88-5. Pp. iv + 486, numerous figs. Utrecht: CBS-KNAW Fungal Biodiversity Centre. [CBS Biodiversity Series no. 10.]. Price: 70 €.

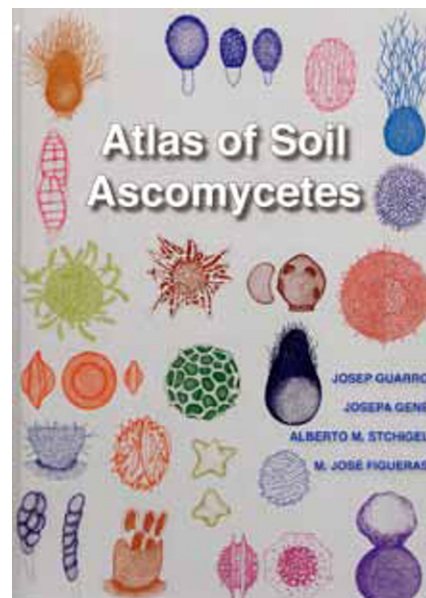
The scarcity of authoritative well-illustrated and comprehensive texts poses a major problem for anyone wishing to identify fungi that are isolated from soil. Previous works dealing with soil fungi have either been selective and concentrated on the most commonly isolated species (Domsch *et al.* 2007), or regional in scope (Moubasher 1993, Subramanian & Wasser 2001), or concerned those found by one group of workers (Watanabe 2010; see *IMA Fungus* 2: (33), 2011). This new work stands apart in worldwide scope and comprehensiveness, though it has to be remembered that it embraces only fungi in which ascomata are known and form in pure culture, and neither yeasts, nor truffles, nor ascomycetes only known as conidial fungi. However, where anamorphs are known in ascoma-forming species, these are embraced. In total, 146 genera and 698 species are treated in detail, and helpfully, notes are added on other species known in the genera so far not known from soil.

Following a key to the treated genera, the generic accounts are alphabetically arranged. Key bibliographic information is provided on both accepted names and synonyms, followed by descriptions of colonies and microscopic features, notes on the known distribution, and pertinent references to sources of further information. The authors are well-known for the high quality of their line-drawings, and the volume does

not disappoint, but rather excels, in that regard. There are also numerous half-tones, often including scanning electron micrographs which are so helpful in visualizing the nature of ascospore ornamentation. The line-drawings including spores of different species of a genus are of especial value in making comparisons.

The taxonomic treatment is generally up-to-date, but in some cases follows that adopted in previous papers by members of the group that are not all accepted by mycologists, such as the inclusion of *Gelasinospora* in *Neurospora*. It is also somewhat unfortunate that the changes in the nomenclature of pleomorphic fungi made in 2011 were not accommodated. In consequence, ascoma-forming species of *Aspergillus* and *Penicillium*, for example, are treated under the names of the teleomorph-typified genera, such as *Neosartorya* and *Eupenicillium*, rather than the anamorph-typified generic names.

The authors, all at the Universitat Rovira I Virgili in Reus, Spain, are to be congratulated on producing a work which will be of lasting value and also a major impetus to those struggling to identify ascomycetes not only from soil, but also from other substrates as well, such as decaying plant materials and dung. The realization of this work was facilitated by grants from the Ministerio de Educacion y Ciencia in Spain; a model not uncommon in Spain, but which is too



rarely emulated elsewhere. All mycological centres should purchase a copy!

Domsch KH, Gams W, Anderson T-H (2007) *Compendium of Soil Fungi*. 2<sup>nd</sup> edn. Eching: IHW Verlag.

Moubasher AH (1993) *Soil Fungi in Qatar and other Arab Countries*. Doha: University of Qatar.

Subramanian CV, Wasser SP (2001) *Soil Microfungi of Israel*. Ruggell: A. R.A. Gantner Verlag.

Watanabe T (2010) *Pictorial Atlas of Soil and Seed Fungi: morphologies of cultured fungi and key to species*. Boca Raton: CRC Press.

