MYCOTAXON

*Volume 95, pp. 181–184* *January–March 2006*

# A new nematode-trapping hyphomycete of *Arthrobotrys*

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**Abstract**—*Arthrobotrys multisecundaria*, isolated from Yunnan, China, was illustrated and described as a new nematode-trapping fungus, which captures nematodes by means of adhesive three-dimensional networks. It is characterized mostly by one-septate primary, elliptical conidia, which produce unicellular secondary conidia from both distal and basal ends. The new species differs obviously from other related species by producing up to four secondary catenulate conidia.

**Keywords**—*Dactylella*, *Monacrosporium,* predacious fungi, taxonomy

## Introduction

Nematophagous fungi have been the subject of research for several decades in the fundamental studies of microbiological ecology, distribution and systematics, and potential biological control agents of nematode pests of plants and animals (Liu & Zhang 2003). These fungi usually can be categorized into four types: endoparasitic, nematode-trapping, egg- and female-parasitizing, and toxin-producing fungi (Barron & Thorn 1987). Among the four types, nematode-trapping fungi (NTF) can produce various trapping-devices to capture nematodes and other small animals (Duddington 1951, Scholler et al. 1999, Ahrén et al. 2004). Traditionally, these predacious hyphomycetes were assigned to three genera (*Arthrobotrys, Dactylella, Monacrosporium*) according to the morphology of conidia (Cooke & Dickinson 1965). Trapping structures were used to rationalize the classification of the nematode-trapping fungi with the molecular data (Liou & Tzean 1997, Pfister 1997, Ahrén et al. 1998). Based on the analyses of partial 18S rDNA, ITS and 5.8S rDNA, Scholler et al. (1999) classified NTF into four genera: *Arthrobotrys*, *Dactylellina, Drechslerella* and *Gamsylella.* Li et al. (2005) redefined the systematic classification of nematode-trapping fungi based on phylogenies inferred from molecular analyses of 28S rDNA, 5.8S rDNA and β-tubulin genes, which indicated NTF should be divided into three genera: *Arthrobotrys, Dactylellina* and *Drechslerella*.

## Materials and methods

Soil samples from Tengchong, Yunnan Province were sprinkled on corn meal agar (CMA) plates inoculated with free-living nematodes, *Panagrellus redivivus*. After approximately one month, a fungus forming adhesive three-dimensional networks was isolated, and identified as a new taxon after a detailed morphological study.

Based on the classification of NTF by Li et al. (2005), we assigned this new taxon to *Arthrobotrys* and here propose the name *Arthrobotrys multisecundaria*. Morphological distinctions between the new species and similar species are discussed.

## Taxonomic Description

***Arthrobotrys multisecundaria*** W.F. Hu & K.Q. Zhang **sp. nov.** **(Figs. 1-14)**

*Coloniae in agaro CMA albidae, post 5 dies 25°C 2.5 cm diam. Mycelium sparsum, hyphis septatis, ramosis, 4–7.5 µm latae. Conidiophora erecta, hyalina, simplicia, 200–365 µm longa, 2.5 µm lata ad apicem. Conidia hyalina, ellipsoideas, 32.5-55×15-22.5µm, 1 septata vel non-septata. Conidia secundaria non-septata. Reticula tenacia quae vermiculos nematodeos capiunt evolventibus.*

*Etymology:* The species name refers to the formation of conidia in a catenulate array.

Holotype: YMF1.01821A, Tengchong, Yunnan Province, China, 2005, Weifeng Hu. The holotype and its culture (YMF1.01821) are deposited in the Laboratory for Conservation and Utilization of Bioresources, Yunnan University.

