New records of Ten species of hyphomycetes from Taiwan

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ABSTRACT

Ten species of saprophytic hyphomycetes are reported for the first time from Taiwan, including Actinocla-dium rhodosporum, Chromelosporium ochraceum, Conoplea novae-zelandiae, Dictyochaeta subfuscispora, Exochalara longissima, Gyrothrix pediculata, Hyalosynnema multisepatum, Kumanasamuha sundara, Spadicoides obovata, and Stachycoremium parvulum. Descriptions and illustrations of these fungi are also given.

Key words: Conidia, Fungi Imperfecti, saprophytic.

Introduction

Saprophytic hyphomycetes of Taiwan had been investigated by K. Sawada and T. Matushima (Chen, 1994). Many additional species were reported by S.S. Tzean, H.S. Chang, and J.-L. Chen who also described many new taxa in Taiwan (Chang 1995, 1997, 1999; Chen, 1994 and references given therein; Chen and Lin, 2000). A list of most of the fungal species known in Taiwan was recently compiled (Anonymous, 1999). These records document a high diversity of hyphomycetes composed of species known from temperate regions as well as from tropical latitudes. This observation is strengthened by further species collected in Taipei and its vicinities, and in the high mountains of Taiwan during 1998–2000.

Materials and Methods

Samples of decaying plant material were collected in the field, brought to the laboratory and investigated with a dissecting microscope for the presence of microfungi. For light microscopy, microfungi were removed from the substrate with a needle and mounted in 5–10% KOH, in some cases after staining with 1% aqueous phloxine. Measurements and drawings were made using an object micrometer and scaled paper. Specimens were dried with an electric dryer and deposited in TNM. Genera and species of dematiaceous hyphomycetes were identified mainly using Ellis (1971, 1976). The known distribution of each species was given according to the literature. In some cases remarks on taxonomy were provided.
Results

*Actinocladium rhodosporum* Ehrenb., Ehrenberg 1819, Jb. Gewächskde 1: 52, n. v. (Fig. 1)

Conidiophores macronematous, dark brown, approx. 50 µm long, 3–6 µm wide. Conidia terminal, holoblastically produced, approx. 50 µm long, basal stalk cell 7–9 × 3.5–5 µm, central body composed of 2 or 3 cells, distally giving rise to three divergent branches, 26–32 × 2–6 µm. Conidial branches dark brown at the base, becoming paler towards the apex that is hyaline and apparently proliferates through the wall of the terminal cell.

**Specimen examined.** Taiwan. Taipei: Wen-shan, on bark of living stem of *Acacia confusa* Merr. in Philip., Oct. 4, 1998, R. Kirschner 425.

**Known distribution.** Africa, North Asia (former USSR), Cuba, Europe (Ellis, 1971; Sutton, 1993), New-Zealand (Hughes, 1978), Taiwan. *Actinocladium amazonicum* Matsushima differs in having convergent or parallel branches (Matsushima, 1993), whereas *A. atrosporum* G.-C. Zhao & N. Li differs in having branches 80–130 µm long (Zhao and Li, 1997).

*Chromelosporium ochraceum* Corda 1833, in Sturm's Deut. Fl. III, 3 (13): 81–82, n. v. (Fig. 2)

Colonies effuse, floccose. Conidiophores hyaline to light ochre, smooth, macronematous, apically more or less dichotomously
branched at approx. right angles, up to approx. 500 µm high and 9–11 µm wide. Conidiogenous cells cylindrical or slightly curved, intercalary and terminal, arranged at a conidiogenous zone up to 130 µm long. Conidia globose, hyaline, appearing ochre in mass, warty, 5–6 µm in diam., solitarily produced from minute denticles that disappear after conidial dehiscence.

**Specimen examined.** Taiwan. Hsinchu: Kuan Wu, on herbaceous stem, May 15, 1999, R. Kirschner 510.

**Known distribution.** Europe (Ellis, 1976), Taiwan.

*Conoplea novae-zelandiae* S. Hughes 1978, N. Z. Jl. Bot. 16: 320–323 (Fig. 3)

Conidiophores aggregated in brown, powdery, cottony cushions, brown, finely echinulate, branched with acute angles, up to approx. 2 mm high, 4–11 µm broad, sometimes anastomosing. Conidiogenous cells pale brown, terminal and intercalary, echinulate, with undulate cell walls, 10–36 × 4–5 µm; conidiogenous regions of the conidiogenous cells arising below the septa, straight when young, curved back or encircling the conidiogenous cell when old, covered with scars after the dehiscence of conidia, with pigmentation and ornamentation less conspicuous than in the other area of the conidiogenous cell, 2–3.5 µm.

