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The genus *Cercophora* (Lasiosphaeriaceae) in Taiwan

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ABSTRACT

Four species of *Cercophora*, *C. acanthigera*, *C. coprophila*, *C. gossypina*, and *C. tuberculata* are described and illustrated. They are new to Taiwan. A key to six species of *Cercophora* from Taiwan is provided.

Key words: *Cercophora*, Lasiosphaeriaceae, Sordariales, Taiwan.

Introduction

The genus *Cercophora* (Lasiosphaeriaceae) is characterized by large dark colored perithecia and hyaline, cylindrical ascospore with a swollen, pigmented head (Lundqvist, 1972; Miller and Huhndorf, 2001). Two species, *Cercophora coronata*, *C. mirabilis* have been reported in Taiwan (Wang, 1994). During the continuous survey of coprophilous fungi in Taiwan, additional four species of *Cercophora* are added to the list. The culture characteristics of these six species were studied while *C. coronata* and *C. mirabilis* were found to produce anamorph stage in culture. Specimens are deposited in the herbarium of the National Museum of Natural Science, Taichung, Taiwan (TNM).

Taxonomies

Key to species of *Cercophora* from Taiwan.

1. Perithecia tomentose ····· 2
   Perithecia not tomentose ····· 3
2. Perithecia with white tomentum, asci without subapical globules ····· *C. coprophila*
   Perithecia with yellow tomentum, asci with subapical globules ····· *C. gossypina*
3. Perithecia covered by large, brown, claw-like cells ····· *C. acanthigera*
   Perithecia covered by agglutinated hairs or tubercules ····· 4
4. Perithecical hairs agglutinated, dark cell of ascospores 17.5–20 × 10–11 μm ····· *C. coronata*
   Perithecical neck tuberculate ····· 5
5. Perithecical neck up to 150 μm long, dark cell of ascospores 12.5–15 × 7.5 μm ····· *C. tuberculata*
   Perithecical neck short, dark cell of ascospores 18-20 × 9-10 μm ····· *C. mirabilis*

Cercophora acanthigera (Berk. & Br.) N. Lundq., Symb. Bot. Upsal. 20: 86, 1972. (Fig. 1)

≡ *Sphaeria acanthigera* Berk. & Br., J. Linn. Soc. Bot. (London) 14: 127, 1873.

= *Podospora strobiliformis* Teng, Sinensia 7: 498, 1936.

Perithecia scattered or gregarious, superficial, brown to dark brown, oblong, 630–1100 × 350–380 μm, externally covered by large, brown, claw-like cells, 60–95 × 25–50 μm, swollen at base; neck black, short conical. Asci 8-spored, cylindrical, 160–180 × 12–16 μm, apical ring small, subapical globules globose, verrucose, ca. 10 μm in diam. Ascospores at first hyaline, vermiform, 48–55 × 5–6 μm, with a lash-like appendage at each end, upper cells at maturity, dark brown, ellipsoid, 20–22.5 × 10–12.5 μm, pedicel hyaline, cylindrical, 30–35 × 5 μm, germ pore apical.

Colonies on MEA medium spreading slowly. Mycelium grayish white; white or pale yellow on reverse, margin smooth or irregular, reaching 2.1–2.2 cm diam. in 14 days at room temperature. Hyphae 2.5–3.7 μm wide, branched, septate, hyaline, occasionally swollen. Inflations globose, 3.7–15 μm in diam. Anamorph not observed.

