

LEAF LITTER FUNGI. EIGHT SETOSE CONIDIAL SPECIES UNKNOWN FROM MEXICO

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RESUMEN

HONGOS DE HOJARASCA. OCHO ESPECIES CONIDIALES SETOSAS DESCONOCIDAS PARA MÉXICO. *Rev. Mex. Mic.* 16: 17-25 (2000). Se describen *Dictyochaeta antillana*, *Dictyochaeta cylindrospora*, *Dictyochaeta fertilis*, *Dictyochaeta novae-guineensis*, *Menisporopsis pirozynskii*, *Paliphora intermedia*, *Phalangispora nawawi* y *Wiesneriomyces laurinus* provenientes de varias regiones subtropicales del estado de Veracruz. La mayoría de estos hongos son especies pocas colectadas a nivel mundial y no han sido reportadas previamente para México.

Palabras clave: Hongos conidiales, hojarasca, Hyphomycetes, México.

ABSTRACT

Dictyochaeta antillana, *Dictyochaeta cylindrospora*, *Dictyochaeta fertilis*, *Dictyochaeta novae-guineensis*, *Menisporopsis pirozynskii*, *Paliphora intermedia*, *Phalangispora nawawi* and *Wiesneriomyces laurinus* are described from various subtropical regions of the State of Veracruz. Most of them have been scarcely collected on a world scale and have not been reported previously from Mexico.

Key words: Conidial fungi, Hyphomycetes, leaf litter, Mexico.

Introduction

Conidial fungi that colonize recently fallen leaves and leaf litter in the humid tropics and subtropics form a diverse and distinctive microbial community. Among the myriad of forms of conidial fungi of decayed leaves a conspicuous subset are the "setose hyphomycetes". The abundance and variations in forms of setose hyphomycetes, i. e., sterile, fertile, straight, branched, or ornamented, leads one to ask if this morphological feature is somehow related to their ecological success. Pirozynski and Patil (1970) speculated that setae might function "as space makers", perhaps opening gaps that permit sporulation between layers of horizontally compressed leaves. An alternative hypothesis may be that setae retain air bubbles around conidiogenesis loci during heavy floods and thus sporulation may proceed under submerged conditions.

This report is a continuation of the studies on the ecology and diversity of conidial fungi from the State of Veracruz and other tropical regions of Mexico (Heredia, 1993; Heredia *et al.*, 1995; Mercado-Sierra & Mena-Portales, 1995; Heredia *et al.*, 1997a). Here in, we describe eight setose hyphomycetes that are

reported for the first time from litter of Mexican forests.

Materials and methods

The specimens were collected in various subtropical locations in the State of Veracruz. Leaves were incubated in damp chambers at 25-28°C. Microscopic examination was made after 5-15 days. All descriptions are from the natural substrate. Permanent slides were mounted in polyvinyl alcohol. Specimens are deposited in the Herbarium of the Institute of Ecology of Xalapa (XAL). Descriptions of the collecting areas can be found in previous papers (Heredia, *et al.*, 1995; Heredia, *et al.*, 1997b).

Description of species

Dictyochaeta antillana. R.F. Castañeda. **Fungi Cubense III**: 7, 1988. Fig. 1B.

Setae sterile or fertile, arising from dark brown, swollen basal cells, erect, straight or slightly curved, smooth, septate, cylindrical, mostly globose and sterile at the apex, sometimes with the apex lageniform and fertile, dark brown, paler toward the

apex, 70-130 μm long x 3-6.5 μm wide above the base and 3-5 μm at the apical region. **Conidiophores** macronematous, erect, straight to flexuous, unbranched, smooth, cylindrical with the apex lageniform, thin-walled, 0-6 septate, from pale brown to hyaline, fertile at the apical region, 13-68 μm long x 3-3.5 μm wide above the base. **Conidiogenous cells** of two types; those developing along the setae, which are phialidic, discrete, intercalary, pale brown to hyaline at the apex, ampulliform or lageniform, mostly bearing one or two funnel-shaped collarettes, 9-23 μm long x 3-5 μm wide, and those from the conidiophores, which are integrated, terminal, cylindrical, hyaline at the apex, up to 33 μm long x 3-3.5 μm wide. **Conidia** fusiform to falcate, smooth-walled, hyaline, aseptate, 9-20 μm long x 1-2 μm wide.