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**Fig. 2.** *Chromelosporium ochraceum*. A. Habit sketch of a conidiophore. Scale bar = 300 µm. B. Terminal part of a branch of a conidiophore. Scale bar = 10 µm. C. Conidia. Scale bar = 10 µm.

**Fig. 3.** *Conoplea novae-zelandiae*. A. Habit sketch of a conidiophore. Scale bar = 200 µm. B. Apical part of branches of the conidiophore. C. Conidia. Scale bar in B and C = 20 µm.
broad. Conidia brown, finely echinulate, obovate or ellipsoidal, with a subapical, lateral, or rarely basal, pale, oval zone, 6–10 × 5–6 µm, with a slightly truncate base.

**Specimen examined.** Taiwan. Hsinchu: Kuan Wu, on branch on ground, May 15, 1999, R. Kirschner 512.

**Known distribution.** New Zealand (Hughes, 1978), Taiwan.

The species is characterised by the undulate walls of the conidiogenous cells and the lateral position of the pale oval zone in the conidia (Hughes, 1978). The conidiophores of the specimen from Taiwan are considerably longer than those described from New Zealand by Hughes (1978).

**Dictyochaeta subfuscispora** A.J. Kuthubutheen & A. Nawawi 1991, Mycol. Res. 95: 1214–1215 (Fig. 4)

Setiform conidiophores macronematous, mononematous, aggregated in small clusters.

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**Fig. 4.** Dictyochaeta subfuscispora. A. Setiform and short conidiophores. Scale bar = 20 µm. B. Conidiogenous cells of setiform conidiophores. Scale bar = 10 µm. C. Conidia. Scale bar = 20 µm.
together with short conidiophores, connected by pale brown creeping hyphae (2–5 µm in diam.), setiform conidiophores smooth, dark brown, cylindrical, 117–210 × 3.5–6 µm, widening up to 9 µm diam. in the apical part, percurrently proliferating, with several septa; short conidiophores macronematous or semimacronematous, mononematous, light brown, smooth, cylindrical or slightly constricted near the middle, aseptate, 24–48 × 6–7 µm. Conidiogenous cells of the setiform conidiophores apical, brown, proliferating, with 1–several apical and subapical flaring, 4–6 µm wide and 2–3 µm deep collarettes, conidiogenous cells of the short conidiophores with 1 apical and several lateral collarettes similar to those of the setiform conidiophores. Conidia with densely granulated cytoplasm, at first hyaline, becoming brown during maturation, ellipsoid, smooth, apiculate, 17–25 × 8–10 µm, produced in slimy heads.

**Specimens examined.** Taiwan. Taipei: Yangmingshan, Dingshan, on wood on ground, July 24, 1999, *R. Kirschner 545*; Chihhsingshan, on wood, May 15, 2000, *R. Kirschner 782*.

**Known distribution.** on rotting submersed wood in Malaysia (Kuthubutheen and Nawawi, 1991b), on terrestrial wood in Taiwan.

There are approx. 70 species in *Dictyochaeta* Speg. and *Codinea* Maire, and *D. subfuscispora* is the only species with brown conidia (Kuthubutheen and Nawawi, 1991b, c).

**Exochalara longissima** (Grove) W. Gams & Hol.-Jech. 1976, Stud. Mycol. 13: 56 (Fig. 5)

Conidiophores brown, erect, simple, smooth, with 5–11 septa, 92–130 µm long, 7–10 µm wide at the base, 5 µm wide above the basal cell, tapering to 1.5–2 µm below the collarette. Conidiogenous cells phialidic, 16–35 × 3–5 µm, terminal, percurrently and sympodially proliferating through older phialides, with collarettes up to 3 µm deep and 2–2.5 µm wide. Conidia adhering end-to-end in chains, hyaline, one-celled, guttulate, fusiform, with

![Fig. 5. Exochalara longissima. Conidiophores and conidia. Scale bar = 10 µm.](image-url)
one or both ends truncate, 6–11 × 2.5–3 µm.