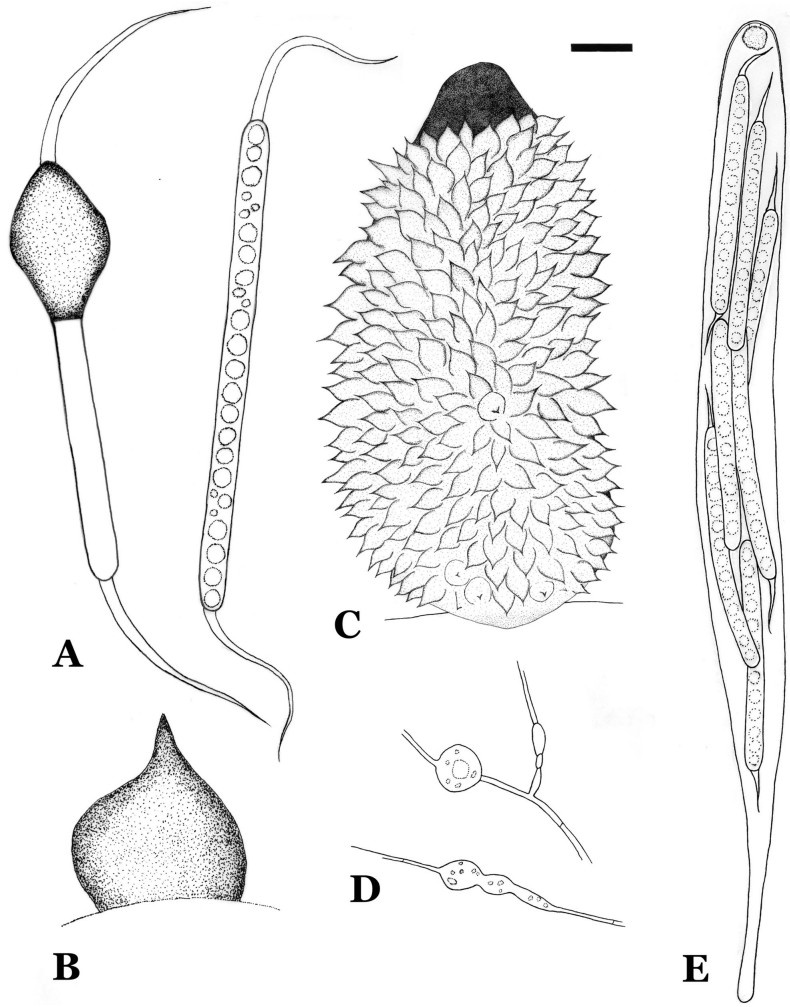

Fig. 1. *Cercophora acanthigera*. A. Mature and young ascospores. B. Peridial cell. C. A perithecium. D. A part of vegetative hyphae. E. An ascus. Bar = 8 μm for A; 16 μm for B, D, E; 60 μm for C.

Specimens examined. Nantou: Chingjing farm, on cow dung, *Wang 9819*, Mar. 4, 1998 (TNM F8939). Taipei: Yangmingshan National Park, Chingtienkang, on buffalo dung, *Wang 9622*, Mar. 7, 1996 (TNM F4544).

This species is characterized by large, claw-like cells of the perithecial wall (Udagawa and Muroi, 1979).

Cercophora coprophila (Fr.) N. Lundq., Symb. Bot. Upsal. 20: 95, 1972. (Fig. 2)

≡ *Sphaeria coprophila* Fr. in Kunze & Schmidt, Myk. Hefte 2: 38, 1823.

= *Sphaeria albicans* var. *fimicola* Alb. & Schw., Consp. Fung. 36: 1805.

= *Sphaeria bovilla* Cooke, Handb. Brit. Fung. 2: 874, 1871.

For more synonyms see N. Lundqvist (1972).

Perithecia gregarious, semi-immersed, pyriform to ovoid, 710–800 × 680–750 μm, covered with a white to grayish tomentum, composed of hyaline to light brown, septate hyphae, ca. 3 μm wide; neck short cylindrical, black. Peridium dark brown, opaque, pseudoparenchymatous, membranous, areolate. Asci 8-spored, narrowly clavate, 350–450 × 15–20 μm, apical ring small, subapical globule absent. Ascospores at first hyaline, vermiform, 50–55 × 5 μm, with bipolar gelatinous cauda, lash-like, upper cells at maturity, dark brown, ellipsoid, 17–20 × 8.5–10 μm, pedicel hyaline, cylindrical, 32–40 × 5 μm, germ pore eccentric.

