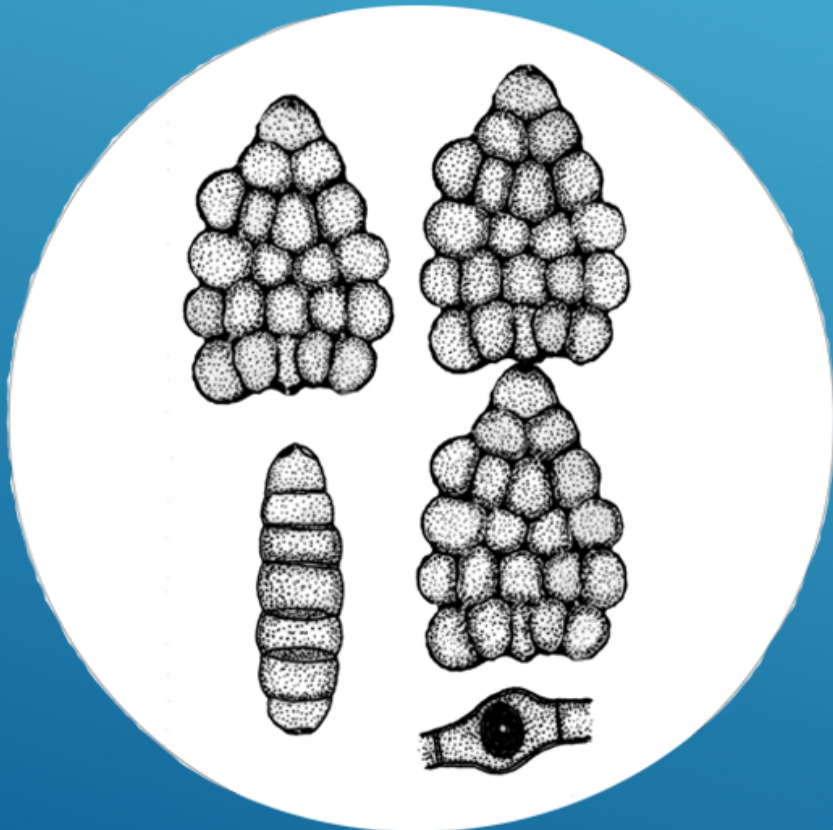


# Asexual Fungi I

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# Asexual Fungi 1

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## Preface

This book is the production of a multi-year collaboration among mycologists from different continents. With publications of more new taxa coming out every year, it sometimes seemed that our manuscript would become a never-ending task. Finally, a cut-off date (2022) was set, to allow the manuscript to see the light at the end of the tunnel. As the subtitle indicates, this book covers dematiaceous trectic hyphomycetes. The book is not only a monograph for mycological studies, but also a manual for other professionals who work with fungi, to identify the fungi covered in this book, based on morphological characteristics.

With the adoption of one fungus = one name, which became effective in 2013 (International Code of Nomenclature for algae, fungi, and plants), and the development of phylogenetic studies on fungi, the names of many fungi have been changed, *Ulocladium*, for example, being demoted to synonymy with *Alternaria*. The names used in this book are the current names in Index Fungorum ([www.indexfungorum.org](http://www.indexfungorum.org)) and MycoBank ([www.mycobank.org](http://www.mycobank.org)). If anyone is interested in the synonyms of the fungus or in checking the name used in the past, please use Index Fungorum and MycoBank. The Index Fungorum/MycoBank number provided for each taxon will allow readers to find more information on the taxon in the mycological databases.

The authors are greatly appreciative of the mycologists and technical professionals who have assisted us during the writing process. Without their help, this book would have been impossible.

Rafael F. Castañeda-Ruiz, Josep Guarro and De-Wei Li  
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## Introduction

Asexual fungi (Hyphomycetes) are microscopic fungi that constitute part (or in some cases, all) of the known phenotypic expression of many fungi in the Ascomycota and Basidiomycota. They are asexual (that is, specifically non-sexual) expressions of the genome. They reproduce by means of conidia, which are mitospores, not involving any karyogamy or meiosis in their formation. These asexual spores develop in many different ways and on many kinds of structures (undifferentiated hyphae, specialized CONIDIOPHORES, or multihyphal conidiomata of several kinds), all of which help us characterize them, and we would suggest that conidia are, in almost all cases, modifications of hyphal growth. Their morphological and developmental details, and the molecular information that now assists us to classify them in a phylogenetic way, are dealt with in detail in the recently published tome “The Genera of Hyphomycetes” (Seifert et al. 2011), which operates at the generic level. The present publication details the species of a specific subset of genera.

