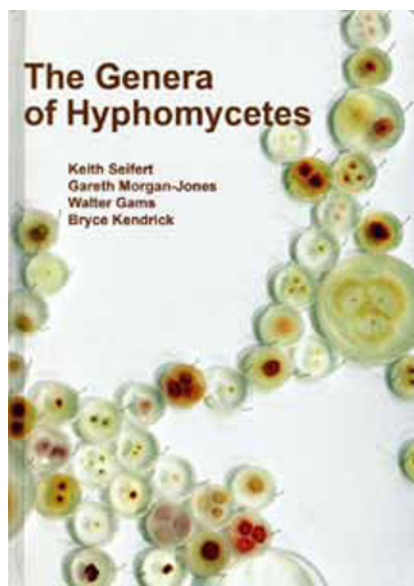


The Genera of Hyphomycetes. By Keith Seifert, Gareth Morgan-Jones, Walter Gams, and Bryce Kendrick. 2011. Utrecht: CBS-KNAW Fungal Biodiversity Centre. [CBS Biodiversity Series no. 2.] Pp. vi + 997, pl. 384, figs 120. ISBN 978-90-70351-85-4. Price: 80 €.



This has to be the most significant work on hyphomycete taxonomy yet to be produced. It started as a revision of the *Genera of Hyphomycetes* (Carmichael *et al.* 1980), which has long been out of print, but has been meticulously and painstakingly expanded and elaborated during a gestation of two decades by four of the foremost world authorities on these fungi. The spiral-bound 1980 work had a small page-size, ran to just 386 pages, had just 129 plates, and weighed 0.8 kg. The new work is A4 in size, three times as long, and weighs in at 3.3 kg.

The book comprises four main sections, Introduction, Dictionary, Synoptic Plates, and Keys, and then six appendices. The Introduction traces the origins of and concepts in hyphomycete taxonomy from the early nineteenth century into the phylogenetic age and their integration with ascus-producing ascomycetes. There are careful and well-illustrated discussions of interpretations of conidiogenesis; detailed explanations of the policies, practices and terminology employed; a list of internet resources; and a bibliography in which titles considered

as “very useful additions” to the new book are asterisked. A delightful feature of the Introduction is a strip of four full-colour attractive thumb-nails at the bottom of each page; just to skim through those makes it self-evident why mycologists can become devoted to these fungi.

The Dictionary section comprises entries for about 2900 named genera, compared with 2032 in 1980, of which 1469 are recognized as applying to distinct, recognizable, hyphomycetes genera. These are arranged alphabetically, with full bibliographic details, indications of the type species, teleomorphs when known, notes on their features, references to plates, notes, and selected references. In the notes, I found the numerous “Compare with . . .” comments especially perceptive and guess some will prompt further comparative studies. The 384 plates are composites with line drawings of 3-5 genera on each, and they are helpfully arranged by conidium type. Branching pattern, and methods of conidiogenesis. Around 1400 of the drawings have been prepared by Gareth Morgan-Jones, and are of the exceptional quality for which he has been long-renowned since his days working close to Martin B Ellis at the then Commonwealth Mycological Institute at Kew in 1966-67. The Keys section comprises 19 keys by a variety of authors on selected ecological or systematic themes, including genera which are, for example: aquatic, coprophilous, lichenicolous, or nematophagous; or *Acremonium*-like, Cercosporoid and ramularioid, sooty mould, or synnematous.

The first of the Appendices is an especially valuable synopsis of the classification of hyphomycete genera according to the pertinent families and higher taxa of asco- and basidiomycetes. This is complemented by a second which lists teleomorph genera alphabetically and indicates associated anamorph

genera by them, and a third with cross-references to synanamorphs. A well-illustrated and carefully prepared glossary comprises the fourth, notes and sources of illustrations a fifth, and an index to plates the sixth.

Proof-reading seems to have been meticulous, and I failed to find any slips meriting note, though I could not understand the reason for some of the “Compare with . . .” comments. In some cases I suspect these may arise due to features shown in species other than the illustrated type. Users must not forget that there can be a considerable divergence in morphologies of different species accepted within a single genus; a careful study of species other than the types, i.e. the circumscription of the genera, needs to be made before rushing to describe more genera; the references at the end of each genus are there to facilitate that process.

