

The Genera of Hyphomycetes: a landmark and a boon

C. V. Subramanian

I have written in these columns in the past about the importance and urgency of making inventories of fungal diversity and fungal genomes, building databases and culture collections, and perennial vigilance in the protection and conservation of fungal resources. Notwithstanding current fears of a devalued and fading taxonomy and taxonomists, there is even now a global awareness of the need and imperative to study biodiversity, and protect and preserve our bioresources. The publication, earlier this year, of *The Genera of Hyphomycetes*, a massive tome (997 pages), authored by Keith Seifert, Gareth Morgan-Jones, Walter Gams and Bryce Kendrick, being the ninth in the series of CBS Biodiversity Series, is testimony to this global awareness. The Treub Laboratory in Buitenzorg (now Bogor) in Java (now Indonesia), which served as an international Visitors' Laboratory for research in tropical biology, the Centraalbureau voor Schimmelcultures in Baarn (now in Utrecht) and the Rijksherbarium in Leiden are examples we know of the Dutch initiative and interest in fostering research in biology. It should then be no surprise that the work which is the subject of this note was sponsored by the CBS-KNAW Fungal Biodiversity Centre, Utrecht, which is an Institute of the Royal Netherlands Academy of Arts and Sciences.

The publication of this book is a landmark in the development of mycology. Only creative effort, backed by enthusiasm, vision, judgement, pragmatism and aesthetics can craft a work so authoritative, so comprehensive, and so very useful. Like all science, from small beginnings, the growth and development of studies on hyphomycetes are traced to the point where molecular systematics makes its debut in its effort to refine our science. The pioneers and the major contributors are mentioned in the context of their ideas and concepts that form the basis of current practice of taxonomy of hyphomycetes.

Encyclopaedic in its information content, it will be an indispensable work of reference. How many genera of Hyphomycetes have been described and named? How many, and which of them, are recognizable in practice? What are the

taxonomic criteria currently in use to distinguish genera? Are there monographs or other taxonomic works which would aid in the study of each genus? At least approximately, how many species are known in each genus? What is known about the geographical distribution of the genera? What is the status of molecular systematics of hyphomycetes? What are the rules pertaining to validation and nomenclature? For these and other questions one might ask, answers are here.

Hyphomycetes are anamorphic fungi, some with known and proven teleomorphs, many with none. There are countless numbers of them, many of them economically important, and many that might jump into prominence for reasons we will know only when they do so. The good earth will continue to hold them if we do not exterminate them. They will continue to draw and demand our attention, especially those who explore, collect and culture them, and use traditional methods, or even sophisticated techniques, to accord them a name and taxonomic status. For those who lack facilities to use molecular techniques, and even for those who have the facility, there should be a way to correctly identify or name a fungus. How do we do that? The above-mentioned book addresses this question for hyphomycetes in a commendable way. Its publication is timely. We have new information on the phylogenetics of some fungal taxa that should especially help in the resolution of their taxonomic status at all levels in a hierarchy. But only a fraction of our mycobiota has so far been subjected to phylogenetic analysis and synthesis. In this scenario, what are the options for students of hyphomycetes?

The authors are in no doubt about the importance of molecular phylogenetics, but are conscious of the fact that it will not be prudent to abandon time-tested current methodologies in the matter of circumscription and identification of genera at the present time. The Dictionary and the Appendices in this tome taken together serve as aids to methodologies in current practice. Observation is the first step in identification and I shall therefore first draw attention to the visual content in the book. The 384 Synoptic Plates that form an Appendix (pp.

481–827) carry line drawings of great accuracy and delineation in the tradition of the great illustrators of the fungi. They are lively and bring out the salient features of each genus. Where a line drawing was not available, drawings have been made faithfully from photomicrographs (e.g. *Ashtaangam*, *Corynesporina*), all true to type. The arrangement of drawings in the Plates is a combination of the Saccardoan and the ontogenetic systems alongside a set of substrate icons (e.g. on humans, animals; on leaves; on insects or arachnids; aquatic (fresh or marine), and on fungi). In this way, the synoptic Plates are bound to prove as excellent aids in identification.

