

A new species of *Syncephalis* from Taiwan

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ABSTRACT. A new species of *Syncephalis* from Taiwan, isolated from soil is described and illustrated. *Syncephalis obliqua* is distinguished from other species by the asymmetrical placement of the merosporangia on the fertile vesicle and shorter cylindrical spores. A discussion comparing this new species with other taxa is included.

Keywords: *Syncephalis obliqua*; Taiwan; Zygomycetes.

INTRODUCTION

Syncephalis Tiegh. & G. Le Monn. was established by Van Tieghem and Le Monnier (1873) for five species with *S. cordata* Tiegh. & G. Le Monn. as the type species. The genus was characterized by simple, straight or recurved sporangiophores with basal rhizoids, cylindrical merosporangia born on terminal vesicles, and merospores released into droplets of fluid at maturity. Species of *Syncephalis* are small, often inconspicuous, obligate parasites of other fungi, mainly members of Mucorales (Benjamin, 1959). Fifty-nine species of *Syncephalis* have been described to date (Indoh, 1962; Zycha et al., 1969; Gruhn and Petzold, 1991; Patil and Patil, 1994; Kirk et al., 2001; Ho and Benny, 2007). Nine species have been found in Taiwan, including two new species (Ho, 2000, 2001, 2002, 2003; Ho and Benny, 2007). During an investigation of merosporangiferous Zygomycetes in Taiwan, an additional new species of *Syncephalis* was discovered and is described here.

MATERIALS AND METHODS

Species of *Syncephalis* were isolated from soil in Taiwan. Soil samples were collected by the roadsides or in the forests and brought to the laboratory in plastic bags. Soil particles (ca. 2-3 milligrams) were placed on the surface of BBL™ corn meal agar (Becton Dickinson 211132) plates. The plates were left on a bench at room temperature, incubated for nearly one week, and then observed using a dissecting microscope. Sporangiophores of *Syncephalis* were transferred, by cutting a small block of agar with the parasite along with its host, to a fresh corn meal agar plate and incubated as mentioned above. After one week, the spores from regenerated, mature merosporangia of *Syncephalis* were transferred onto new

corn meal agar plates using a sterilized needle. A day after inoculation of *Syncephalis* propagules, the spores of the mucoraceous host were also inoculated in the vicinity of the parasite. After 4-7 days, the host was found parasitized by the mycoparasite. Slides were prepared from 10-day-old cultures by using tap water or lactic acid-cotton blue (cotton blue, 0.5 g; 90% lactic acid, 1L) as mounting medium (Kurihara et al., 2000). They were observed and photographed using a Leica MPS32 light microscope (LM). For scanning electron microscopy, pertinent specimens were selected using a dissecting microscope, fixed for 1 h with 2.5% glutaraldehyde in distilled water, and then post-fixed for 1 h with 1% osmium tetroxide in distilled water. The specimens were washed with distilled water and dehydrated in a graded acetone series. Specimens were dried in a critical point dryer, coated with gold, and observed with a Hitachi S-520 scanning electron microscope (SEM) at 20 KV.

TAXONOMY

Syncephalis obliqua H. M. Ho et Benny, sp. nov.

Figures 1A-F, 2 A-D

Sporangiophorae non ramosae, 630-775 µm longae, 14-17 µm diametre ad basem sporangiophorae ad 8-9 µm diametre infra vesiculam terminalom; vesiculae terminales 60-65 µm altae, 45-48 µm diametre. Merosporangia plurima, non ramosa, solum una parte vesiculae sporangiophorae lata, 6 sporarum capacia. Sporae cylindricus, (5-)5.5-6(-6.5) µm longae, 2.5-3 µm diametre. Zygosporae non visae. Parasitus in *Mucor*. (Typus: TNM F20624).

Vegetative hyphae hyaline, aerial hyphae growing densely on the host, 1-2 µm wide; sporangiophores simple, occasionally branching, arising from the host hyphae or from the media, growing vigorously, hyaline when young, standing singly, 14-17 µm wide at the broadest part near the base, tapering gradually to the