Material examined. On decaying leaves of *Quercus germana* Cham. et Schldl., Rancho Guadalupe, Xalapa, Veracruz, Mexico. *Heredia-Reyes*. 16/X/96. CB699XAL, CB700XAL, CB701XAL, CB702XAL.

Observations. Dimensions and morphology are sufficiently close to consider the material studied as conspecific of *D. antillana*. The type species was isolated from decaying leaves of *Quercus oleoides* var. *sagraeanae* (Nutt.) C. H. Mull. collected in Cuba. This represents the first record since it was described by Castañeda-Ruiz (1988).

Dictyochaeta cylindrospora (Morgan-Jones et E.G. Ingram) Aramb. et Cabello, *Mycotaxon* 34: 679-696, 1989. Fig. 2C.

= *Codinaea cylindrospora* Morgan-Jones et Ingram

Setae fertile, arising from dark brown, swollen basal cells, erect, straight, smooth, septate, thick-walled, dark brown, paler toward the apex, terminating in a single narrowly clavate phialide, 75-138 μm long x 3-4 μm wide and 6-8 μm at the bulbous base.

Conidiophores macronematous, mononematous, arising in fascicles up to 6 near the base of each seta, cylindrical, simple, septate, smooth, terminating in a single, clavate phialide, pale brown to subhyaline at the apical part, 32-53 μm long x 2-3 μm wide above the base. **Conidiogenous cells** monophialidic, integrated, terminal, obclavate, from pale brown to subhyaline, 20-25 μm long x 4-4.5 μm wide, bearing a single apical, funnel-shaped stalked collarette, up to 4.5 μm deep x 0.5-1.5 μm wide. **Conidia** accumulating in colorless, slimy droplets, semiendogenous, cylindrical, obtuse at each end,

straight, aseptate, hyaline, 6-7.5 μm long x 1.5-2 μm wide.

Material examined. On decaying leaves of *Quercus germana*, Rancho Guadalupe, Xalapa, Veracruz, Mexico. *Heredia-Reyes*. 16/X/96. CB703XAL, CB704XAL.

Observations. Even though conidial size of the specimens are smaller than those of the type material (8-11 μm x 2-2.5 μm), all other features including the presence of stalked collarettes match with the description of the species. This conidial fungus is known from Alabama where it was described on fallen leaves of *Quercus nigra* Wangerh. (Morgan-Jones & Ingram, 1976); later was recorded from Cuba on dead leaves of *Pinus caribaea* Barrett and Golfari, (Castañeda-Ruiz & Kendrick, 1990) and Malaysia on decaying leaves of *Pinanga* sp. (Kuthubutheen & Nawawi, 1991).

Dictyochaeta fertilis (S. Hughes et W.B. Kendrick) Hol.-Jech., *Folia Geobot. et Phytot.* 19: 387, 1984. Fig. 2B.

= *Codinaea fertilis* S. Hughes et W.B. Kendr.

Setae arising single or in groups of 2-3, erect, straight or gently curved, simple, smooth, cylindrical, thick-walled from the base to the middle region, apical region fertile, poliphialidic, from dark brown to pale toward the apex, up to 228 μm long x 6-8 μm wide above the lobulate base. **Conidiophores** macronematous, mononematous, simple, erect, straight to slightly flexuous, cylindrical, septate, pale brown at the base, paler toward the apex, up to 83 μm long x 4-5 μm wide above the base and 2.5-3.5 μm at the apex. **Conidiogenous cells** polyphialidic, integrated, determinate, from pale brown to subhyaline, up to 38 μm long x 4-5.5 μm wide, with several prominent funnel-shaped collarettes, 2-2.5 μm deep x 2.5-3.5 μm wide. **Conidia** accumulating in colorless slimy masses, simple, smooth, cylindrical, slightly curved, tapered towards both ends, aseptate, hyaline, 11-14 μm long x 2-2.5 μm wide, with a setula 5-8 μm long at each end.

Material examined. On unidentified decaying leaves, La Barranca, E. Zapata, Veracruz, Mexico. *Reyes*. 8/VIII/98. CB705XAL. Tropical Biology Station "Los Tuxtles", Veracruz, Mexico. *Reyes-Arias*. 7/X/98. CB705XAL.

Observations. This species is widespread in different kinds of plant debris including wood, fruits, stems, leaves and roots. Its distribution embraces New Zealand (Hughes & Kendrick, 1968), Tanzania

(Pirozynski, 1972), Czechoslovakia (Holubová-Jechová, 1984), Brazil (Piccolo-Grandi, 1990, 1991a, 1991b) and Malaysia (Kuthubutheen & Nawawi, 1991).