The planning and execution of the work are impeccable. The scholarship, vision and wisdom of the authors are reflected in the entire work. The balance required to make taxonomic judgements is admirably shared by the authors, and the collective result shows up clearly. Of the 2900 generic names the authors had to contend with, they recognize 1482 as acceptable, which gives us an idea of the enormity of the task. The arguments for rejection and acceptance of generic names are carefully weighed in arriving at a decision. When in doubt, the name is retained. Thus, there can be no criticism that the authors' decisions on rejection or acceptance of genera are biased or incorrect. The Dictionary (pp. 61–479) which forms the core of the book deals with the genera, listed alphabetically, with the accepted generic names in bold font, and others in simple italics. The information and citations provided for each genus are remarkably accurate and free from errors. Citations, short descriptions, important taxonomic literature, and other relevant references, monographs where available, molecular data, if any, and an illustration are given for every genus accepted in the work. Teleomorphs and synanamorphs, where known, are cited along with all pertinent information on them. Most usefully, genera closely resembling each genus are specifically mentioned to enable the user to make his own assessment of the genus after comparison with genera showing close resemblance. The effort that has gone into the making of the Dictionary is staggering.

It is never easy to taxonomize fungi. They are a 'treacherous' tribe. They do not agree to our divisions. The authors' disinclination to accept the available systems is therefore understandable and justifiable. And yet, they have drawn on proposed systems and tried to classify genera in certain groups which are a matter of convenience for identification, which is the objective of the exercise. On the other hand, the authors provide information available on diverse parameters to enable the user to ponder over the correct taxonomic placement of the genera, an open invitation to the user to think and ponder over options. They present a number of phylogenetic trees showing estimated phylogenetic relationships based on aligned ITS sequences for groups of hyphomycetous anamorphs of Nectriaceae, Hypocreaceae, Microascales and other ascomycetous families and orders, supplemented alongside illustrations of the respective hyphomycetous anamorphs belonging to each group. Traditional and molecular features are highlighted in this way for groups of hyphomycetous anamorphs linked to their respective teleomorph groups, an explicit example of a balanced approach adopted by the authors. There are illustrations of conidiophore morphology and the basic modes of conidium ontogeny, and their many variations seen in the

known genera. A glossary of technical terms used in the description of hyphomycetes, an alphabetical list of teleomorph–anamorph connections, and a list of synanamorphies, including hyphomycete genera form the Appendices. The taxonomic classification of hyphomycete genera indicating their placement in the Ascomycota/Basidiomycota is presented in a separate Appendix.

A single key to all genera is not attempted and is not given. Such a key would be unwieldy. Keys (dichotomous or polychotomous) are given, instead, for ecological groups of genera (e.g. coprophilous, aquatic), taxonomic groups of genera (e.g. *Acremonium*-like genera, *Beltrania* and similar genera, Helicosporous hyphomycete genera, synnematosous hyphomycete genera), and certain groups of genera that have undergone significant revision departing from classical concepts (e.g. *Sporidesmium* and segregate genera). Keys are adapted from published ones or written by the authors or by authors commissioned for special groups. The use of different approaches in the construction of keys inevitably might lead to some overlap, as noted by the authors. Also, not all genera may be reachable through the keys. And yet, the majority of the genera, especially the common ones can be recognized.

The magnitude and majesty of this work are arresting. The rich and accurate factual content, the balanced taxonomic delineation and judgement, the pragmatic choice of approaches and methodologies, and the splendid visual fare all make it a unique work. It will evoke admiration not merely for the authors, but more important, for those whose passion and enthusiasm have earned for our science its present status that is reflected so beautifully in this work. It is an open and arresting document that serves to proclaim the progress and stability in nomenclature that was achieved since sanction for use of generic names for fungi imperfecti was given under the International Code at the VII International Botanical Congress at Stockholm in 1950. It will be a reminder to the adherents of the Amsterdam Declaration of the un wisdom and haste of their vision. In science, as always, the last word is yet to be. And yet, the present tome will hold its sway for a long time to come and will have a tremendous positive impact on the future development of our science.

*C. V. Subramanian lives at A-8 Damayanthi Apts, 17 South Mada Street, Nungambakkam, Chennai 600 034, India.
e-mail: cvsubra1952@yahoo.co.in*