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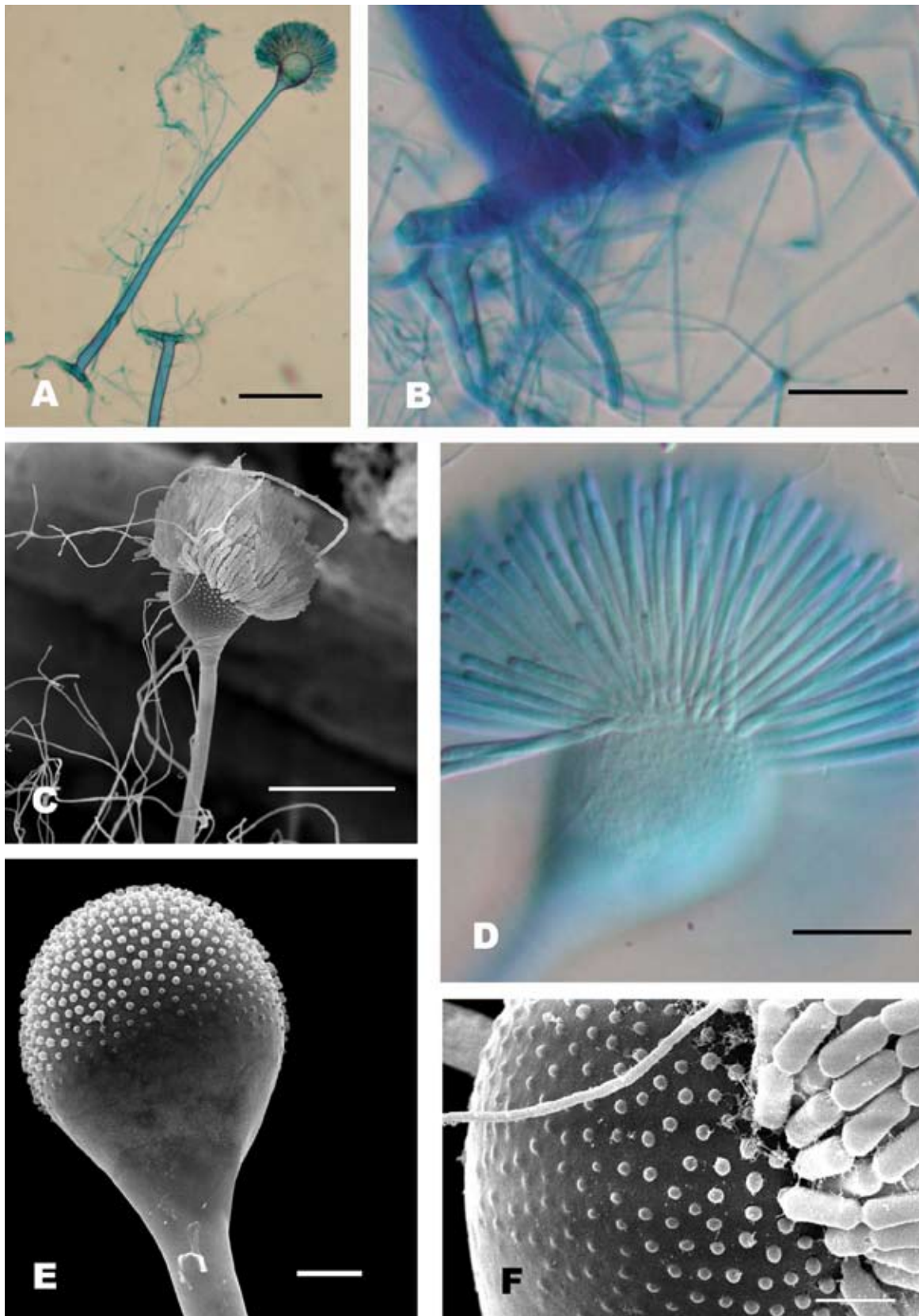


Figure 1. *Syncephalis obliqua* (TNM F20624). A, B, D, LM, DIC; C, E, F, SEM. A, Nearly mature sporangiophore with the vesicle bearing young merosporangia. Bar = 100 μ m; B, Branching rhizoids. Bar = 20 μ m; C, Upper portion of a sporangiophore showing vesicle bearing mature merosporangia. Bar = 50 μ m; D, Upper portion of a sporangiophore with vesicle bearing merosporangia prior to spore formation, Bar = 20 μ m; E, Vesicle with persistent merosporangial bases after spores detached. Bar = 10 μ m; F, A vesicle with spores. Bar = 5 μ m.