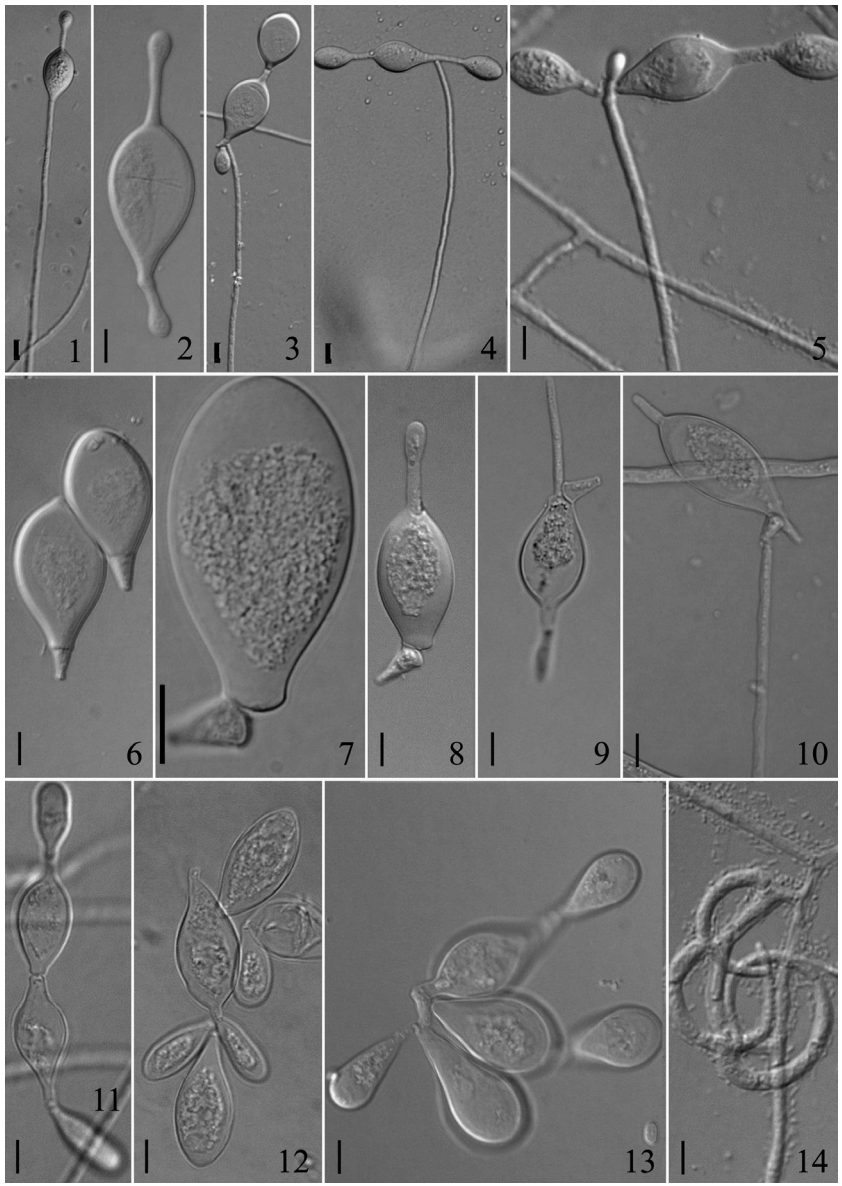
Colonies on CMA whitish, slowly-growing and extending a diameter of 2.5 cm at 25° within 5 days. Mycelium hyaline, scanty, vegetative hyphae, septate, branched, 4-7.5 µm wide. Conidiophores (Fig. 1, 3, 4-5) erect, hyaline, septate, unbranched, 200-365 µm long, 5 µm wide at the base, gradually tapering upward to a width of 2.5 µm at the apex, bearing one or two conidia. Conidia (Figs. 6-7) hyaline, ellipsoidal, 32.5-55 × 15-22.5 µm, 1-septate (75%) or non-septate (25%). Secondary conidia (Figs. 3-5, 11-13) can be produced from both distal and basal ends of primary conidia, non-septate, 32.5-55 × 15-22.5 µm. The predacious organ exhibits adhesive three-dimensional networks.

The single spore culture produced conidia after six days incubation on PDA at 25 °C. Each conidiophore produced one to two conidia (Figs. 4, 5, 9, 10, 13) that proliferated to form secondary conidia from both the distal and basal ends of primary conidia (Figs. 1, 2, 8).

This process sometimes was repeated two to three times so that three to four conidia could be produced on each conidiophore in catenulate arrangement (Fig. 3, 4, 11). Sometimes up to three conidia were produced from the distal end of a conidium (Fig. 12).

An interesting process was observed during our study: primary conidia were observed to dehisce at the septa to form germ tubes from the end of the distal cell (Figs. 7-8) while the basal cell remain attached to the distal cell (Fig. 10).

**Comments**-This species resembles *Monacrosporium indicum* (Chowdhry & Bahl) Xing Z. Liu & K.Q. Zhang (1994) and *M. janus* S.D. Li & Xing Z. Liu (Li et al. 2003) in conidial shape and number of septa but differs in conidial size and method of conidial germination. Additionally, in *M. indicum*, conidia are elliptic, obovoid or top-shaped, 22-30×14-20µm, and mostly 2-septate with distinct hila. In *M. janus*, conidia are broadly turbinate to napiform, 15-26 × 17.5-37.5 µm, 1-2-septate (mostly 1 septa). *A. multisecundaria* is distinguished by the catenulate conidial arrangement and germination that occurs from both basal and distal ends of conidia, characters that were not observed in *M. indicum, M. janus,* or other related nematode-trapping fungi.




Figs. 1-14. *Arthrobotrys multisecundaria*. Figs. 1, 3-5, 10. Conidia on conidiophores. Figs. 2, 6-9, 11-13. Primary conidia with secondary conidia. Fig. 14. Adhesive three-dimensional networks. Bars = 10 μm

## Acknowledgments

We wish to thank Dr Xingzhong Liu and Dr Shidong Li for their suggested revisions of the manuscript. This work was supported by the project from the Department of Science and Technology of Yunnan Province, P. R. China (2005NG05).

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