Keith commented to me that: “We tried to produce the kind of book I wished I had when I started in mycology, and I think we were successful”. I do not “think”, I am sure of that, and especially at such a remarkably low price for such a work. This will undoubtedly be the single most important reference work for the current and future generations of mycologists dealing with these microfungi. I cannot praise it too highly, and it certainly needs to be in the hands of all mycologists working with microfungi – and perhaps can be incorporated into MycoBank, *Species Fungorum*, or an online version of *Ainsworth & Bisby's Dictionary of the Fungi* in due course

Carmichael JW, Kendrick WB, Connors IL, Sigler L (1980) *Genera of Hyphomycetes*. Edmonton: University of Alberta Press.

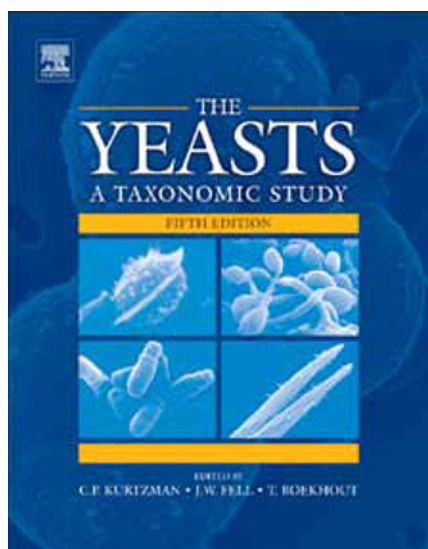
The Yeasts: a taxonomic study. Fifth edition. Edited by Cletus P Kurtzman, Jack W Fell, and Teun Boekhout. 2011. Amsterdam: Elsevier. 3 vols, 2354 pp., illustr. ISBN 978-0-444-52149-1. Price: US \$ 368 (hard copy) or \$ 460 (e-book).

Since the first publication of *The Yeasts* by the Dutch zymologists Lodder & Kreger-van Rij in 1952, this work has become the cornerstone of yeast systematics. Each edition has gone from strength to strength, and the

fourth of 1998 represented a considerable jump forward as molecular data started to be incorporated. If that was a jump, the fifth is a record-breaking leap. Not only has the volume swelled into three hefty tomes, the

number of yeasts treated has rocketed from 100 genera and over 700 species in 1998, to 149 genera and almost 1500 species in 2011.

Volume One first discusses the current concept of yeasts, their isolation, charac-



ters used in their classification, cytology, chemotaxonomy, genomics, phylogeny and nomenclature. Then follow reviews of those of importance as human or plant pathogens, food spoilage agents, or which are of biocontrol, biotechnological, ecological, or other interest. A key to all species treated, a summary table of species characters, glossary, indices, and literature references are also to be found here. The two other volumes comprise the detailed treatments of particular genera; Volume Two the ascomycete

yeasts, and Volume Three the basidiomycete ones. Each starts with a scholarly overview, and then in both cases I was pleased to see that the genera were treated alphabetically, except that the teleomorph-typified genera appeared before anamorph-typified ones. The individual accounts are separately authored, and mostly devoted to a single genus: 85 in Volume Two, and 62 in Volume Three. The sheer volume of information is staggering, and traditional characters are not discarded in favour of the new. Diagnostic gene sequences are now available for essentially all known yeast species, but the wealth of information on fermentation and growth tests is still included – information of value for the selection of species with particular biotechnological, ecological, or metabolic traits. Traditional detailed descriptions are also provided, often along with photographs, in some cases line-drawings, and information on ecological and biochemical features, as well as any biotechnological and clinical aspects. The phylogenetic placement of genera and species is shown in a series of phylograms.

However, there are a few small things I found rather strange: not giving precise bibliographic citations for the accepted genera

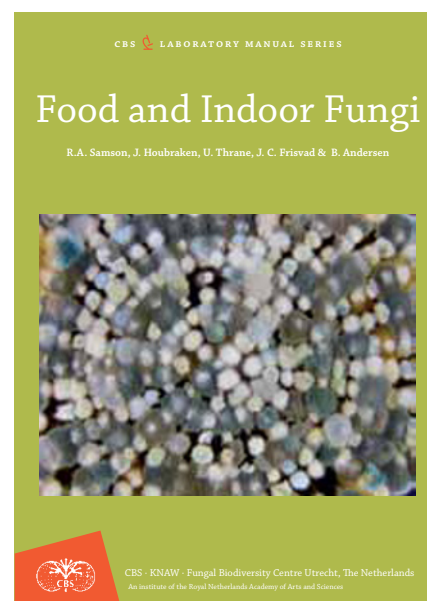
and species, with the actual page number where a name was introduced; often very imprecise information on the nomenclatural types, with “type strains” often being cited with no reference to the kind of type; and the use of “emend.” in author citations as if this was a meaningful formal requirement. Attention to such details would have brought this work closer to something that could be adopted at some point in the future as a protected list of names. Nevertheless, this has been an extraordinary achievement, and the editors have to be congratulated on marshalling so many authors so efficiently to produce such an authoritative work.

