

Two new species of *Coniochaeta* with a cephalothecoid peridium wall

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Two new species of *Coniochaeta*, isolated from Japanese soils, are described and illustrated: *C. cephalothecoides*, which is characterized by dark brown ascomata clothed with short setae, cylindrical asci and ovoid to almond-shaped or pyriform ascospores with a longitudinal germ slit; and *C. dumosa*, which is characterized by dark brown ascomata clothed with short setae and dense hyphal hairs, cylindrical asci and ellipsoid-fusoid ascospores with a longitudinal germ slit. These species are distinguished from most species of the genus by the unique cephalothecoid peridium of their ascomata. The associated anamorphs of both species are assignable to the form-genus *Lecythophora*.

Key Words—*Coniochaeta cephalothecoides*; *Coniochaeta dumosa*; Japan; pyrenomycetes; soil fungi.

The genus *Coniochaeta* was originally placed as a subgenus of *Rosellinia* (Xylariaceae) and was raised to generic rank in 1887 (Cooke, 1887). Most species of the genus differ from the apparently xylariaceous genus *Rosellinia* by their non-stromatic ascomata and lack of an amyloid apical apparatus in the ascus. Thus Malloch and Cain (1971) transferred *Coniochaeta* and its non-ostiolate counterpart *Coniochaetidium* to the new family Coniochaetaceae. They are characterized by dark brown to black ascomata with a peridium that may or may not be setose, and forming dark brown, discoid or ellipsoidal ascospores that have a longitudinal germ slit along the narrow edge. They are saprobes occurring on dung or on decaying plant remains. Routine isolation from soil, however, often yielded several species of *Coniochaeta*, which almost certainly are widespread in their terrestrial occurrence.

During the course of a continuing study concerning the occurrence of pyrenomycetous ascomycetes in Japanese soils, two unusual isolates of *Coniochaeta* were encountered with cephalothecoid ascomata associated with a *Lecythophora* anamorph. These fungi can not be assigned to any of the currently accepted taxa of the genus (Hawksworth and Yip, 1981; Mahoney and LaFavre, 1981; Checa et al., 1988) and are described as new to science.

Taxonomy

Coniochaeta cephalothecoides Kamiya, Uchiyama et Udagawa, sp. nov. Figs. 1, 2

Coloniae in agar cum decocto tuberorum et carotatum (PCA) effusae, planae, tenues, ex mycelio vegetativo submerso constantes, postea ascomatibus abundantibus

formantes; conidiogenesis moderata, dilute carnea vel persicina; reversum incoloratum vel aurantiacum vel croceum.

Ascomata dispersa, semiimmersa, ostiolata, subglobosa vel pyriformia, 300–350 × 250–280 μm, nigra, omnino pilosa; collum nigrum, brevi-cylindraceum, 40–60 × 50–70 μm; pili brunnei, setosi, recti, 10–65 × 2–2.5 μm, non ramosi, septati, leves, superne attenuati et pallescentes; peridium ca 12.5 μm crassum, atro-brunneum, valde cephalothecoideum, multi-stratum, ex “textura prismatica” et “textura angularis” compositum. Asci 8-sporei, cylindracei, 75–100 × 7.5–12.5 μm, annulo apicali parvo praediti, cum iodo non reagentes, brevi-stipitati; paraphyses filiformes, septatae, simplices. Ascosporae oblique uniseriatae, atrobrunneae, ovoideae vel amygdalinae vel pyriformes, 8–13 × 5–7.5 × 4–5 μm, leves, cum fissura germinali longitudinali praeditae; vagina gelatinosa tenuis. Status anamorphus: *Lecythophora* sp.

Holotypus: BF 35344, colonia exsiccata in cultura ex solo stativa, Saitama, in Japonia, 2.i.1992, a S. Uchiyama et S. Kamiya isolata et ea collectione fungorum, Musei et Instituti Historiae Naturalis Chiba (CBM) conservata.

Etymology: The genus *Cephalotheca* and Greek adjectival suffix, -oides, referring to its cephalothecoid ascomata, with the resemblance to *Cephalotheca*.

Anamorph: *Lecythophora* sp.

Mycelium ex hyphis hyalinis ramosis septatis levibus 1.5–3 μm diam saepe fasciculatis compositum. Conidiophora indistincta. Cellulae conidiogenae (phialides) hyalinae, vulgo ampulliformes, 5–15 × 2.5–3.5 μm, saepe deminutae. Conidia hyalina, unicellularia, ovoidea vel ellipsoidea vel allantoidea, 2.5–5 × 1–2 μm, levia, in capitulis mucidis connexa. Status teleomor-