**Taxonomic Manual of the Erysiphales (Powdery Mildews).** By Uwe Braun and Roger T. A. Cook. 2012. ISBN 978-90-70351-89-2. Pp. vi + 707, figs 860 (7 col.). Utrecht: CBS-KNAW Fungal Biodiversity Centre. [CBS Biodiversity Series no. 11.] ISBN 978-90-70351-89-2. Price: 80 €.

It is 25 years since Uwe Braun's world monograph of *Erysiphales* appeared (Braun 1987). It was immediately sought after by mycologists ranging from plant pathologists to what are now termed citizen scientists. That work accepted 516 species, and clearly stimulated fresh interest in these fungi as this new book, prepared with plant pathologist Roger Cook, has 873 species, no less than 55 of which are described as new to science

here. The addition of 357 species represents an increase in the number of known species of the order of 69 %, indicating just how much remains unknown even within a relatively well-studied order of ascomycetes. I anticipate that the number will swell further now the field has this new very moderately priced monograph as a stimulus.

The monograph starts with an overview of the powdery mildews and the characters

used in their taxonomy and identification; all well-illustrated by line-drawings or photographs, and embracing haustorium and conidium germination types. A most helpful table (pp. 31–32) summarizes the conidium germination types and ornamentation of the conidia as seen in scanning electron micrographs. Amongst other aspects covered are accounts of ascoma development, fungicolous fungi, and fossil representatives.



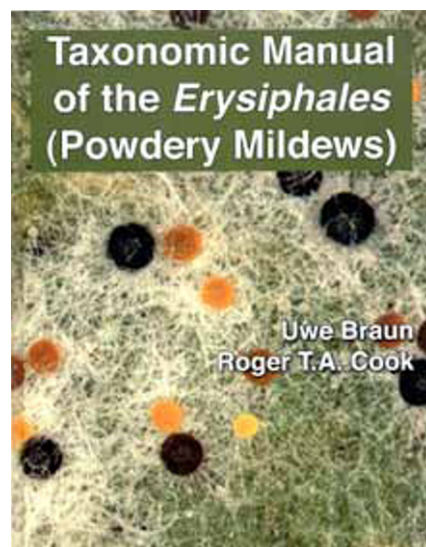
The phylogenetic systematics of the order is now much clearer than it was in the pre-molecular age in which the 1987 monograph was produced. A series of papers giving an overview of the current systematics and evolution of these fungi was published separately in *Mycoscience* 52 (3) last year (see *IMA Fungus* 2: (60)–(61), 2011).

Four tribes are now accepted within *Erysiphales*. Thirteen genera are recognized, which can be distinguished morphologically by the teleomorphs, but not always so readily by the anamorphs. A fourteenth “genus”, *Microidium* comb. stat. nov., is pragmatically used for three species only known from the anamorph which appear to form a distinct taxon, while 27 of uncertain affinity are left in “*Oidium*”. Keys to the genera and sections are presented based on teleomorph and anamorph features, with a separate key to species based on the host families. Within each genus or section account, however, I was pleased to see that the characters used in making separations in the couplets were almost exclusively of the fungi rather than the hosts.

The species accounts are meticulously prepared, with full synonymies, information not only on types, but exsiccatae, illustrations, and literature reports; details not generally seen in many modern monographs. Comprehensive descriptions and informa-

tion on host species and distribution are followed by often full and informative notes about the species, including doubtful or erroneous reports. Careful line drawings illustrate both teleomorph and anamorph where known. In such cases, the names of named anamorphs are presented with separately grouped synonyms under that of the teleomorph. The changes in the *Code*, effective from 30 July 2011, under which one fungus species can have only one correct name came too late to enable the new provisions to be accommodated in the nomenclatural presentations. Very few names, a mere 2%, need any change as a result, and Braun (2012) has helpfully provided details of 18 cases where there is an earlier anamorph-typified name for inclusion in a future approved *List* of accepted names. In reality, the full slate of 873 accepted names could be included in such as *List* to stabilize the nomenclature of this order for posterity.