The cost is not so outrageous for such a massive and lavishly presented three-volume work. Also, in addition to being made available as hard copy and an e-book, it is a possible to purchase individual chapters as separate downloadable PDF’s – as far as I am aware, this is the first time this has been offered for a mycological work. Needless to say, this is “must-have” for all working with or endeavouring to identify yeasts, whether in biotechnological, clinical, ecological, or industrial situations.

Food and Indoor Fungi. By Robert A Samson, Jos Houbraken, Ulf Thrane, Jens C Frisvad, and Birgitte Andersen. 2010. Utrecht: CBS-KNAW Fungal Biodiversity Centre. [CBS Laboratory Manual Series no. 2.] Pp. 390, figs 276, tables 19. ISBN 978-90-70351-82-3. Price: 70 €.

This work is a successor to the widely acclaimed *Introduction to Food and Airborne Fungi*; that title was first issued in 1981, ran to seven editions, and sold around 11 000 copies. The focus is on identification, but the first two chapters are very much pragmatic hands-on guides to methods of detection and isolation, with step-by-step illustrations of commended practices. Also included is advice on special techniques to employ where the source of a fungus with a particular ecology (e.g. psychrophilic, xerophilic) or which produces a particular toxin (e.g. ochratoxin A) was being sought. In the case of indoor fungi, there is a useful tabulation of the advantages and disadvantages of seven sampling methods. The meat of the book, occupying 320 pages, is devoted to identification. Following an introduction to techniques used in identification, from slide preparation to molecular approaches, the treatments are arranged using the now rather dated class names *Zygomycetes*, *As-*

comycetes, and *Deuteromycetes*; this would have been an opportunity to make clear that the latter are not a separate evolutionary line – and enabled the accounts of *Eurotium* and *Neosartorya* to be integrated with those of other aspergilli. General introductions to each class, with a key to genera treated and often also a tabulation of characters of the treated species. The individual species have a double-page spread; on the left are accounts of macro- and micromorphology, molecular and chemical markers, notes on habitat, distribution, applications or problems, differences from similar species, CBS accession numbers of “typical cultures”, and selected references; on the facing page are superb colour photomicrographs of colonies on different media, and several of microscopic features to show any variability. A few genera are selected for more in-depth treatment, for instance *Alternaria*, *Aspergillus*, *Fusarium*, and *Penicillium*, and in those cases there are keys to species and additional



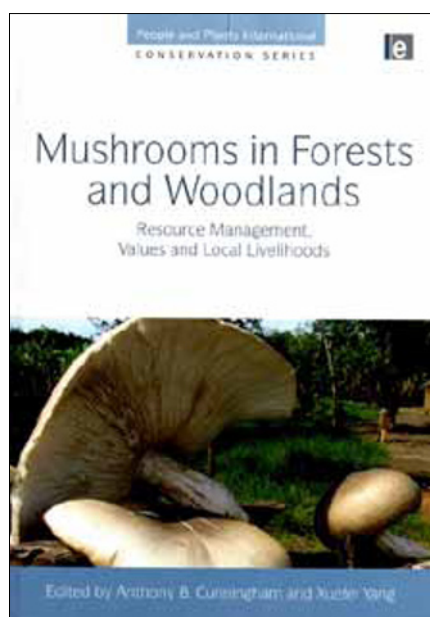
notes on characters used in their identification. Of course, users will, nevertheless, always need to keep in mind that as the species included are not *all* those that could

be encountered in these environments they might be dealing with one not covered here. The last sections of the book start with an introduction to methods used in the detection and identification of yeasts that can be encountered in these environments; the yeasts are well-illustrated macro- and mi-

croscopically, but don't get the double-page spread treatment. There is also a most-useful synopsis of the fungi to be expected associated with spoilage of different food products and water-damaged building materials, a list of extrolites (including mycotoxins) and fungi that may produce them, a glossary, mi-

dia recipes, quite an extensive reference list, and an index. Produced by a team that have to be considered the current doyens of these areas of applied mycology, this manual is authoritative, exceptionally well-presented, modestly priced, and can be unhesitatingly commended.