Dictyochaeta novae-guineensis (Matsush.) Romero. Aramb. *et* Cabello, *Mycotaxon* 34: 679-696, 1989. Fig. 2A

= *Codinaea novae-guineensis* Matsush.

Setae rising from lobulated cells, erect, simple, straight, slightly, flexuous, smooth-walled, septate, cylindrical, apical region phialidic, pale brown at the base and hyaline at the apex, up to 120 μm long and 4-5 μm wide above the base. **Conidiophores** macronematous, mononematous, arising in groups of 2-6 at the base of the setae, erect, simple, straight or slightly flexuous, cylindrical, septate, pale brown at the base, hyaline at the apex, up to 78 μm long x 3-4 μm wide, apex fertile. **Conidiogenous cells** phialidic, integrated, terminal, from pale brown to subhyaline, with a terminal collarette infundibuliform, 2-3 μm deep x 1.5-2 μm wide. **Conidia** accumulated in colorless slimy masses, semiendogenous, simple, cylindrical tapering at both ends, slightly curved, 1 transversal septa, hyaline 15-20 μm long x 2-3 μm wide, with a setula 7-11 μm long at both ends.

Material examined. On decaying leaves of *Liquidambar styraciflua* L., Rancho Guadalupe, Xalapa, Veracruz, Mexico. *Heredia-Reyes*. 16/X/96. CB706XAL, CB707XAL.

Observations. Dimensions and morphology of the material examined agree with Matsushima's description (1971). This species have been scarcely recorded; the material type was isolated from leaves of *Castanopsis* sp. collected in Bulolo, Papua-New Guinea (Matsushima, 1971). Since then apparently it has only been reported from Cuba growing on dead leaves (Castañeda-Ruiz & Kendrick, 1991).

Menisporopsis pirozynskii Varghese *et* G.V. Rao, *Bot. Notiser* 131: 215, 1978. Figs. 1A, 3A and 4D.

Setae erect, simple, solitary, straight or flexuous, smooth, thick-walled, cylindrical, tapering at the apex, septate, dark brown to black at the base, apex obtuse and brown, up to 410 μm long x 8-10 μm thick at the base. **Conidiophores** macronematous, synnematous, placed around the central setae, slightly divergent at the apex, erect, cylindrical, wider at the apex, straight, smooth, septate, brown to dark brown, up to 200 μm long x 3-4 μm wide at base. **Conidiogenous cells** monophialidic, terminal,

integrated, slightly clavate, pale brown, up to 25 μm long and 3-4 μm wide, with a short, inconspicuous collarette. **Conidia** simple, falcate, cylindrical, tapering at both ends, thin-walled, 0-septate, hyaline, 16-21 μm long x 3-4 μm wide, with 2-3 basal setulae varying from 4-10 μm in length, 1-apical setula, of 8-10 μm long and 1-subapical setula of 5-6 μm in length. Conidia are aggregated in slimy colorless heads.

Material examined. On decaying leaves unidentified, Rancho Guadalupe, Xalapa, Veracruz, Mexico. *Arias-Reyes*. 20/IV/98. CB708XAL. Tropical Biology Station "Los Tuxtlas", Veracruz, Mexico. *Reyes-Arias*. 7/X/98. CB716XAL.

Observations. Castañeda-Ruiz *et al.* (1997) pointed out the differences among the species included in the genera *Menisporopsis*. The number and position of the setulae are distinctive characteristics of *M. pirozynskii*. In the material examined these features were clearly observed. There are few records of this species; the type material consisting of leaf litter was collected in India, later was recorded for New Caledonia (Mouchacca, 1990) and Cuba (Castañeda-Ruiz *et al.*, 1997).

Paliphora intermedia Alcorn, *Mycotaxon* 59: 149-166, 1996. Fig. 1D.

Conidiophores macronematous, mononematous, simple, setiform, tapering to the apex, with a swollen basal cell, single or in groups, erect, straight to slightly curved, thick-walled, smooth, becoming lightly roughened at the apex, up to 27 septate, with a distinctive uniform golden-brown pigmentation, up to 225 μm long x 6-7 μm wide above the basal cell, basal cell 9-12 μm in diam. **Conidiogenous cells** integrated, intercalary, determinate, cylindrical, mostly monotretic with the pore situated just below the septum. **Conidia** arising through pores, single, hyaline, smooth, cylindrical, straight or curved, apex obtuse, base subacute, irregularly guttulate, 1-septate, 11-17 μm long x 1.5-2 μm wide.

