

Book Review

De Hoog, G. S. (ed.) (1999). Ecology and evolution of black yeasts and their relatives. – Stud. Mycol. 43: 1–208.

Fungi belonging to the heterogeneous group of the black yeasts are regularly isolated from plant substrates or food and some of them are feared human pathogens. In 1977, De Hoog & Hermanides-Nijhof presented a first, at that time very valuable treatment of one of the most difficult group of fungi (*Aureobasidium*, *Exophiala*, *Hormonema*, *Hortaea*, *Ramichloridium* and *Rhinocladiella* being the most important genera) that can be isolated from a large number of substrata. In the meantime, advances in the taxonomy and ecology of black yeasts has called for a much needed update of the in 1977 published work.

The issue 43 of Studies in Mycology is completely devoted to the presentation of new data on this group of fungi, including not only the above mentioned taxa but also related genera such as the anamorphs of *Capronia*, *Cladophialophora*, *Coniosporium*, *Ochroconis*, *Scolecobasidium*, and *Trimmatostroma*. This 208 pages long issue is a collection of 22 contributions dedicated to taxonomy, ecology and medically important issues. The recent advances in the molecular biology of this group have been analysed in detail, and most articles deal, at least partly, with molecular biology and phylogenetic analyses.

The book contains fascinating and interesting new data. In particular, it allows the reader to appreciate the enormous importance that molecular biology methods and phylogenetic analyses will continue to have in order to solve taxonomic problems related to this fungal group. After having read all articles, every mycologist will clearly see that the most important issue for the future will be to establish clear anamorph/teleomorph connections within all genera and species of the group.

I thoroughly enjoyed reading each article. The contributions are generally well written, with good illustrations. I was particularly glad to find good descriptions of *Phaeotheca* and *Hyphospora*, two fungi that I have regularly encountered as endophytes without, however, being able to identify them. New technologies such as *in situ* hybridisation are presented clearly and their application with this group of fungi is illustrated with convincing examples. The article by Horré and de Hoog on primary cerebral infections by melanised fungi is an excellent and comprehensive review of the knowledge so far available on this field.

The articles dealing with the ecology of selected black yeasts are very informative. Sterflinger and colleagues present a very detailed account of the phylogeny and ecology of meristematic, melanised ascomycetes. The halotolerance of dothideaceous black yeast is presented very convincingly by Zalar et al. and an article by de Leo and colleagues gives an interesting account of *Coniosporium* species on rock surfaces. A short communication by Meletiadis et al. deals with the antifungal activity of selected drugs against *Ochroconis gallopava*, the agent of a phaeohyphomycosis in turkey pullets and emerging agent of subcutaneous and disseminated infection in humans.

While the book is presenting a collection of very valuable information, I am somewhat disappointed by the lack of a practical guide to the identification of the fungi presented. For instance, it would have been useful to have a key to the

identification of the *Phialophora* complex discussed at pp. 107 ff., or a key with morphological characters in the otherwise excellent paper by Untereiner on *Capponia*, which would have led to an interesting comparison with the key based on physiological characters. In addition, an editorial containing a key to the accepted genera of black yeast, a discussion of the individual genera and of their generic delimitation would have made this book a must for every mycologist interested in this group of fungi.

Some more attention could have been given to the editorial work. I spotted a number of typos (see, for example, the date of publication on page 49) and the Latin descriptions should have been checked by a Latin scholar, as they are inaccurate and grammatically incorrect. It is also evident that the use of desktop publishing methods requires careful proof-reading, to avoid layout problems such as that of the key in Untereiner's paper.

All these minor problems notwithstanding, this is a very valuable collection of papers that will benefit all mycologists interested and working on this extremely important and difficult group of fungi.

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Reference

De Hoog, G. S. & E. J. Hermanides-Nijhof (1977). The black yeasts and allied hyphomycetes. *Stud. Mycol.* 15: 1-222.