The use of “Taxonomic” in the title should not put off the non-specialist, and might have been expanded to “Taxonomic and Identification” as there is so much information here that it can be utilized by the neoerysiphalean with little or no previous knowledge of these fungi. This work is the pinnacle in the careers of two exceptional and dedicated mycologists, and is destined to be of everlasting value. Individual my-

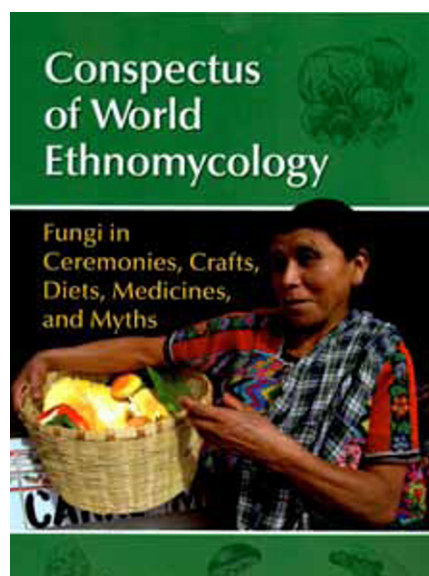


cologists and plant pathologists, as well as institutions, are urged to secure a copy of this superb work while they can.

Braun U (1987) A monograph of the *Erysiphales* (powdery mildews). *Beibefte zur Nova Hedwigia* 89: 1–700.

Braun U (2012) The impacts of the discontinuation of dual nomenclature of pleomorphic fungi: the trivial facts, problems, and strategies. *IMA Fungus* 3: 81–86.

## Conspectus of World Ethnomycology: fungi in ceremonies, crafts, diets, medicines, and myths. By Frank M. Dugan. 2011. ISBN 978-0-89054-395-5. Pp. viii + 151, figs 27 (18 col.), tables 6, Appendices 2. St Paul, MN: APS Press (American Phytopathological Society Press). Price US\$ 69.95.



Frank Dugan has already addressed the role of fungi in ancient civilizations (Dugan

2008), but now goes global. APS Press), but is much broader in scope and has a wealth of vignettes that have the potential to liven-up mycology classes.

There is perhaps almost no end to what might be encompassed in such a title, especially as Dugan adopts a particularly broad definition of “ethnomycology”, as the study of the multifarious uses of fungi by humans since pre-historic times. The first chapter of the book provides a well-referenced global overview, while the second has an interesting take on the role of women, specially market women, as sources of information for herbalists since at least the sixteenth century – and accompanied by several pertinent early illustrations. The bulk of the volume, however, is organized by regional chapters: Europe and the Mediterranean; Asia and the Pacific; Sub-Saharan Africa; Latin America and the Caribbean; and North America. He

aims to list the exploited fungi in each of these regions, which conclude with a table of those “commonly documented as ethnomycologically important”. This is an almost impossible task, and the author makes a laudable effort, but mycologists who have visited rural markets and traditional medicine shops in Africa and China in particular will note numerous species they encountered remain uncited. A final chapter looks at the nature of “folklore”, and touches on the issue of the exploitation and conservation of wild mushrooms. The literature cited covers over 25 pages, and this compilation is of considerable value in its own right as some sources are little-known, but again is inevitably incomplete, and I missed Findlay’s (1982) book in particular. The whole concludes with lists of utilized fungi available from selected fungal genetic resource collections, and some 20 recipes compiled

from various sources around the world.

Overall, I found the book, while necessarily eclectic, rather absorbing and with many often fascinating footnotes and asides, and I especially enjoyed some of illustrations. I am sure both professional and other mycologists would similarly enjoy it, but fear

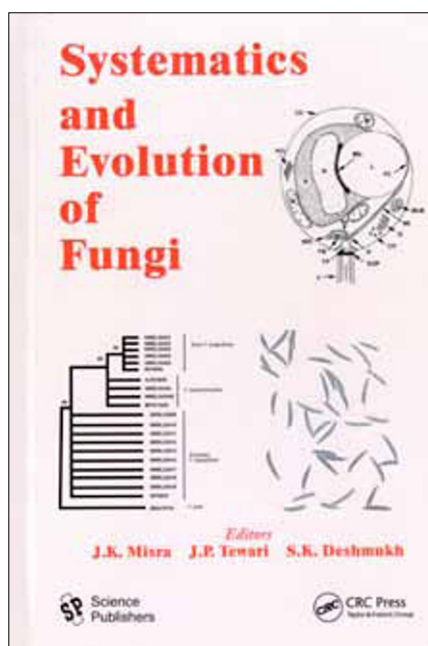
that the price might be seen as prohibitive – especially for a small-format slim paperback as compared to, for example, the *Atlas of Soil Ascomycetes* reviewed above in this column.