Material examined. On decaying leaves of *Quercus xalapensis* Humb. *et* Bonpl., Rancho Guadalupe, Xalapa, Veracruz, Mexico. *Heredia-Reyes*. 16/X/96. CB709XAL, CB710XAL.

Observations. The genera *Paliphora* Sivanesan is easily distinguished by its prominent setiform golden brown conidiophores. The species *P. intermedia* and *P. porosa* Kuthub. are very close. Conidiophores lengths of the specimens are within the range of *P. porosa*, however dimensions of the swollen base, as

well as the conidial morphology and septation of this taxon, resemble *P. intermedia*.

This record represents the first observation of this taxon since it was described by Alcorn (1996) on leaf litter from Australia.

Phalangispora nawawi Kuthub., **Trans. Br. mycol. Soc.** **89** (3): 415-420, 1987. Figs. 1C, 3B and 4C.

Setae single or in groups, erect, simple, solitary, straight or slightly inwardly curved, subulate, acutely pointed at the apex, smooth, thick-walled, septate, dark brown, apex obtuse, up to 308 µm long and 6-9 µm wide at the base. **Conidiophores** macronematous, synnematos, cylindrical, erect, straight, simple or branched at the apex, septate, brown at the base and pale brown to hyaline at the apex, up to 118 µm long x 2-3 µm wide. **Conidiogenous cells** polyblastic, discrete, determinate, clavate or cylindrical, with 2-3 terminal protuberances or denticles, hyaline, 8-10 µm long x 4-5 µm wide. **Conidia** branched, moniliform, composed of 11-15 cylindrical cells, constricted at the septa, the basal and end cells are tapered, pale brown to subhyaline, up to 106 µm long from the basal cell to the longest tip, basal cell 10-12 µm long x 1.5-2 µm wide.

Material examined. On decaying submerged leaves unidentified. La Barranca, Xalapa, Veracruz, México. *Reyes*. 26/IV/98. CB711XAL, CB712XAL. Tropical Biology Station "Los Tuxtlas", Veracruz, Mexico. *Reyes-Arias*. 7/X/98. CB717XAL.

Observations. The genera *Phalangispora* was erected by Nawawi and Webster (1982), including the species *P. constricta* which is very similar to *P. nawawi*. The main difference between both species are the dimensions and number of cells of the conidia. In *P. constricta* the conidial chains are made of 19-21 cells, while in *P. nawawi* the conidial chains have 13-19 cells. Considering this character, we assume that the material examined is conspecific with *P. nawawi*.

Kuthubutheen (1987) described the species from decaying submerged leaves from Malaysia; at the same time Castañeda-Ruiz (1987) recorded a collection as *P. constricta* from Cuba. Given the dimensions and number of cells of the conidia in his description it is highly probably that this specimen could be *P. nawawi*.

Wiesneriomyces laurinus (Tassi) P.M. Kirk, **Trans. Br. mycol. Soc.** **82**: 748-749, 1984. Figs. 3C, 4A, and 4B.

= *Volutellaria laurina* Tassi

Chaetopeltis laurina (Tassi) Sacc.

Tassia laurina (Tassi) et P. Syd.

Wiesneriomyces javanicus Koord.

Chaetopsira javanicus (Koord.) Clements

Sporodochium mature elevated by a dark pseudoparenchymatous base, the central part composed of a slimy conidial white to greenish-white mass, surrounded by dark, brown, curved, thick and smooth-walled, pointed setae, which arise from the margin of pseudoparenchymatous base of the sporodochium, up to 450 µm long, with swollen bases from 7 to 17 µm wide. **Conidiophores** macronematous, cylindrical, erect, branched at the apex, straight or flexuous, smooth, septate, hyaline, up to 50 µm long and 2-3 µm wide. **Conidiogenous cells** polyblastic, discrete, determinate, clavate or cylindrical, usually with two or three denticles. **Conidia** formed in acropetal chains of 6-8 cells, tapering at both ends, falcate, connected by narrow isthmi, hyaline, 60-73 µm long x 2-3.7 µm wide.

Material examined. On decaying leaves unidentified. Lomas de Rogelio, Actopan, Veracruz, Mexico. *Reyes*. 9/V/98. CB713XAL. Col. 6 de enero, Xalapa, Veracruz, Mexico. *Reyes*. 9/V/98. CB714XAL. Rancho Guadalupe, Xalapa, Veracruz, Mexico. *Arias-Reyes*. 20/IV/98. CB718XAL. Tropical Biology Station "Los Tuxtlas", Veracruz, Mexico. *Reyes-Arias*. 7/X/98. CB719XAL.