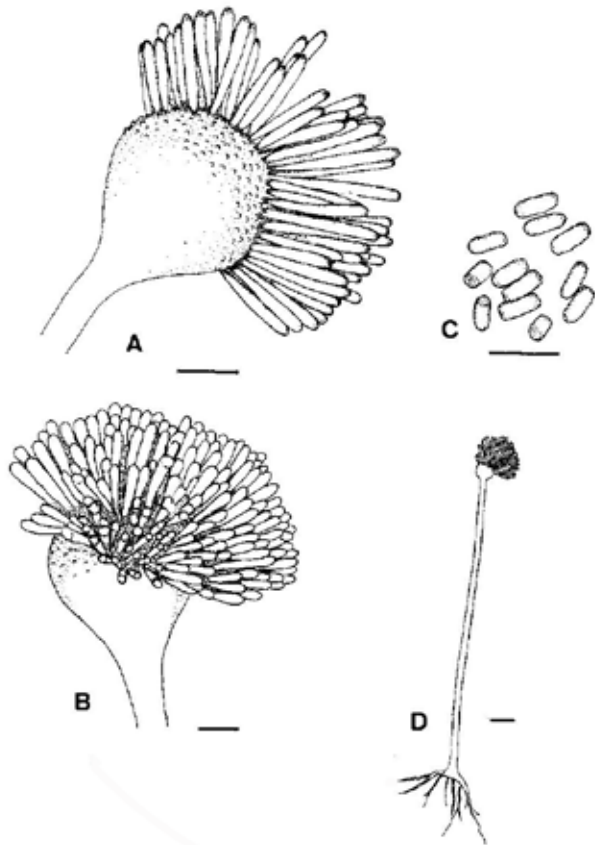


Figure 2. *Syncephalis obliqua* (TNM F20624). A, Upper portion of a sporangiophore showing vesicle bearing nearly mature merosporangia. Bar = 10 μ m; B, Young merosporangia on a vesicle. Bar = 10 μ m; C, Spores. Bar = 10 μ m; D, A sporangiophore with merosporangia. Bar = 50 μ m.

narrowest portion 8-9 μ m wide below the vesicle, 630-775 μ m long; rhizoids developing well, branching, primary rhizoids horizontal, producing branches once or twice, septated; vesicles oval, 60-65 μ m high, 45-48 μ m wide, bearing numerous merosporangia on upper two-thirds surface obliquely, the bare portion still with sterile merosporangial primordia; merosporangia unbranched, cylindrical, containing 6 spores, detached when mature leaving distinct merosporangial bases on vesicle surface; merospores cylindrical with two rounded ends, smooth, hyaline, (5-)5.5-6(-6.5) \times 2.5-3 μ m in size; zygospores not observed.

Holotype. TAIWAN. ILan County, Fu-shan Research Station, parasitizing *Mucor* sp. growing on soil collected and isolated Dec. 2003 by H.-M. Ho, *S121102*, dry culture deposited in the National Museum of Natural Science, Taichung, Taiwan (TNM F20624). A living culture deposited in Food Industry Research and Development Institute (BCRC 34165).

Other isolates examined. PLS0203, Taiwan, Taipei County, Shrding Shiang, Wenshan Botanical Garden, from soil, collected by H.-M. Ho, isolated by S.-C. Chuang, Oct. 2006; MLS1302, Taiwan, Miaoli County, Gongguan

Shiang, from soil, collected by H.-M. Ho, isolated by S.-C. Chuang, Nov. 2006; LHZ3402, Taiwan, Nantou County, Lienhuachin Research Center, from soil, collected by H.-M. Ho, isolated by S.-C. Chuang, Dec. 2006.

Etymology. Obliquus (L.); referring to the oblique placement of merosporangia on the fertile vesicle.

Notes. The distinct feature of *S. obliqua* is the placement of the merosporangia on the vesicle. In this genus, only two described species are similar: *S. plumigaleata* Embree and *S. fuscata* Indoh (Indoh, 1962; Embree, 1965). *Syncephalis plumigaleata* (Embree, 1965) differs in having larger, oval spores (6.5-10 \times 3.5-4.5 μ m) and in producing minutely punctate ornamentation on the spore surface. *S. fuscata* (Indoh, 1962), by contrast, forms 4 to 6 cylindrical spores with somewhat rounded ends, which are smaller (6-7.5 \times 3 μ m), with a refractive body at the two ends of each spore ornamented with a few scattered, irregular thickenings. Indoh (1962) only observed and illustrated merosporangial formation on the upper 50% of the fertile vesicle. Later, however, Kuzuha (1973) reported that merosporangial formation also could occur unilaterally and that the spores were cylindrical to oval, smooth-walled, and longer than originally cited (3.5-9.5 \times 2-3.5 μ m). The characteristics that clearly differentiate *S. fuscata* and *S. obliqua* are the shape, ornamentation, and size of the spores. On this basis *S. obliqua* is distinct from *S. fuscata* sensu Kuzuha (1973) and is described as new.

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台灣產一新種集珠黴菌

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本文描述與圖示一新種集珠黴菌 *Syncephalis obliqua* (側生集珠黴) 係由土壤分離得到。此菌的特徵為孢子囊柄不分枝，管狀孢子囊多數、不分枝，側生於頂端頭狀構造之一邊上，孢子柱狀。孢子大小及形狀與相近種類不同。文中比較此種與相近種類之異同點並提供照相及圖示。

關鍵詞：側生集珠黴；台灣；接合菌綱。