Mushrooms in Forests and Woodlands: resource management, values and local livelihoods. Edited by Anthony B. Cunningham and Xuefei Yang. 2011. London: Earthscan. Pp. xviii + 217, illustr. ISBN 978-1-84971-139-5. Price: £ 49.99.



During a visit to Kunming and surrounding villages in 2002, I was struck by the scale of the collection of wild mushrooms for export, and also the extent and variety of the mushrooms (over 240 species) used as food by the local community. Assessment of the economic and nutritional values of this activity on a global scale is fraught with difficulties, but FAO was sufficiently aware of the potential importance of wild mushroom collection and consumption that they commissioned a report on the matter (Boa 2004). This book explores those aspects further, including also approaches to securing more quantifiable data and issues of sustainability and the maintenance of forest health. Eric Boa first sets the world scene, intermingled with personal observations from his experience of mushroom harvesting in the miombo woodlands of East Africa. Chapters on collection, identification, and methods of obtaining ethnobiological data from

local peoples follow. Susan Alexander and colleagues endeavour to assess the economic value of wild mushrooms; in the US alone, the wholesale value of wild-harvested mushrooms is estimated to have varied from US \$ 35–57 million annually over the years 1998–2007, with exports in the range of 1540 – 9985 tonnes each year during the same period. A “box” by Cherly Geslani features the matsutake (*Tricholoma matsutake*) harvest in Yunnan where individuals reported earning as much as ¥ 10 000 per year. Cathy Sharp makes sure that the role of fungi in nutrient cycling and forest health are not forgotten, with contributed boxes on the situation in dipterocarp forests, Madagascar, boreal forests, miombo woodland, and temperate deciduous forests; she concludes with ten bulleted points of topics of “exciting research possibilities” in macrofungal ecology (pp. 135–137). Drawing heavily on his involvement with the harvesting of chanterelles, morels and other mushrooms in the Pacific Northwest of the US, David Pilz considers issues of sustainability and monitoring – stressing that much new research is needed to address concerns over possible long-term effects of harvesting at the landscape level. A perhaps too-brief summary of the medicinal and nutritive value of mushrooms by Zhu Yang follows, where I would have expected *Ganoderma* to receive more than a passing mention. Finally, Anthony Cunningham looks to the future, and recommends action in relation to the need for: taxonomy and reference collections, systematic planning and priority setting, escaping the “regulatory maze” of access and benefit sharing policies, a better understanding of trade and values, enterprise development, better access to research literature, curriculum development

for undergraduates, and the communication of research results.

There are the inevitable small quibbles and slips. Examples include: the omission of *Funga Nordica* (Knudsen & Vesterholt 2008) amongst key regional identification literature for Europe where only two semi-popular works are cited (p. 31), Letcher (2007, as “2008”) missing from the reference list on p. 18, *Thelephora* being incorrectly spelled several times in Ch 9, a seemingly haphazard approach to citing authors of scientific names, and the repeated use of *Cordyceps sinensis* rather than *Ophiocordyceps sinensis* – even though attention to the latter was drawn (p. 29). The numerous photographs suffer from poor half-tone reproduction; they really merited being in colour to make the impact the originals surely had, and would have been much-appreciated by those unfamiliar with their true colours.

This is not a book in which to look for answers, but rather one which flags up the questions and provides pointers for future assessments and research – with extensive references to the primary literature. As such, it deserves attention from all concerned with issues around wild mushroom harvesting, economics, and sustainability.

Boa E (2004) *Wild Edible Fungi: a global overview of their use and importance to people*. [Non-wood Forest Products no. 17.] Rome: Food and Agriculture Organization.

Knudsen H, Vesterholt J (eds) (2008) *Funga Nordica: agaricoid, boletoid and cyphelloid genera*. Copenhagen: Nordsvamp.

Letcher A (2007) *Shroom: a cultural history of the magic mushroom*. New York: HarperCollins.

Microhongos Comunes de Costa Rica y otras regions tropicales (Ascomycota, Pezizomycotina, Sordariomycetes). By Priscila Chaverri, Sabibe M Huhndorf, Jack D Rogers, and Gary J Samuels. 2011. Santo Domingo de Heredia: Instituto Nacional de Biodiversidad (INBio). Pp. 241, col. pl. 60. ISBN 978-9968-927-66-6. Price: US \$ 30.