Rossmann, A. Y., Samuels, G. J., Rogerson, C. T. & Lowen, R. (1999). Genera of Bionectriaceae, Hypocreaceae and Nectriaceae (Hypocreales, Ascomycetes). *Studies in Mycology* 42: 1-248.

This book is a very thorough revision of the order of the Hypocreales, which contains more than thousand described species. The last published key to the genera of the Hypocreales was published by Rogerson (1970) and included over 115 taxa. Since then, 58 genera have been added. This revision, therefore, is very welcome. The authors examined all available type specimens of the type species of genera classified in the Hypocreales. Fifty six genera were accepted in three families, Bionectriaceae fam. nov., Hypocreaceae and Nectriaceae, 14 genera in the Niessliaceae and six genera in the Clavicipitaceae. Eighty four genera were excluded from the Hypocreales.

The creation of the Bionectriaceae in my opinion is justified. This family includes most of the nectrioid genera that have pallid and KOH negative ascospores, contrasting with those included in the Nectriaceae which are mostly characterised by red to dark purple and KOH positive ascospores. *Ochronectria* is introduced as a new genus in the Bionectriaceae, *Albonectria*, *Haematonectria*, *Lanatonectria*, *Rubrinectria* and *Viridispora* are introduced as new genera in the Nectriaceae. Many new combinations are proposed for members of both families.

This guide to the genera of the Hypocreales is presented in a very well structured form. In a more general chapter the morphological and ecological characteristics (stromata, ascospores and ascospore wall structure, asci, ascospores, anamorphs, geographic distribution, substrata and pathogenicity) of the Bionectriaceae, Hypocreaceae and Nectriaceae are compared, followed by definitions of the order and families of the Hypocreales. A table of genera previously included in the Hypocreales is also presented. A key to the families of the Hypocreales follows. Keys to the genera of each of the families of the Bionectriaceae, Hypocreaceae and Nectriaceae are provided as well. Accepted name and its synonyms with their re-

spective types are listed for each genus of the three families followed by a generic description and discussion of the origin and current state of knowledge about the genus. Next, the nomenclature and description of the type species is presented. All additional species are described, along with a key to species of small genera. For larger genera which recently have not been monographed, or those for which the generic concept is not well delineated, the included species are listed and relevant references provided. For recently monographed genera, reference is made to the relevant publication. Excluded species and genera are listed in a very useful, alphabetically ordered checklist of genera of the Bionectriaceae, Hypocreaceae and Nectriaceae. A generic and a type species description are presented for excluded genera based on the examination of the type specimen along with a discussion of the placement of the genus. The work ends with a bibliographic list of more than 250 references and an index to fungal names. The book also contains 54 high quality black and white and two coloured photographic plates which show characteristics of some selected species. Fluorescence, transmission light, phase contrast or differential interference contrast microscopy have been used to illustrate the micromorphology of these species.

As a mycologist and forest pathologist I was interested in finding the new combinations for names of some nectrioid fungi often collected in forest ecosystems in Central Europe. *Nectria coccinea* (Pers.: Fr.) Fr. and *N. galligena* Bres. have now been transferred to the genus *Neonectria* as *Neonectria coccinea* (Pers.: Fr.) Rossman & Samuels and *Neonectria galligena* (Bres.) Rossman & Samuels. Species with *Cylindrocarpon* anamorph, ascomatal walls thinner than 50 µm (built of relatively thick-walled, small cells) and smooth ascospores are now classified in *Neonectria*. The position of *Nectria fuckeliana* Booth, a fungus originally described by Fuckel (1869) as *Nectria cucurbitula* (? *Nectria cucurbitula* (Tode: Fr.) Fr.) is not clear. According to the authors it probably belongs to *Neonectria*. *Nectria episphearia* (Tode: Fr.) Fr., a hyperparasitic species often observed on stromata of ascomycetes (e. g. *Diatrype stigma* (Hoffm.: Fr.) Fr.) on hardwoods, has been moved to *Cosmospora episphearia* (Tode: Fr.) Rossman. *Nectria ditissima* Tul., not mentioned in the book, and *Nectria cinnabarina*, the type species of the genus *Nectria*, retain their names.