Dugan FM (2008) *Fungi of the Ancient World: how mushrooms, mildews, molds, and yeast shaped the*

*early civilizations of Europe, the Mediterranean, and the Near East*. St Paul, MN: APS Press.

Findlay WP (1982) *Fungi, Folklore, Fiction & Fact*. Richmond, Surrey: Richmond Publishing.

## Systematics and Evolution of Fungi. Edited by J. K. Misra, J. P. Tewari, and S. K. Deshmukh. 2012. ISBN 978-1-57808-723-5. Pp. xii + 412, illustr. (2 col. plates). Enfield, NH: Science Publishers. Price: £ 76.99.



This book, according to the Preface, is “intended to present the progress and shifts that have taken place towards the understanding of systematics and evolution of fungi in recent years”. Indeed, the impact of molecular phylogenetics on fungal systematics at all levels, from kingdom to population, can only be viewed as traumatic. The capturing of the excitement as new relationships emerge and long-cherished hypotheses fall was always going to be difficult one to capture in a single volume. The editors of this work approached this challenge by inviting 13 papers concerned with different aspects and levels of fungal systematics today. Three of those papers are broad in scope, dealing with the integration of morphological and molecular data (Hawksworth), perspectives from the fossil record (Tripathi), and an overview of comparative methods (Nagy

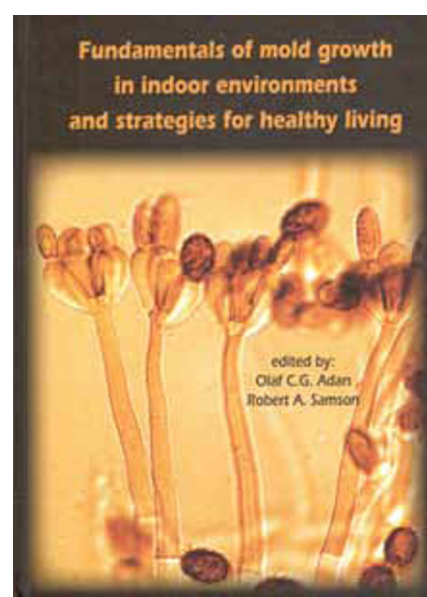
*et al.*). The remainder concern particular groups of fungi: *Chytridiomycota* (Powell & Letcher); *Zygomycota* (Benny, including a detailed synopsis down to and including all generic names proposed); *Trichomycetes* (Lichtwardt); *Stachylina* and *Smittium* (Misra); *Morchella* and *Macrolepiota* (Barseghyan *et al.*); mushroom-formers (Zmitrovich & Wasser); *Phellinus* and *Inonotus* (Tura *et al.*); toxigenic *Fusarium* species (Yli-Mattila); alternarioid hyphomycetes (Gannibal); and rapid diagnostic methods for candidiasis (Nagy *et al.*). These studies give a flavour of the current situation, rather than a comprehensive overview, which would have been a much larger task, but mycologists working on the selected topics will wish to access a copy. The title is also available in a kindle version.

## Fundamentals of Mold Growth in Indoor Environments and Strategies for Healthy Living. Edited by Olaf C. G. Adan and Robert A. Samson. 2011. ISBN 978-90-8686-135-4. Pp. 523, illustr. Wageningen: Wageningen Academic Publishers. Price 97.00 €.