What a gorgeously illustrated little book! If you every wondered why tropical pyrenomycetes proved so bewitching to some of our leading mycologists, perhaps that is partially answered by their beauty as documented here. The mycobiota of Costa Rica, in particular, has attracted the attention of mycologists from many parts of the world, especially

ones based in the USA. INBio, which has done so much to stimulate biodiversity research in the region, now holds some 52 000 specimens of fungi, representing 2 415 species; these include 305 ascomycetes, of which 117 have been selected for treatment; all are *Sordariomycetes*, and the majority of species are from the orders *Hypocreales* and *Xylariales*. Identical text is provided in both Spanish (at the front) and English (at the back), with 60 superb colour plates of macro- and micrographs sandwiched in the centre. A synopsis of the species included is provided, arranged by order and family, and that followed by a series of dichotomous keys to the species treated. The systematic arrangement is used in both the plates and the main text, which makes searching for a particular genus a little irritating. The species entries have a thumbnail habit shot, a code indicating colour and sporophore type, a description including microscopic measurements (of ascomata, asci and ascospores), cross-references to elements on the plates, mentions of anamorphs (but without descriptive notes), observations on habitat and the known world distribution, and references to key literature. As the work is aimed at the “general public”, some general

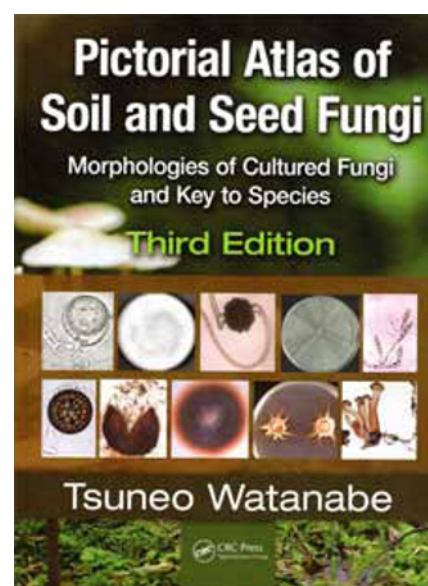
information on fungal structures, ecology, economic importance, and collecting methods is provided, as is a glossary. There is also a too-short single page “additional bibliography” that could usefully been extended not just by citations of additional reference works, but by direction to key databases and other pertinent internet sites, including that of the Latin American Mycological Association, to which users wishing to learn more could turn.

However, this work is not just one for the beginner. It will also be sought after by more experienced mycologists, working not only in Costa Rica but elsewhere in the neotropics, as it brings together in one place, and illustrates in colour for the first time, some of the species described as new from the neotropics by the authors and their colleagues. This is a fine addition to INBio's growing list of identification manuals, which already includes two volumes on macrofungi and one on lichens. These are a vital part of training the next generation of neotropical mycologists, and I trust that more dealing with other fungal groups, such as discomycetes, foliicolous fungi, or slime moulds, will follow in due course.

Pictorial Atlas of Soil and Seed Fungi: morphologies of cultured species and key to species. By Tsuneo Watanabe. 3rd edn. 2010. ISBN 978-1-4398-0419-3. Pp. xxi + 404, illustr., CD-ROM. Boca Raton: CRC Press. Price: US \$ 159.95.

This work is based on the 515 or more fungi that the author has encountered during his career, not only soil and seed fungi but further ones involved in cellulose and dioxin breakdown, isolated from roots, and wood-rotting fungi forming basidiomes. The selection is consequently eclectic, and is a mix of commonly isolated taxa and more unusual ones – not least fungi the author has personally described as new to science (e.g. *Didymosphaeria appendiculata*, *Narans crytomeriae*, *Taeniolella phialospora*). As I had been somewhat critical of the second edition of this book, which came out in 2002 (*Mycotaxon* 88: 504, 2002), I was intrigued to see the extent to which action had been taken to address my concerns. While I was relieved to see that the sketchy line drawings had all been removed, I was sad to see that many other issues had not been addressed. For example, rather few species in

some commonly isolated genera are covered, for instance only four of *Aspergillus*, eight of *Fusarium*, six of *Penicillium*, and five of *Trichoderma*. Incorrect author citations still abound, something hardly excusable when checks could have been easily made against the *Index Fungorum* database, such as *Fusarium moniliforme* (Sheldon) emend. Snyder & Hansen and not J. Sheld., *Torula herbarum* (Pers.) Link ex S.F. Gray not (Pers.) Link, *Trichoderma viride* Pers. ex Fr. not Pers., *Trichothecium roseum* (Pers. ex Fr.) Link not (Pers.) Link. Some taxonomic revisions made in recent years have also not been taken up, for example the segregation of *Lecanicillium* from *Verticillium*, and the dimensions of characters given are provided down to 0.1 μm , giving a false impression of precision. On the positive side, the number of species treated has increased by about 165, the price has only risen by US \$ 30,