Observations. This is a cosmopolitan fungus, occurring more frequently in the tropical areas, on many different kinds of leaf litter. Maniatis and Strain (1968) isolated it from soil samples from Panama. Kirk (1981) refers collections from Australia, Brazil, Ghana, India, Java, Malaysia, New Zealand, Pakistan, Papua New Guinea, Puerto Rico, Sri Lanka. Places where it has been recorded include Tanzania (Pirozynski, 1972), Taiwan (Matsushima, 1980), Hawaii (Goos, 1978) and Cuba (Mercado-Sierra & Mena-Portales, 1995). Collections from the British Isles (Sutton, 1978; Kirk, 1981) indicate that its distribution it is not confined to tropical areas.

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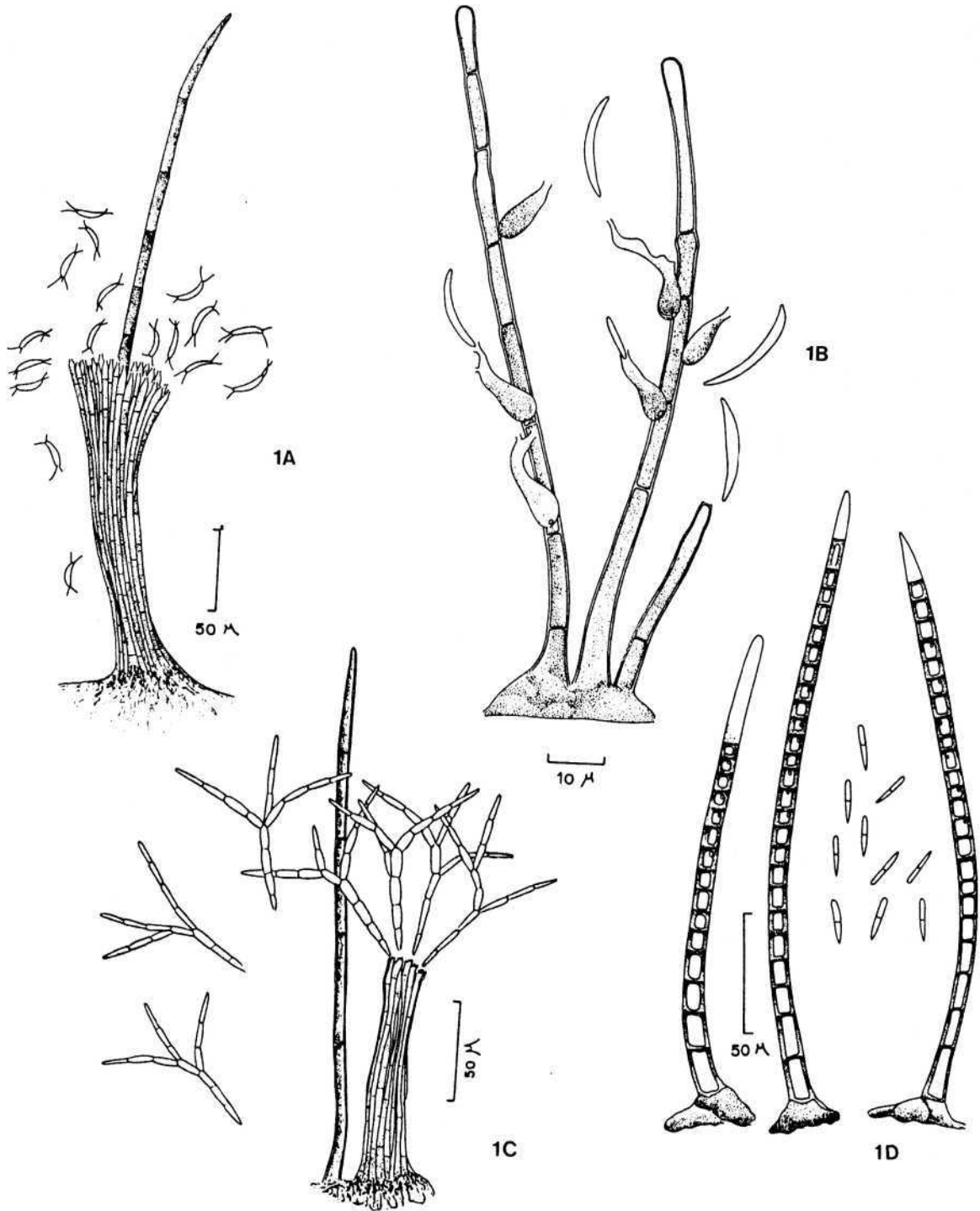