Indoor fungi continue to be a matter of considerable concern, to the extent that the World Health Organization (WHO) issued “Guidelines on Air Quality: dampness and mould” in 2009. There are already numerous publications on the matter, including several recent books, for example on identification (e.g. Samson *et al.* 2010) and sampling and analysis methods (e.g. Yang & Heinsohn 2007). However, this new work, which is also available as an e-book, has a somewhat different aim, to describe the fundamentals of indoor mould growth as a requisite to tackling the problem in buildings that exist and ones yet to be designed and built. In order to do this, it brings together 23 specialists from diverse pertinent disciplines, including materials science, physics, and public health as well as mycologists.

The result is a book which has three main threads that the editors consider set it apart: (1) the response of moulds to indoor climate dynamics; (2) the crucial role of materials in control strategies for indoor mould; and (3) the newest insights into adverse health effects.

As many who consult the work will not have a mycological or microbiological background, it starts with five chapters which together present fundamental information on water relations, growth and humidity fluctuations, the fungal cell, ecology and general characteristics of indoor fungi, and the characteristics and identification of indoor wood-decaying basidiomycetes. This is followed by a section on health implications, including epidemiological studies, aerosolization of fungal fragments,





mycotoxins in building materials, and a detailed discussion of the WHO Guidelines mentioned above. Strategies for measuring moisture content, the fungal resistance of interior finishing materials, and for the detection of indoor fungal aerosols follow. Strategies for remediation discuss the situation from experience in North America and western European buildings, the protection of wood, and coating and surface treatments of wood.

Of particular interest to practitioners is a series of recommendations prepared by the editors (pp. 491–498) and based on those of the Second International Workshop on Fun-

gi in Indoor Environments” held in Utrecht in March 2005. In addition to aspects of inspection and detection, three “pillars” are recognized as important for building and construction: thermal performance, ventilation, and finishing materials. Five statements and recommendations on matters of policy conclude the chapter.

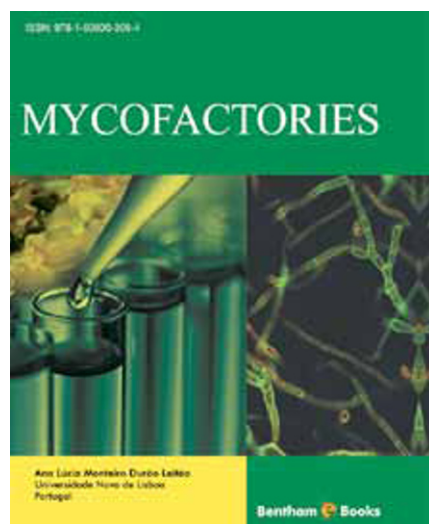
Many of the contributions inevitably have a “western” focus, as that is the region where most research on indoor fungi has been conducted. Nevertheless, this well-edited and thoughtfully constructed book, together with its recommendations merits wide dissemination in the public health sec-

tors of all countries, including those of the tropics. Only in that way will the risks to human health posed by indoor fungi come to be more widely recognized and appropriate prophylactic actions taken.

Samson RA, Houbraken J, Thrane U, Frisvad JC, Anderson B (2010) *Food and Indoor Fungi*. Utrecht: CBS-KNAW Fungal Biodiversity Centre.

Yang CS, Heinsohn P (eds) (2007) *Sampling and Analysis of Indoor Microorganisms*. Hoboken, NJ: Wiley-Interscience.

## Mycofactories. Edited by Ana Lúcia Monteiro Durão Leitão. 2011. eISBN 978-1-60805-223-3. Pp. v + 147, illustr. Bentham e-Books. Price: US \$ 59.00.