The then-known dematiaceous (darkly pigmented) hyphomycetes were treated in two excellent books by Ellis (1971, 1976). All previously described genera and many species published in the traditional journals (botanical, mycological, naturalist, ecological and other) before 1974 were compiled by the author in those books, which thus became the vade mecum of mycologists dedicated to hyphomycete taxonomy, together with the subsequently published “Genera of Hyphomycetes” (Carmichael et al. 1980). The now-accepted terminology produced at the first Kananaskis Conference (Kendrick 1971) provided standardization and homogeneity to the descriptions included in Ellis (1971, 1976) and those that followed during the subsequent four decades. Cole & Samson (1979), after studies with SEM and TEM, clarified several events of conidiogenesis that later were interpreted by Minter et al. (1982, 1983 a, b).

The present book is a compilation of the more than 500 taxa of enterogenous dematiaceous hyphomycetes, commonly described as “tretic” (spores formed with the inner layers of the conidiogenous cells and emerging through pores) in different journals from 1974 to 2022, although species of *Bipolaris* Shoemaker, *Curvularia* Boedijn, *Drechslera* S. Ito, and *Exserohilum* K.J. Leonard & Suggs described by Sivanesan (1987) are not included in present work. Illustrations of conidiogenous cells and conidia redrawn or adapted from the literature or from the holotype of each taxon are provided, together with brief descriptions. A key to the species treated is provided, except for those of the genus *Corynespora* Güssow.

## GENERA AND SPECIES

**ALCORNIA** J.S. Monteiro, S.M. Leão, Gusmão, P.M. Kirk & R.F. Castañeda, Mycotaxon 132(3): 486 (2017)

Index Fungorum/Mycobank IF/MB 553580

CONIDIOMATA sporodochial, punctiform, scattered, brown, dark brown, or black. CONIDIOPHORES erect, unbranched or slightly branched, cylindrical, with a distinct constriction near the base, flexuous, sub-coiled, undulated, septate, verruculose, pale brown or brown. CONIDIOGENOUS CELLS polytretic, integrated, cylindrical, determinate, intercalary, rarely terminal, brown. Conidial secession rhexolytic. CONIDIA solitary, pleurogenous, globose, unicellular, verruculose or verrucose with a basal frill, dark brown to dark reddish-brown.

Type species: *Alcornia sessilispora* (Alcorn & P.M. Kirk) J.S. Monteiro, S.M. Leão, Gusmão, P.M. Kirk & R.F. Castañeda 2017.

***Alcornia sessilispora*** (Alcorn & P.M. Kirk) J.S. Monteiro, S.M. Leão, Gusmão, P.M. Kirk & R.F. Castañeda, Mycotaxon 132(3): 486 (2017) (Fig. 1A)

Index Fungorum/Mycobank IF/MB 553581

CONIDIOPHORES cylindrical, flexuous, sub-coiled, undulating toward the apex and distinctly constricted near the base, 8–14-septate, verruculose, pale brown to mid brown, <500 µm long, 5–6 µm wide. CONIDIA solitary, pleurogenous, globose, unicellular, verruculose or verrucose, 5–7 µm diam, dark brown to dark reddish-brown, with a pale brown, 1–1.5 µm long basal frill.

On leaves of *Calopogonium mucunoides* Desv., Queensland, Australia and decaying fruit of unidentified plant, Brazil.

**ALTERNARIA** Nees, Syst. Pilze (Würzburg): 72 (1816) [1816-17].

Index Fungorum/Mycobank IF/MB 10346

COLONIES on the natural substrate effuse, brown, olivaceous to black. Mycelium superficial and immersed. CONIDIOPHORES distinct, single, unbranched or branched, erect, straight, flexuous or geniculate, septate, pale to mid brown, smooth or verruculose. CONIDIOGENOUS CELLS polytretic, integrated, terminal becoming intercalary, indeterminate, sympodially extending, cicatrized. CONIDIA

solitary or blastocatenate, acrogenous or acropleurogenous, obclavate, ellipsoid, obovoid, clavate, globose to pyriform, dictyoseptate, pale brown to dark brown, smooth or verrucose, with a tiny or conspicuous basal scar.

Type species: *Alternaria alternata* (Fr.) Keissl., Beih. bot. Zbl., Abt. 2 29: 434 (1912).