Figure 1. A: *Menisporopsis pirozynskii*. Setae and conidiophores (500x), conidia (1500x). B: *Dictyochoaeta antillana*. Conidiophores with conidiogenous cells and conidia. C: *Phalangispora nawawi*. Setae and conidiophores synnematosus (350x). D: *Paliphora intermedia*. Conidiophores setiform, conidia cylindrical with apex obtuse and base subacute.

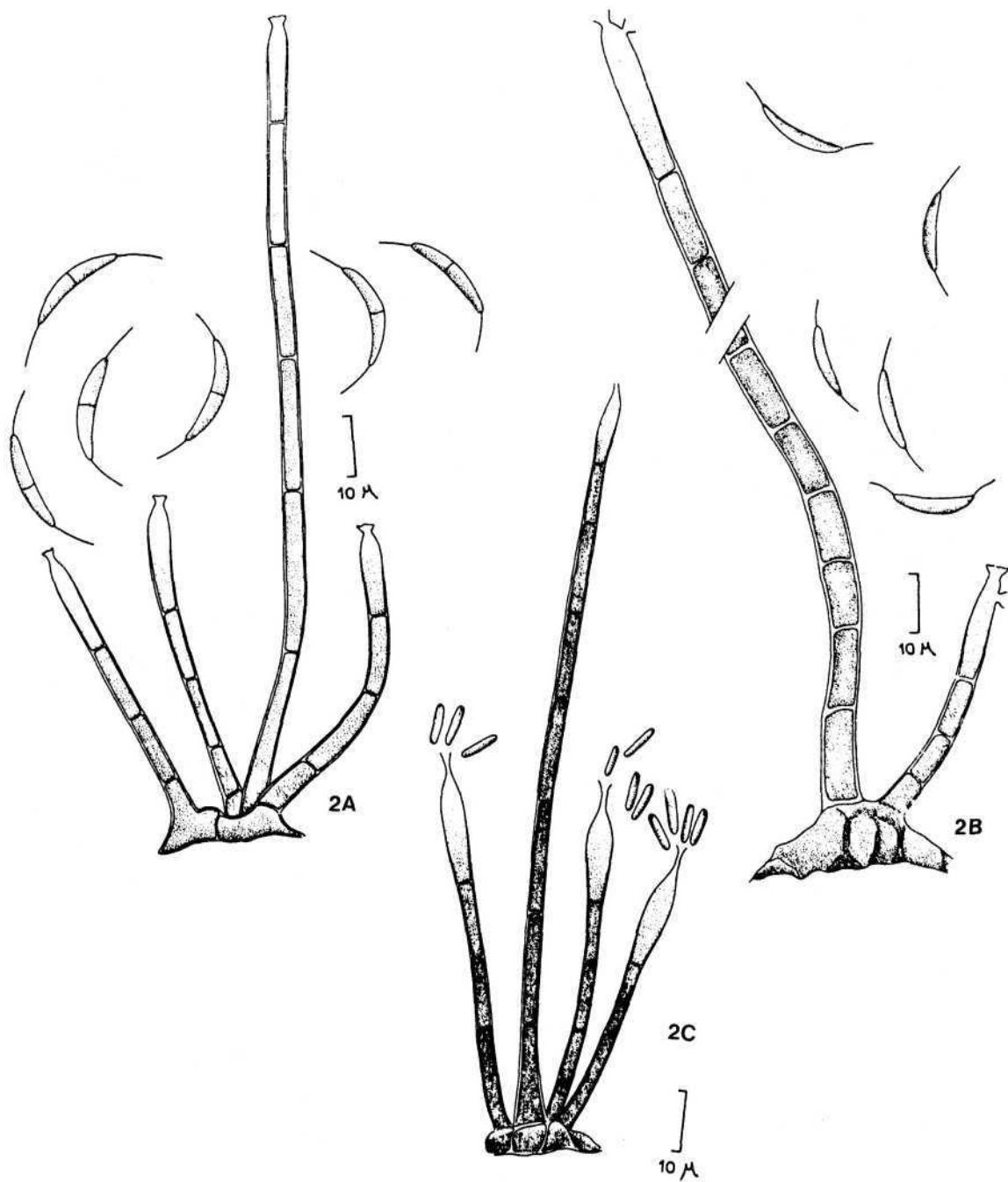


Figure 2. A: *Dictyochaeta novae-guineensis*. Setae and conidiophores, conidia curved with setula at both ends. B: *Dictyochaeta fertilis*. Setae polyphialidic, conidiophore and conidia. C: *Dictyochaeta cylindrospora*. Setae and conidiophores with funnel-shaped stalked collarette, conidia cylindrical.