Colonies on MEA medium spreading slowly. Mycelium olivaceous brown; yellowish olivaceous brown on reverse, margin smooth, reaching 2.7–2.8 cm in diam. in 7 days at room temperature. Hyphae 2.5–3.7 μm wide, branched, septate, hyaline. Anamorph not observed.

Specimens examined. Hualien: Chaofeng farm, on cow dung, *Jong 46*, Oct. 25, 2004 (TNM F17204). Ilan: Shuanglienpi, on buffalo dung, *Wang 94009*, Mar. 22, 1994 (TNM F1924). Nantou: Lienhuachih, on cow dung, *Wang 2004*, Jan. 15, 2000 (TNM F10387). Pingtung: Kengting National Park, on buffalo dung, *Jong 52*, Nov. 30, 2004 (TNM F17205). Taichung: Chunghsing Univ., on cow dung, *Wang 9261*, Jun. 29, 1992 (TNM F0209); Tungshih, on cow dung, *Wang 94074*, Nov. 4, 1994 (TNM F2588).

The species is characterized by white tomentum on the perithecia which contain asci lacking subapical globules (Lundqvist, 1972).

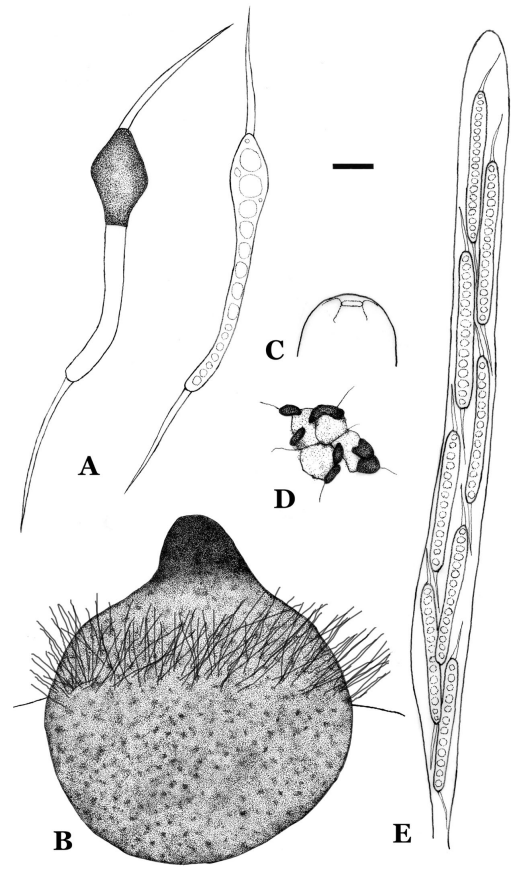

Fig. 2. *Cercophora coprophila*. A. Mature and young ascospores. B. A perithecium. C. Tip of ascus. D. A part of peridium. E. Ascus and young ascospores. Bar = 8 μm for A, C, D; 100 μm for B; 16 μm for E.

Cercophora coronata (Cailleux) Udagawa & Muroi, Trans. mycol. Soc. Japan 20: 459, 1979. (Fig. 3 A)

≡ *Bombardia coronata* Cailleux, Bull. Soc. Mycol. France 87: 623, 1971.

= *Cercophora nainitalensis* Mukerji, Kumar & Singh, Phytomorphology 45: 98, 1995.

Colonies on MEA medium spreading slowly. Mycelium olivaceous to grayish olivaceous; olivaceous on reverse, margin irregular, reaching 1.4–1.6 cm diam. in 14 days at room temperature. Hyphae 2–2.5 μm wide, branched, septate, hyaline. Conidiophores lacking. Phialides borne singly and sparsely from aerial hyphae, hyaline to pale olive, lageniform with a conical collarette at apex, 6–10 × 2–3.5 μm. Conidia hyaline, globose, ca. 2.5 μm diam., thin-walled, smooth, sometimes aggregated into slimy masses.

