Mycorrhiza (1998) 7:329–330

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Book reviews

The Mycota. A comprehensive treatise on fungi as experimental systems for basic and applied research.

K. Esser, P.A.Lemke (eds) Volume 5
Plant relationships, part A. G. C. Carroll, P. Tudzynski (eds)

Springer, Berlin Heidelberg New York, 1997. 253 pp. ISBN: 03–540–58006–9. DM 258.00

The latest volume in "The Mycota" series deals with plant/fungus interactions and consists of two parts: Part A reviews the temporal sequence of events which takes place in infected tissues from the time fungal spores make contact with the host plant. The first chapters (Epstein and Nicholson; Staples and Hoch) deal with external interactions, *i.e.* adhesion and germination of spores followed by appressorium formation. The next contributions review the initial events of fungal invasion within the host plant, *i.e.* cuticle and cell wall penetration (Howard), the release by fungi of cell-wall-degrading enzymes (De Lorenzo et al.), and the early signalling processes in plant/fungus pathogenic interactions (Ebel and Scheel). The next chapters provide a general description of the structure and function of pathogenesis-related proteins in plant defence (Kombrink and Somssich) and of the metabolic interactions between host and fungus within the plant after infection. In this latter context, the roles played by fungal toxins (Hohn; Yoder et al.; Siegel and Bush) and phytohormones (Tudzynski) in pathogenic as well as mutualistic associations are very usefully reviewed. The last two chapters are devoted to metabolic interactions in lichens (Honnegger) and to changes in gene expression during ectomycorrhizal development (Martin et al.). In all, this is an excellent collection of essays on plant/fungus interactions. Each chapter can be read independently and provides a wealth of references. The book deserves a wide circulation among mycologists and it should also be appreciated by non-mycologists wishing to learn what fungi can bring to the study of plant physiology or trying to gain an insight into the different factors regulating host/parasite interactions.

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Plant relationships, part B. G. C. Carroll, P. Tudzynski (eds)

Springer, Berlin Heidelberg New York, 1997. 88 pp. ISBN: 03–540–62018–4. DM 278.00

This volume is part of a series designed to highlight the interest and advances in the study of fungi, which has, as the Series Preface indicates, burgeoned in the last few years. Volume 5 part B is entitled "Plant relationships". Covering all aspects of this enormous field is a very significant challenge, and the editors have been quite selective in the examples chosen. All of us might find gaps and feel that our particular interests have not been sufficiently addressed, but on balance the selection is excellent and should provide something to interest and extend the ideas of researchers at all levels. It also would provide an up-to-date starting point for postgraduate students entering the field of plant/fungus interactions. The book is divided into 3 sections: "Profiles in pathogenesis and mutualism", "The consequences of fungal associations in plant populations" and "The evolution of fungus/plant associations". The contributions are by well-known researchers and to a very large extent are focussed on their particular interests. This has resulted in interesting and authoritative accounts of different aspects of plant/fungus relationships, which are, however, inevitably focussed on rather few fungi. I thoroughly enjoyed reading all the articles and found them clear and well written, and I also kept wanting to turn to articles in the other volumes in the series (particularly 5 Part A). This indicates both the breadth of the field and also the effectiveness of the cross referencing.

In section 1, the associations covered vary from relatively well-understood parasitic biotrophs or hemibiotrophs to mutualistic associations. The content varies considerably. In the former group, significant advances are being made to provide genetic and molecular information on the associations (*Cladosporium fulvum,* Joosten et al.; *Phytophthora infestans*, Govers et al., *Magnaporthe grisea*, Valent; *Erysiphe graminis*, Giese et al. and The Uredinales, Mengden). *Hebeloma cylindrosporium* (Debaud et al.) is proving to be a useful model system for genetic and molecular studies of ectomycorrhizas, but for other mutualists likeVA mycorrhizal fungi (Linderman) and fungal endophytes of forest trees (Stone and Petrini), the last two chapters of the

section provide important basic information about associations which are less well known (at least to plant pathologists and many mycologists) and reflect our need for more research at the genetic, molecular and population levels. However, it is worth noting that the chapters in Part A on metabolic interactions in lichens (Honegger) and gene expression during ectomycorrhizal development (Martin et al.) could very well have been placed in Part B, with the only serious gap being in the cellular and molecular advances currently being made in studies of VA mycorrhizas. This reflects my personal bias, but is of importance for a review in "Mycorrhiza".

The second section of the volume should be of interest not only to mycologists and plant pathologists, but also to ecologists. English and Marois provide an overview of the importance of epidemiology in understanding plant pathogens in agroecosystems and highlight the need for population ecology and population genetics in multidisciplinary approaches to disease control. TeBeest et al. focus on the diverse genus *Colletotrichum* and show how basic biology has been combined with molecular and genetic studies to sort out the relationships and taxonomy within the genus as well as to understand interactions with hosts. The next chapter on "Epidemiology of mycorrhizal fungal infection during succession" (Allen et al.) is essentially ecology. It describes the roles played by mycorrhizal fungi in ecosystems and emphasises the effects of factors such as disturbance on mycorrhiza development, as well as the roles of various vectors and constraints in establishment of mycorrhizas in plant populations. "The population biology of grass endophytes" (Leuchtmanm and Clay) provides an update on this group of mutualistic fungi, which have only recently attracted widespread attention. Advances are being made in understanding genetic variation and population biology and how this relates to host range. I look forward (again from a biased standpoint) to the time when we also understand the nutritional interactions between the symbionts.

The third section covers "The evolution of fungus/plant associations". The first chapter provides a thoughtful overview and update of genome structure and the bases for genetic flexibility in plant pathogenic fungi (Wöstemeyer). The next provides an account of the way mutualistic grass endophytes have most probably evolved from pathogens, drawing on both biological and molecular information for a range of related associations. Saloniemi ("Mathematical models of plant/fungus interactions") discusses modelling in general, as well as showing how different types of models can be used in studies of plant/pathogen interactions. Again this should be useful to ecologists and those interested in mutualistic associations, as well as plant pathologists. The final chapter ("Heath, evolution of plant resistance and susceptibility to fungal parasites") is a thought-provoking review which provides a highly appropriate conclusion to the volume. The section on our lack of understanding of the basis of susceptibility of plants to VAM fungi should act as a significant challenge for future work.

I am concerned that the volume may have been at least 3 years in production; several authors indicate that their chapters were written in 1994. This sort of delay is not really acceptable if books are to have the highest value and impact, and editors and publishers must take steps to minimise the problems! I enjoyed reading all the chapters in this volume and I am strongly tempted to buy the companion (Part A) . I fear that the price may put off many, such as postgraduate students and even advanced-level undergraduates, who would find the coverage very useful in broadening their ideas about plant/fungal interactions. However, the volume should be purchased by libraries and thus be widely available.

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