### Key to *Alternaria* species

1. Secondary conidiophores and conidia present ..... 2
  - 1a. Secondary conidiophores and conidia absent ..... 3
2. Conidia  $12\text{--}44 \times 6.5\text{--}14 \mu\text{m}$ , smooth ..... *A. allii-tuberosi*
- 2a. Conidia  $20\text{--}30 \times 11\text{--}15 \mu\text{m}$ , verruculose, smooth at the base ..... *A. castaneae*
- 2b. Conidia broadly ellipsoid or obovoid,  $21\text{--}25 \times 14\text{--}16 \mu\text{m}$ , or globose,  $16\text{--}21 \mu\text{m}$  diam, tuberculate ..... *A. preussii*
3. Conidia 1–4 transversely septate ..... 4
  - 3a. Conidia 3–6 transversely septate ..... 11
4. Conidia 3 transversely and 1 longitudinally septate,  $17\text{--}26 \times 10\text{--}16 \mu\text{m}$ , verruculose ..... *A. manihoticola*
- 4a. Conidia 1–4 transversely septate ..... 5
5. Conidia shortly blastocatenate, unicellular, dictyoseptate or cruciate,  $15\text{--}32 \times 11\text{--}15 \mu\text{m}$ , tuberculate ..... *A. gpagarwalii*
- 5a. Conidia otherwise ..... 6
6. Conidia 1–3 transversely septate ..... 7
  - 6a. Conidia 1–4 transversely septate ..... 10
7. Conidia 0–1 longitudinally septate ..... 8
  - 7a. Conidia 1–4 longitudinally septate ..... 9
8. Conidia  $11\text{--}25 \times 7.5\text{--}12 \mu\text{m}$ , smooth ..... *A. oblongo-obovoidea*
- 8a. Conidia  $15\text{--}30 \times 12\text{--}15 \mu\text{m}$ , smooth or verrucose ..... *A. sorghi*
9. Conidia verruculose, 1–3 longitudinally septate,  $16\text{--}31 \times 11\text{--}20 \mu\text{m}$  ..... *A. pseudobotrytis*
- 9a. Conidia 1–2 longitudinally, rarely cruciately, septate,  $6\text{--}19 \times 6\text{--}10 \mu\text{m}$  ..... *A. microspora*
10. Conidia 1–4 transversely and 0–3 longitudinally septate,  $24\text{--}35 \times 11\text{--}18 \mu\text{m}$  ..... *A. zantedeschiae*

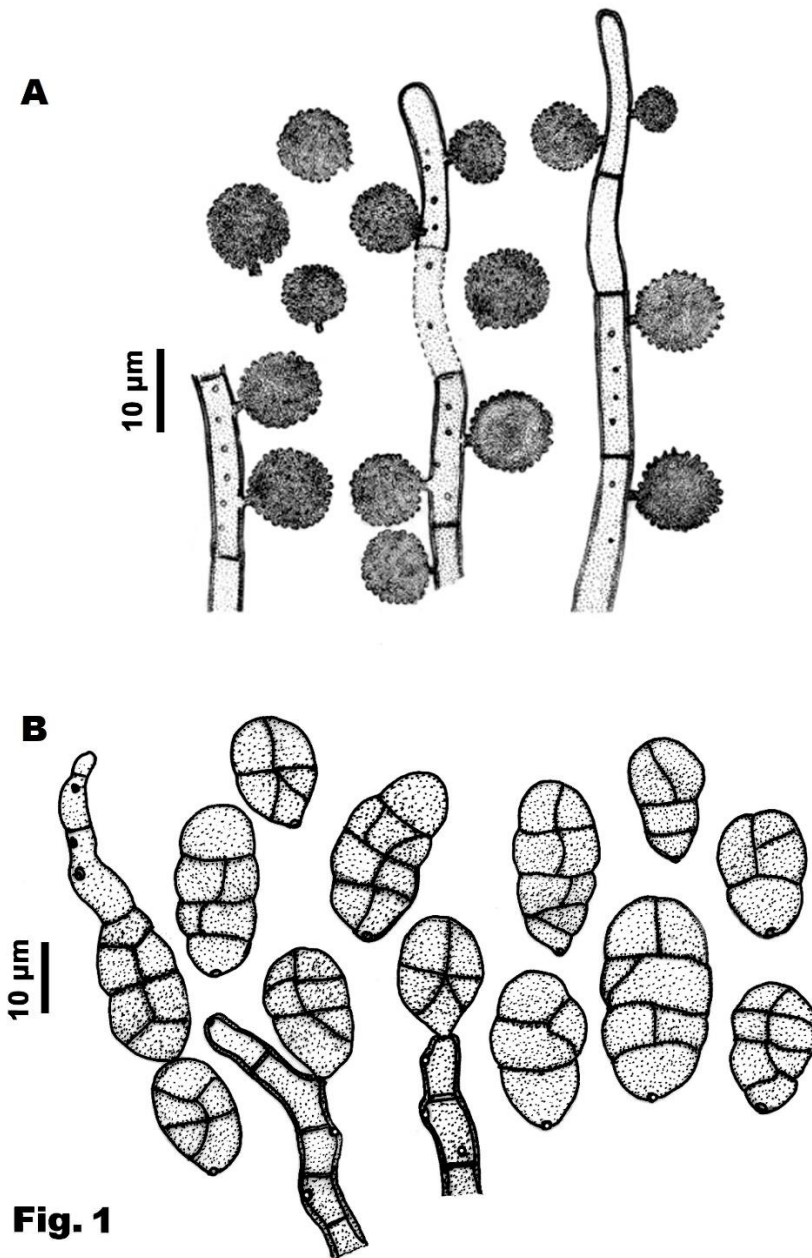


Fig. 1. A. *Alcornia sessilispora*., B. *Alternaria allii-tuberosi*.