Specimens examined: Chiayi: Liuchiao, on buffalo dung, *Jong 43*, Sept. 14, 2004 (TNM F17199); *Jong 48*, Oct. 29, 2004 (TNM F17201). Hualien: on cow dung, *Wang 94034*, June 27, 1994 (TNM F2124). Pingtung: Kangtzu, on yellow ox dung, *Wang 93069*, May 11, 1993 (TNM F0745); Kengting National Park, on buffalo dung, *Jong 53*, Nov. 30, 2004 (TNM F17202); Nanjen Lake, on buffalo dung, *Wang 9258*, June 26, 1992 (TNM F0206). Taichung: Chunghsing Univ., on rabbit dung, *Wang 9267*, July 3, 1992 (TNM F0236); Shenkaung, on cow dung, *Wang 92112*, Oct. 7, 1992 (TNM F0682); Taiping, Chelungpu, on yellow ox dung, *Jong 44*, Sept. 22, 2004 (TNM F17200); Tunghai Univ., on cow dung, *Wang 9232*, May 23, 1992 (TNM F0180). Taipei: Mucha, on horse dung, *Wang 92008*, Mar. 4, 1992 (TNM F0157).

Cercophora gossypina N. Lundq., Symb. Bot. Upsal. 20: 107, 1972. (Fig. 4)

Perithecia scattered, semi-immersed, olivaceous brown, broadly obpyriform, 600–700 × 450–550 μm, covered with yellowish tomentum except the neck region, tomentum consisting of hyaline, flexuous, septate hyphae. Neck brown, short conical. Peridium yellowish brown, pseudoparenchymatous, membranous, consisting of angular cells. Asci 8-spored, cylindrical, 200–237.5 × 17.5–20 μm, apical ring small, subapical globules round, smooth, ca. 5 μm in diam. Ascospores at first hyaline, vermi-

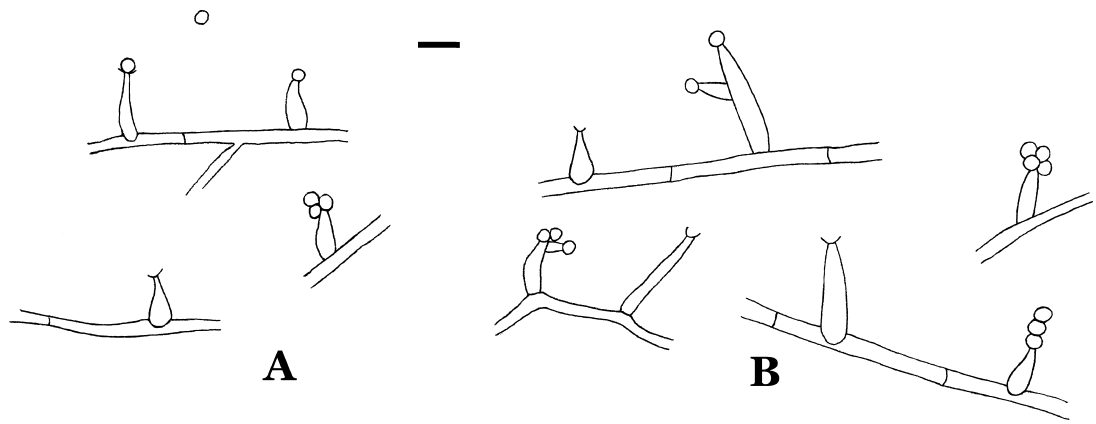

Fig. 3. A. *Cercophora coronata*. Phialides and conidia. B. *Cercophora mirabilis*. Phialides and conidia. Bar = 6 μm for A and B.