**Specimen examined.** Taiwan. Taichung: Anmashan, 2200 m, on wood on ground, Nov. 8, 1998, R. Kirschner 442.

**Known distribution.** Cuba (Castañeda Ruiz *et al.*, 2000), Europe (Holubová-Jechová, 1984, Rong and Gams, 2000), Taiwan.

**Gyrothrix pediculata** J. L. Cunningham 1974, Mycologia 66: 123 (Fig. 6)

Colonies effuse, brown, with white basal layer during sporulation. Setae brown, smooth, 200–265 µm tall, thick-walled and 6–9 µm broad at the base, 6-4 µm broad above the base, simple and 4–7 septate below the branching in the upper third, dichotomously branched, ending in terminal coils ca. 0.5 µm thick. Conidiogenous cells apparently phialidic, with a minute apical wall-thickening and an inconspicuous collarette, hyaline, 15–24 µm long, 3–4 µm broad at the base, 1.5 µm broad at the apex, sitting directly on the basal hyphae or supported by a single short-cylindrical, hyaline cell. Conidia hyaline, one-celled, with one end rounded and the other acute, “planaria-shaped” (Cunningham, 1974), 7–10 × 2–3 µm, aggregating in white cirrhi.

**Specimen examined.** Taiwan. Taipei: National Taiwan University, campus, on rotting palm leaf on ground, Oct. 2, 1998, R. Kirschner 414.

**Known distribution.** Argentina (Gamundi *et al.*, 1977), USA (Cunningham, 1974), Taiwan.

Species of *Gyrothrix* differ by characteristics of the setae and conidia. The setae of the specimen from Argentina by Gamundi *et al.* (1977) have fewer branches and are shorter than those reported in the original description by Cunningham (1974), but the conidial morphology is the same as that in Cunningham (1974). In contrary, the setae of the Taiwanese specimen agree better with the original description than those reported from Argentina, but the conidia are slightly narrower. Conidogenesis in species of *Gyrothrix* is difficult to interpret (Cunningham, 1974) and probably cannot be resolved solely by light microscopy.

**Hyalosynnema multiseptatum** Matsushima 1975, Icones Fungorum a Matsushima Lectorum, Kobe, p. 85 (Fig. 7)

Synnemata hyaline, erect, composed of parallel, smooth, sparsely branched and 2–3 µm thick hyphae and a loose head, appearing brush-like through projecting conidia, 315–330 × 27–100 µm. Conidiogenous cells terminal, with one or two truncate, hyaline scars

![Fig. 6. *Gyrothrix pediculata*. A. Seta. Scale bar = 100 µm. B. Conidiogenous cells at the base of setae. Scale bar = 10 µm. C. Conidia. Scale bar = 10 µm.](image-url)
after conidium dehiscence, 10–25 × 2–3 µm. Conidia dry, solitary, clavate or cylindrical, hyaline, smooth, apically rounded, slendering to the truncate base, with 5–10 transversal septa, 28–40 × 7–10 µm.

**Specimen examined.** Taiwan. Taipei: National Taiwan University, campus, on bark of dead stems, March 24, 1999, R. Kirschner 473.

**Known distribution.** Japan (Matsushima 1975), Peru (Matsushima 1993), Taiwan.

Conidial ornamentation seems to be composed of ridges rather than spines as suggested by the description and drawings in Ellis (1971), Matsushima (1975), and Rao & Rao (1964). Three further species were described in the genus. *Kumanasamuha arakuensis* T. Raman, B.R. Rao & D. Rao differs in having aseptate lateral branches (Raman et al., 1978). In *K. kalakadensis* Subramanian & D.J. Bhat the conidiophores and the hyaline outgrowths of the conidiogenous cells are longer (Subramanian and Bhat, 1987) than in *K. sundara*. *Kumanasamuha nova-zelandica* L.J. Hunter & W. B. Kendrick differs in having clusters of conidiogenous cells exclusively on top of the main axis of the conidiophore (Hunter and Kendrick, 1977). Specimens almost identical to *K. nova-zelandica* were described as

late, approx. 700 µm long, 7–11 µm thick, main and lateral branches with several septa, distances between septa 15–80 µm, cell wall approx. 0.5 µm thick. Conidiogenous cells brown, spherical or subglobose, 9–12 µm, with a short hyaline outgrowth bearing several denticles, denticles short and broad after conidium dehiscence, in some cases thick-walled. Conidia solitary, dry, one-celled, containing 0–2 droplets, with golden brown cell wall, ornamented with obliquely arranged ridges (appearing refractive in light microscopy), 5–7 × 3.5–5 µm (without ridges which are approx. 1 µm high).