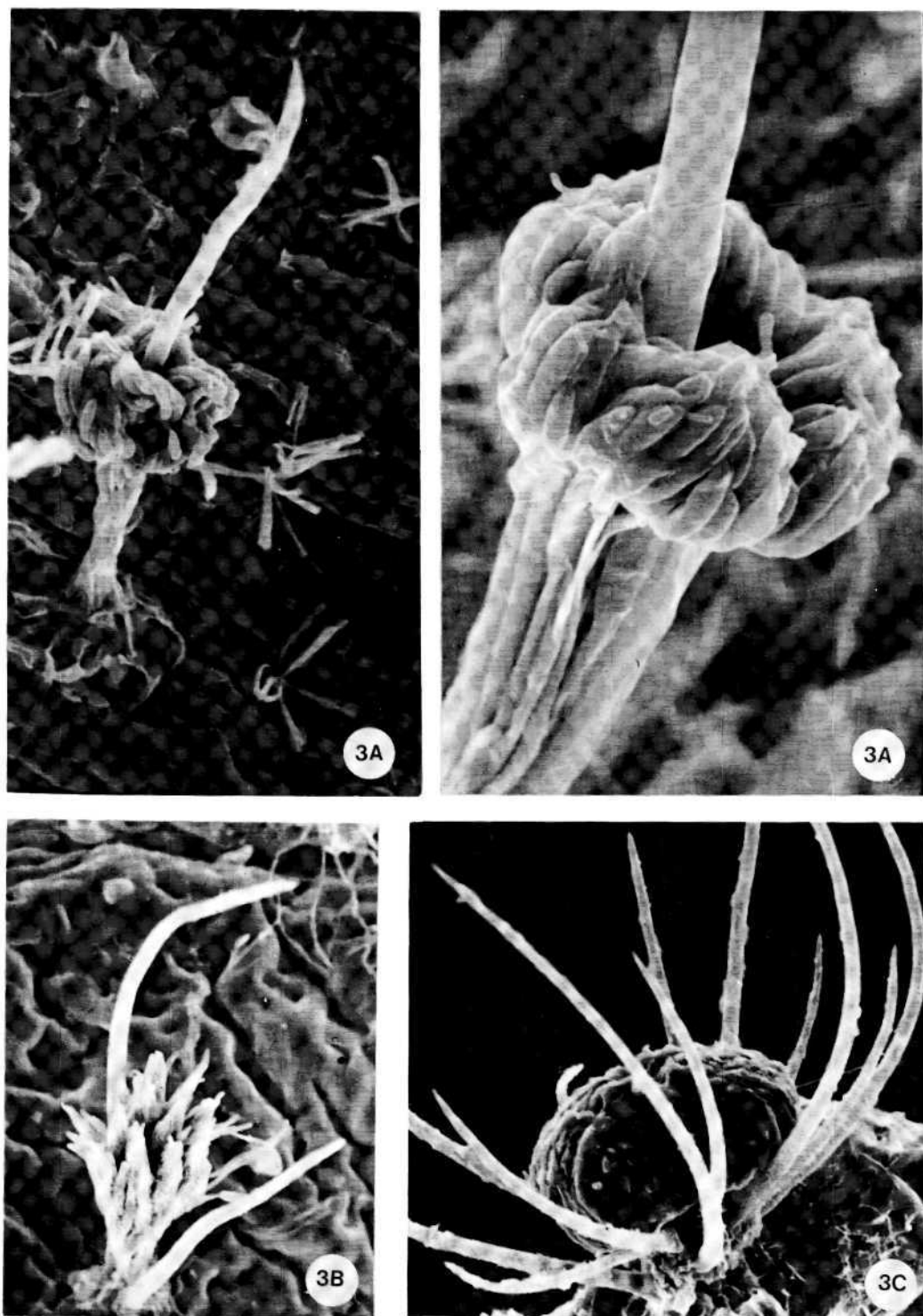


Figure 3. A: *Menisporopsis pirozynskii*. Setae, conidiophores synnematos, conidia with setulae. B: *Phalangispora nawawi*. Setae, conidiophores synnematos. C: *Wiesneromyces laurinus*. Sporodochium with setae (350x).