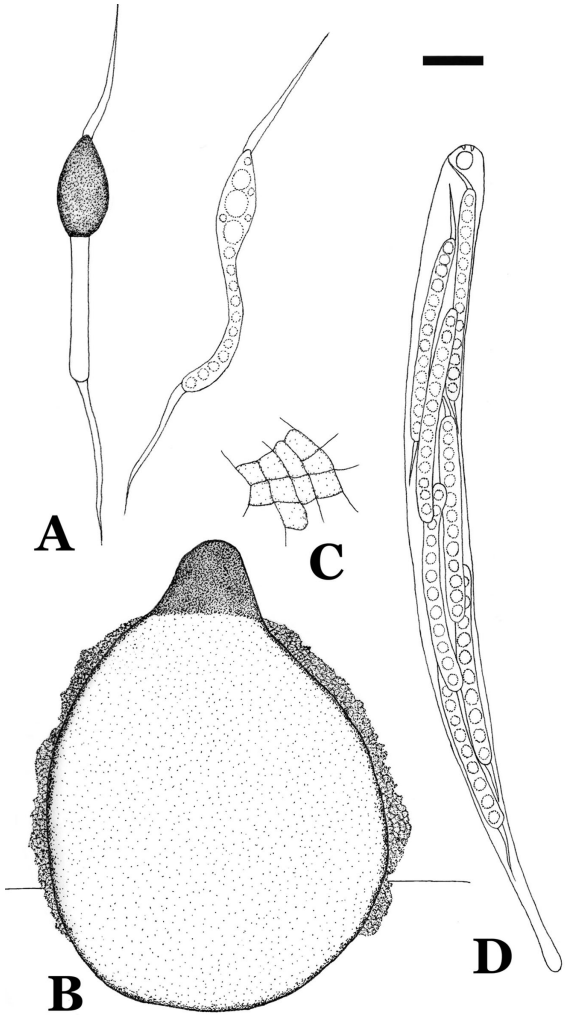

Fig. 4. *Cercophora gossypina*. A. Mature and young ascospores. B. A perithecium. C. A part of peridium. D. An ascus. Bar = 12 μm for A, C; 100 μm for B; 16 μm for D.

form, 45–55 × 5 μm, with a lash-like appendage at each end, upper cells at maturity, brown, ellipsoid, 15–17.5 × 7.5–10 μm, pedicel hyaline, cylindrical, 25–29 × 3.75 μm, germ pore eccentric.

Specimen examined. Taichung: Shenkang, on yellow ox dung, *Wang 92130*, Nov. 17, 1992 (TNM F0748)

This species can be easily distinguished by the yellowish tomentum on perithecium (Furuya and Udagawa, 1973; Lundqvist, 1972).

Cercophora mirabilis Fuckel, Symbolae mycologicae 24: 245, 1870. (Fig. 3 B)

≡ *Podospora mirabilis* (Fuck.) Gola, Atti Accad. Sci. Ven. Trent. Istr. 21, Suppl. 1: I-XVI, 213, 1930.

Colonies on MEA medium spreading slowly. Mycelium olivaceous to dark olivaceous; olivaceous on reverse, margin smooth, reaching 1.4 cm diam. in 14 days at room temperature. Hyphae 2.5–4 μm wide, branched, septate, hyaline. Conidiophores often lacking, if present, borne singly, hyaline, lageniform. Phialides borne singly and sparsely from aerial hyphae or on short conidiophores, hyaline to pale olive, lageniform to cylindrical with a conical collarette at apex, 7.5–17.5 × 2–3.5 μm. Conidia hyaline, globose to subglobose, ca. 2.5 μm in diam., thin-walled, smooth, aggregated into slimy masses or occasionally forming a short chain.

Specimens examined. Hualien: Juisui, on ox dung, *Wang 94069*, Nov. 1, 1994 (TNM F2584). Taipei: Yangmingshan National Park, Chingtienkang, on ox dung, *Jong 20*, Sept. 1, 2003 (TNM F17203); *Wang 9811*, Jan. 15, 1998 (TNM F7971).

Cercophora tuberculata Mukerji, Kumar & Singh, Phytomorphology 45: 103, 1995. (Fig. 5)

Perithecia gregarious or scattered, semi-immersed, dark brown, obpyriform, 430–820 × 240–480 μm, covered with flexuous, olivaceous brown, septate hairs, ca. 2.5 μm wide. Neck black, long cylindrical, with tubercular hairs, sometimes glabrous. Peridium olivaceous to olivaceous brown, opaque, pseudoparenchymatous, membranous, consisting of angular cells. Asci 8-spored, cylindrical, 162.5–187.5 × 7.5–12.5 μm, apical ring small, subapical glob-