**Specimens examined.** Taiwan. Taipei: Tsao Ling Trail, on bark on branch on ground, Nov. 1, 1998, R. Kirschner 446; Wen Shan, on bark on branch on ground, Febr. 11, 1999, R. Kirschner 457; Yangmingshan, Dingshan, on wood on ground, July 24, 1999, R. Kirschner 546.

**Known distribution.** Africa, India (Ellis 1971), Japan (Matsushima 1975), Taiwan.
**Fig. 8.** *Kumanasamuha sundara*. A. Habit sketch of a conidiophore. Scale bar = 100 µm. B. Conidiogenous cells. Scale bar = 20 µm. C. Conidia. Scale bar = 10 µm.

*Civisubramaniana eucalypti* by Vittal & Dorai (1986). Type material of both species should be checked to clarify whether or not these two names are in synonymy.

*Spadicoides obovata* (Cooke & Ellis) S. Hughes 1958, Can. J. Bot. 36: 806 (Fig. 9)

Basal hyphae brown, 2–5 µm. Conidiophores simple, brown, erect, in some cases proliferating, 60–195 µm long, 4–8 µm broad at the base, tapering to 3–4 µm at the apex.

Conidiogenous cells formed by a terminal and up to five subterminal cells, with several minute pores, terminal pore slightly thickened,
other pores lacking thickening. Conidia single, obovate, mostly straight, rarely slightly curved, with truncate and slightly thickened base, brown, with two septa appearing as thick dark bands, basal cell mostly paler than the two apical cells, 10.5–12.5 × 5–7.5 µm.

*Specimen examined.* Taiwan. Taipei: Yangmingshan, on wood on the ground, June 26, 1999, *R. Kirschner* 537.

**Known distribution.** Europe, New Zealand, North America (Holubová-Jechová, 1982), Taiwan.

The length of the conidia of the specimen from Taiwan is at the lower range of the measurements given by Holubová-Jechová (1982; 12.5–16 × 6–8.5 µm). A key to species of *Spadicoides* is provided by Kuthubutheen & Nawawi (1991a).

**Stachycoremium parvulum** (Cooke & Ellis)
Seifert 1985, Mycologia 77: 987 (Fig. 10)

Synnemata simple or with basal branches, stipitate-capitate, 440–800 µm high, stipe white, composed of hyaline, 1.5–2 µm thick, parallel hyphae, up to 80 µm wide, apical head yellowish to light beige. Conidiophores irregularly branched. Conidiogenous cells hyaline, 19–45 × 1.5–2 µm, with an apical, up to 23 µm long rachis with sympodially arranged collarettes, apical wall-thickenings not found. Conidia hyaline, two-celled, in some cases constricted at the septum, oblong or short-cylindrical, thin- or thick-walled, straight or slightly curved, aggregating in a slimy mass.

*Specimen examined.* Taiwan. Taipei: Yangmingshan, Ta Tun Shan, on branch on ground, May 17, 2000, *R. Kirschner* 672.

**Known distribution.** Japan, North America (Seifert, 1985), Taiwan.

The mode of conidiogenesis in this species is not clear (Seifert, 1985) and could not be resolved in this study by light microscopy only. The conidiogenous cells might be polyphialides according to Seifert (1985).

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Fig. 10. *Stachycoremium parvulum*. A. Habit sketch of a synnema. Scale bar = 200 µm. B. Apical part of a conidiophore. Scale bar = 10 µm. C. Conidia. Scale bar = 10 µm.

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References


十種新記錄臺灣產絲孢綱真菌

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摘 要

本文描述十種腐生的臺灣產新記錄種絲孢綱真菌，分別為 Actinocladium rhodosporum、Chromelosporium ochraceum、Conoplea novae-zelandiae、Dictyochaeta subfuscispora、Exochalara longissima、Gyrothrix pediculata、Hyalosynnema multiseptatum、Kumanasamuha sundara、Spadicoides obovata 與 Stachycoremium parvulum。

關鍵詞：分生孢子、不完全菌、腐生。