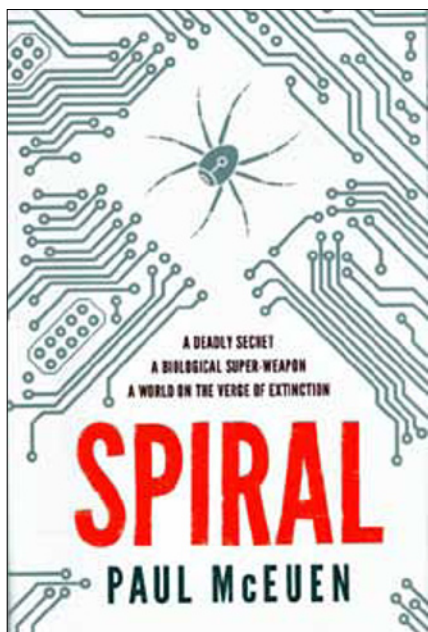
and the larger double-column format with the illustrations separated in page-blocks is more pleasing than the species per page em-

played before. I was keen to see what was on the CD as many of the numerous half-tones printed are of a poor to indifferent quality – there are some coloured illustrations there, but disappointingly these are only coloured versions of the actual plates in the book. For mycologists wishing to take the first steps

in identifying soil fungi, Watanabe's book is by no means an alternative to the second edition of the *Compendium of Soil Fungi* by Domsch *et al.* (2007, IHW-Verlag, Echting) – which sadly is not even cited. While I can appreciate the enthusiasm of the author for the fungi he has found, and his desire to

broadcast that information, if a fourth edition is ever to be contemplated, much more attention needs to be paid to the coverage, critical taxonomic aspects, and quality of the illustrations.

Spiral. By Paul McEuen. 2011. ISBN 978-0-7553-7462-5. Pp. 311. London: Headline Publishing Group. Price: £ 19.99.



A novel centred around a fungus, that is sure to fascinate mycologists as well as voracious devourers of sci-fi. The fungus is *Fusarium spirale*¹ (Umuzake), discovered in Brazil and a dangerous human pathogen with bioweapon potential. The fungus is dimorphic, with a yeast-phase that can live in human and bird guts. It produces a lethal toxin with hallucinations, manic behaviour, and madness preceding death. Intriguingly,

those who have had antibiotic courses are most at risk as a gut bacterium is able to flip a genetic switch and render in harmless. The antidote is another *Fusarium* genetically engineered with the bacterial genes, and green fluorescent protein to make it more visible; the product is named *F. spero*¹ – perhaps the first engineered fungus ever to be favoured with a novel binomial! I won't go into the plot as that could spoil a great read, or the way the fungus could spread at an alarming rate, but this is also a potential public awareness tool. Amongst concepts introduced *en passant*, are a fungus making an immunosuppressant used in transplant surgery (*Cordyceps margaritae*¹), that lichens are a "marriage" of two kingdoms with a black no-man's land developing between crustose species on rock, endosymbiotic theory, ergot and the Salam Witches (and the French Revolution – a story new to me!), sooty moulds growing on sugary solutions, and 95 % of fungi being unknown with undescribed species even to be expected in New York State. The Plant Pathology Herbarium at Cornell is the scene of much action, and at the end an outcome is the establishment of a collection of fungus cultures. It was also good to see links made between USDA mycologists and the National Security Agency.

That the mycology is unusually sound for a novel is no accident. This is the first novel of the holder of the Golden Smith Professor of Physics at Cornell who specializes in nano-electronic technology, but he had Kathie Hodge as a source of "inspiration and endlessly fascinating facts about fungi". One might also speculate as to the identity of at least part of the model for one of the heroes, the lauded octogenarian mycologist who developed the herbarium over 50 years and had Japanese connections (though no award of a medal by the IMA is mentioned). This is a great book and a racy read to commend as light-relief to students in mycology classes, or to take on a summer vacation – although perhaps not for the overly squeamish. I understand that a lower price paperback is planned for September, which will surely encourage its dissemination. More fungus fiction is a little travelled route to increasing public awareness of fungi, and this book prompts me to re-open my own files of a partially completed myconovel

¹ These binomials are not validly published, but are best avoided for future novel non-fiction taxa as they may gain some popular currency.