The term “mycofactory” was new to me, and is used here in the sense of the use of fungi, and particularly fungal enzymes, in industrial processes, especially those conducted within a factory. This e-book focuses on recent developments, future trends, and realizable potentials in the exploitation of fungi as a main source for the production of enzymes and for the manufacturing of food

derivatives, applications in bioremediation, and the production of pigments and other food additives. This is such an enormous field that a selection of topics had to be made, and seven are chosen. These concern: (1) Hydrolases, especially thermotolerant amylases in starch utilization for the baking, sugar, sweetener, textile, brewing and paper manufacturing industries; pectinases in fruit juice extraction and coffee and tea fermentation; and phytases in animal and fish feed. (2) Lignocellulose biodegradation, and applications of lignocellulolytic fungi or their enzymes in the biotransformation and biodegradation of wastes, and the conversion of biomass into useable products. (3) The emerging potential of the fungal secretome in biomass degradation as revealed from genomic and proteomic analyses. (4) Multicopper oxidases, especially laccases and tyrosinases, and their potential applications in the oxidation of aromatic compounds. (5) The use of *Penicillium* species as ripening agents in cheese and meat products, including rarely compiled information on *P. nalgiovense* on the surface of certain meat

products. (6) *Monascus* pigments used in food colouring and flavouring, and further dietary supplements to ameliorate hyperlipidemia, hypercholesterolemia, and hypertension. And (7) the development of biofilters to purify or deodorize waste gases by passing them through fungal.

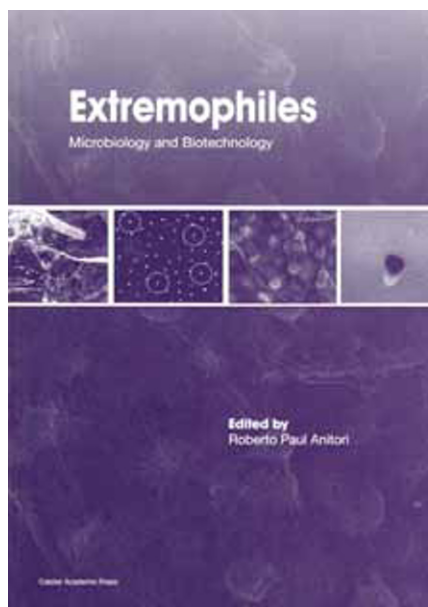
I found this an exciting and stimulating book, with numerous fine colour diagrams explaining the processes, and with extensive reference lists for each chapter. In addition to clear and full explanations of current applications, it gives a topical overview of cutting-edge research and glimpses as to the potential fungi have to play an increasingly important role in industry – and at a time where it endeavours to develop novel strategies to meet current and emerging human needs and challenges. The editor, from the Universidade Nova de Lisboa in Portugal, is to be congratulated on marshalling her authors to prepare such a fine prospectus for, and glimpses of, future directions in industrial mycology.

## Extremophiles: microbiology and biotechnology. Edited by Roberto Paul Anitori. 2012. ISBN 978-1-9904455-98-1. Pp. xii + 299. Caister, Norfolk, UK: Caister Academic Publishing. Price US\$ 319.00, £ 159.

“Microbiology” is used here in what is increasingly the usual sense of being almost synonymous with prokaryotology. Nevertheless, it does have some content of interest to mycologists. Thomas D. Brock poignantly notes in a Foreword (p. ix) that the term “extremophile” is essentially anthropocentric and that it could be more aptly defined taxonomically on the basis of environments

where particular organisms can grow but others cannot. There is a helpful table (p. 4) with definitions of eight categories of extremophiles with commercial applications, ranging from hyperthermophiles (optimal growth > 70 °C) to piezophiles (growth at > 38 MPa). The 11 individual chapters are either reviews of a particular extremophile niche (e.g. acidophiles, deep sea environ-

ments, ionizing radiation resistant, psychrophiles, or a particular exploited thermophile (e.g. a cold-loving archaeon). Fungi are almost entirely ignored except for a chapter by Helena Nevalainen and co-workers (pp. 89–108) devoted to psychrophilic microfungi; this provides a valuable overview (though omitting to mention lichens) and also detailed information on a cold-active li-



pase from an Antarctic strain of *Penicillium expansum* -- which has potential application in the degradation of crude oil and has been tested on a range of islands. Nevertheless, this book will be of some value to mycologists wishing to categorize extremophile fungi, or wishing to learn of possible novel commercial applications for particular enzymes. Unfortunately, the opportunity was missed to treat or critically review what is known of the numerous fungi of extreme environments alongside the archaea and bacteria; that would have enhanced its value to mycologists considerably.