The only thing I miss in the book is the genus *Hypocreopsis*, not included in the key to the genera of the Hypocreaceae (pages 80 and 81). On the whole, however, I highly recommend this comprehensive, modern taxonomic treatment of the genera in the Hypocreales. Anyone who wishes to identify hypocrealean ascomycetes will thoroughly appreciate and enjoy this excellent example of taxonomic thoroughness.

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References

- Fuckel, K. W. G. L. (1869). *Symbolae mycologicae*. – Jahrb. Nassauischen Vereins Naturk. 23–24: 1–459 (reprint Cramer 1966).
Rogerson, C. T. (1970). The hypocrealean fungi (Ascomycetes, Hypocreales). – Mycologia 62: 865–910.

Samuels, G. J., Petrini, O., Kuhls, K., Lieckfeldt, E. & Kubicek, C. P. (1999). The *Hypocrea schweinitzii* complex and *Trichoderma* sect. *Longibrachiatum*. *Studies in Mycology* 41: 1–54.

This monograph provides a revision of *Hypocrea schweinitzii* and related sexual and apparently asexual *Hypocrea* (*Trichoderma*) species. Revision of this

species complex is a difficult task, first of all because of the paucity of useful phenotypic characters. In addition, the molecular genetic divergence among putative species as revealed, for example, by sequence differences of the ITS regions is minimal. The authors use data from DNA sequence analysis, PCR-fingerprinting, isozyme analysis, enzyme production and morphometric analysis to develop a species concept. Most of these data have already been published elsewhere. The strength of this monograph is represented by the compilation and combination of these data. Correspondence analysis, a powerful statistical ordination method, was employed as a tool to combine the various types of data and to group the fungal strains. The authors recognised 10 species in what they call the *H. schweinitzii* complex, six sexual and four apparently asexual species: *H. andinensis*, *H. jecorina*, *H. novaezelandiae*, *H. orientalis*, *H. pseudokoningii*, *H. schweinitzii*, *Trichoderma ghanense*, *T. konilangbra*, *T. longibrachiatum*, *T. saturnisporum*.

H. andinensis, *H. novaezelandiae*, *H. orientalis*, *H. pseudokoningii* and *T. konilangbra* were described as new. A comprehensive and well-presented description of the morphology of both the morph(s) and the colonies formed on three different media (SNA, PDA and CMD) are given for each species. The temperature requirements and a short discussion are also included. Each species is illustrated by full-page high quality black and white photographic plates. Stromata, stromatal texture, perithecia, asci and ascospores and/or a selection of conidiophores and conidia are illustrated using phase contrast, differential interference contrast or fluorescence microscopy. A full page of line drawings of several conidiophores and conidia is also provided for each species to illustrate the within-species variability. A synoptic table summarising the most salient characters of the anamorphs and two dichotomous keys, one based on anamorphs the other one on teleomorphs, are also included and represent valuable tools for all those who are confronted with the identification of fungi belonging to this species complex. The keys seem to be very useful: the choice is given between clearly different characters or character states (e. g. magnitude of the growth increment on PDA or CMD at defined temperatures in a given time interval) and 70% confidence intervals rather than maxima and minima are given for conidial dimensions. Apart from a few typographical errors (e. g. page 8: "Sections of stromata ca. 15 mm thick . . ."; "µm" would be correct) and inconsistencies ("65 h of incubation" in the keys versus "64 h" in Tables 2 and 3) it is difficult to find serious drawbacks in this book. The work depended to a great extent on cultures received from culture collections rather than from fresh isolations, i.e. some isolates possibly behaved atypically, and many species are represented by fewer than five strains: *H. andinensis*, in fact, by just one collection. Despite these few weak points, the authors have performed an excellent task in revising the taxonomy of this group of fungi. I am looking very much forward to testing the keys provided in this book the next time I will have to identify a *Trichoderma* isolate of the *H. schweinitzii* complex.

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