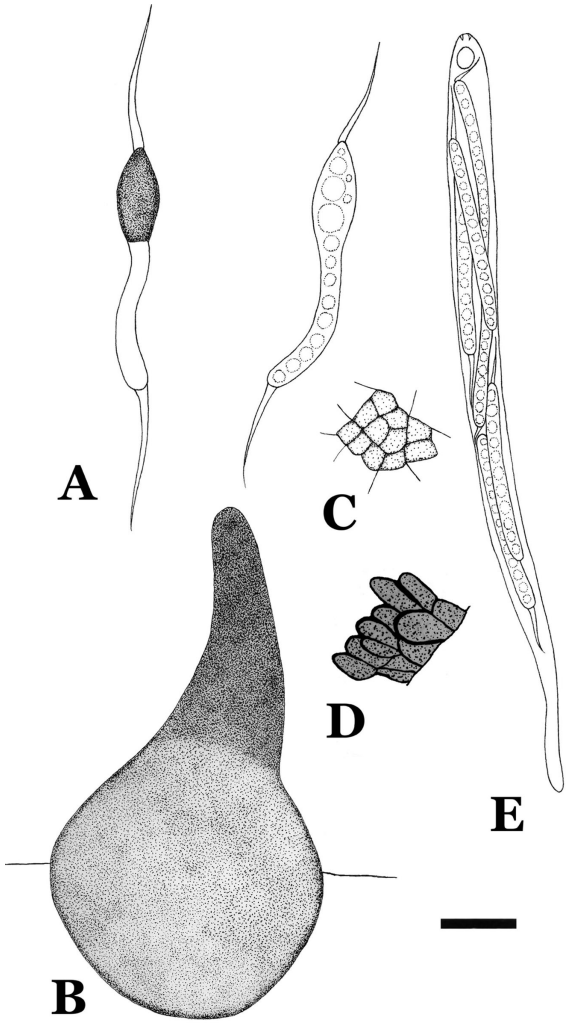

Fig. 5. *Cercophora tuberculata*. A. Mature and young ascospores. B. A perithecium. C. A part of peridium. D. Perithecial hairs. E. An ascus. Bar =12 μm for A; 100 μm for B; 16 μm for C, D, E.

ules round, smooth, 3.7-5 μm in diam. Ascospores premature hyaline, vermiform, 37.5–40 × 2.5–5 μm, with a lash-like appendage attached to both ends, upper cells at maturity, dark brown, ellipsoid, 12.5–15 × 7.5 μm, pedicel hyaline, cylindrical, 20–25 × 3.7–5 μm, germ pore not observed.

Colonies on MEA medium spreading slowly. Mycelium pale olivaceous to olivaceous; yellowish olivaceous on reverse, margin smooth, reaching 1.5–1.7 cm in diam. in 7 days at room temperature. Hyphae ca. 2.5 μm wide, branched, septate, hyaline. Anamorph not observed.

Specimens examined. Hualien: Yuli, on goat dung, *Wang 9288*, Sept. 8, 1992 (TNM F0676). Pingtung: Kengting National Park, on Formosan sika deer dung, *Jong 74*, Jan. 27, 2005 (TNM F17744); *Jong 76*, Feb. 15, 2005 (TNM F17746). Taipei: Yangmingshan National Park, Chingtienkang, on ox dung, *Jong 19*, Aug. 4, 2003 (TNM F16876); *Wang 2008*, Feb. 16, 2000 (TNM F10391).

Cercophora sordarioides (Speg.) N. Lundq. is close to this species, but differs in having a transverse septum below the middle ascospores and lacking tubercles at the neck (Lundqvist, 1972; Mukerji *et al*., 1995).

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臺灣產尾柄孢殼屬 (毛球殼科) 之研究

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摘　　要

本文描述 4 種尾柄孢殼菌 *Cercophora acanthigera*、*C. coprophila*、*C. gossypina* 與 *C. tuberculata*，均爲臺灣新紀錄種，並提供 6 種臺灣已記錄尾柄孢殼屬種類的檢索表。

關鍵詞：毛球殼科、尾柄孢殼屬、臺灣、糞殼菌目。