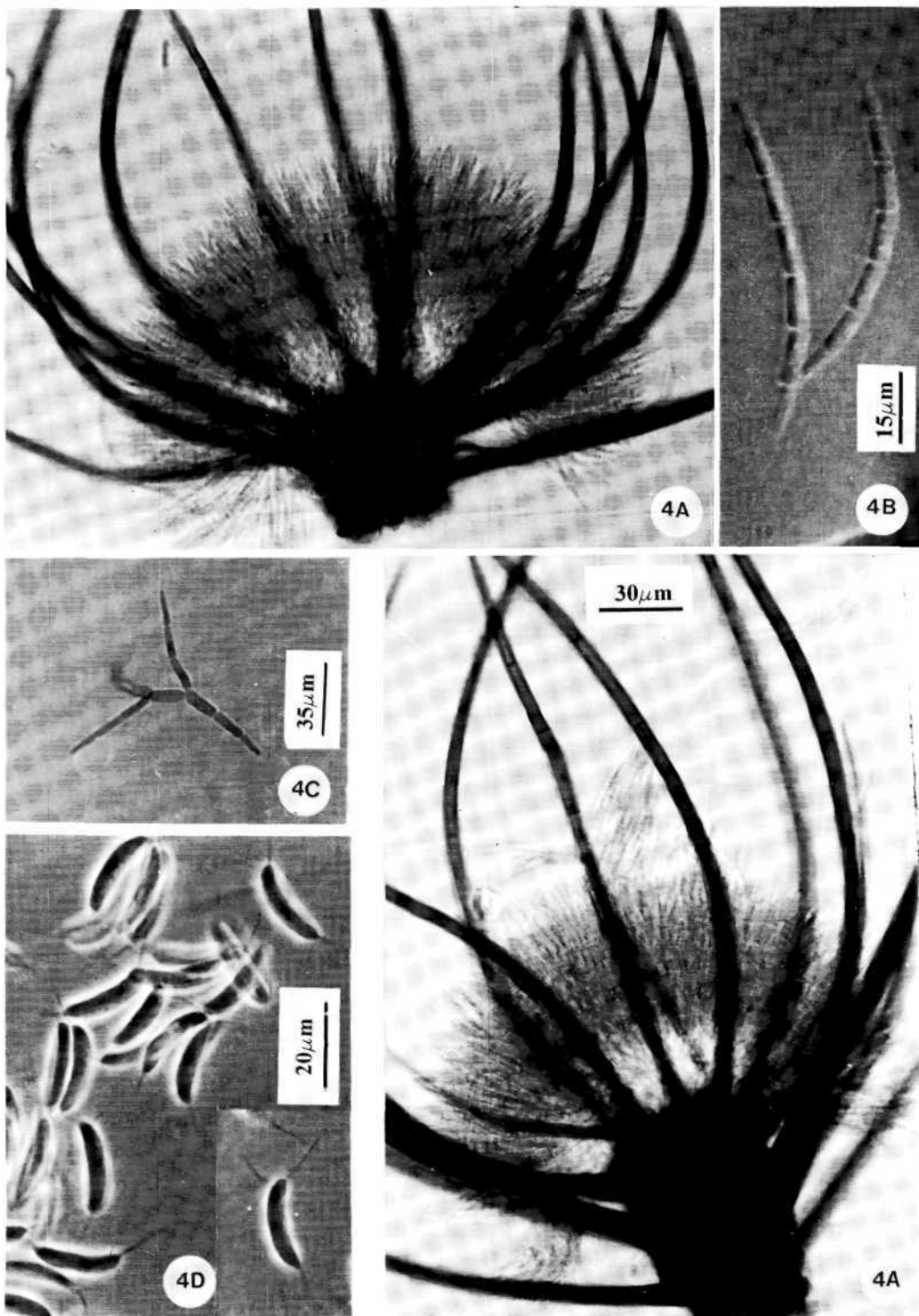


Figure 4. A, B: *Wiesneromyces laurinus*. Sporodochium and conidia. C: *Phalangispora nawawi*. Conidia. D: *Menisporopsis pirozynskii*. Conidia with setulae.