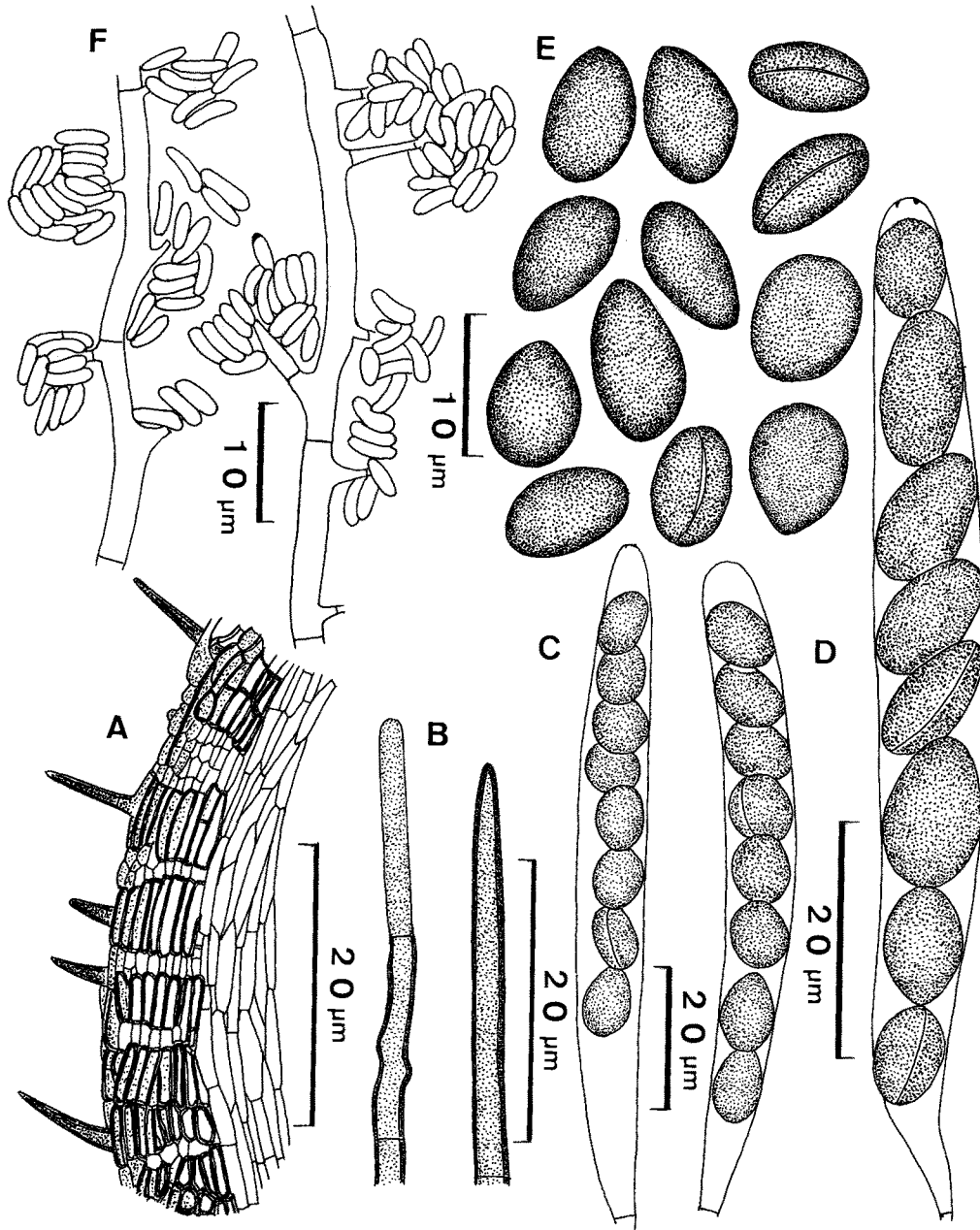


Fig. 1. *Coniochaeta cephalothecoides*, BF 35344.

A. Part of lateral ascomatal wall. B. Ascomatal setae. C, D. Asci. E. Ascospores. F. Conidiogenous cells and conidia.

phus: *Coniochaeta cephalothecoides* Kamiya, Uchiyama et Udagawa.

Holotypus: BF 35344, loc. cit.

Colonies on PCA growing rapidly, attaining a diameter of 62–65 mm in 21 days at 25°C, plane, thin, consisting of a submerged vegetative mycelium, later producing abundant ascomata as black dots in the substratum; conidiogenesis moderate, Pale Red (M. 8A3, after Korerup and Wanscher, 1978) or Peach (Rayner, 1970); reverse uncolored to Pale Orange (M. 5A3) or Saffron (R). Colonies on oatmeal agar (OA) growing rapidly as on PCA, radially sulcate, consisting of a thin mycelial felt, with surface appearing funiculose; ascomata scattered in

central areas, as described above; conidiogenesis conspicuous, white to Light Yellow (M. 4A4) or Pale Luteous (R); reverse Light Yellow (M. 4A4) or Straw (R).

Ascomata scattered, semiimmersed, ostiolate, subglobose to pyriform, 300–350 × 250–280 µm, black, entirely hairy, maturing 8–9 wk after inoculation; neck black, short cylindrical, 40–60 × 50–70 µm; hairs brown, setose, straight, 10–65 × 2–2.5 µm, unbranched, septate, smooth, tapering and paling to a pointed tip; peridium ca. 12.5 µm thick, dark brown and opaque, distinctly cephalothecoid, multi-layered; outer layer composed of textura prismatica, thick-walled cells; inner layer of textura angularis, hyaline to pale brown, thin-walled, angular

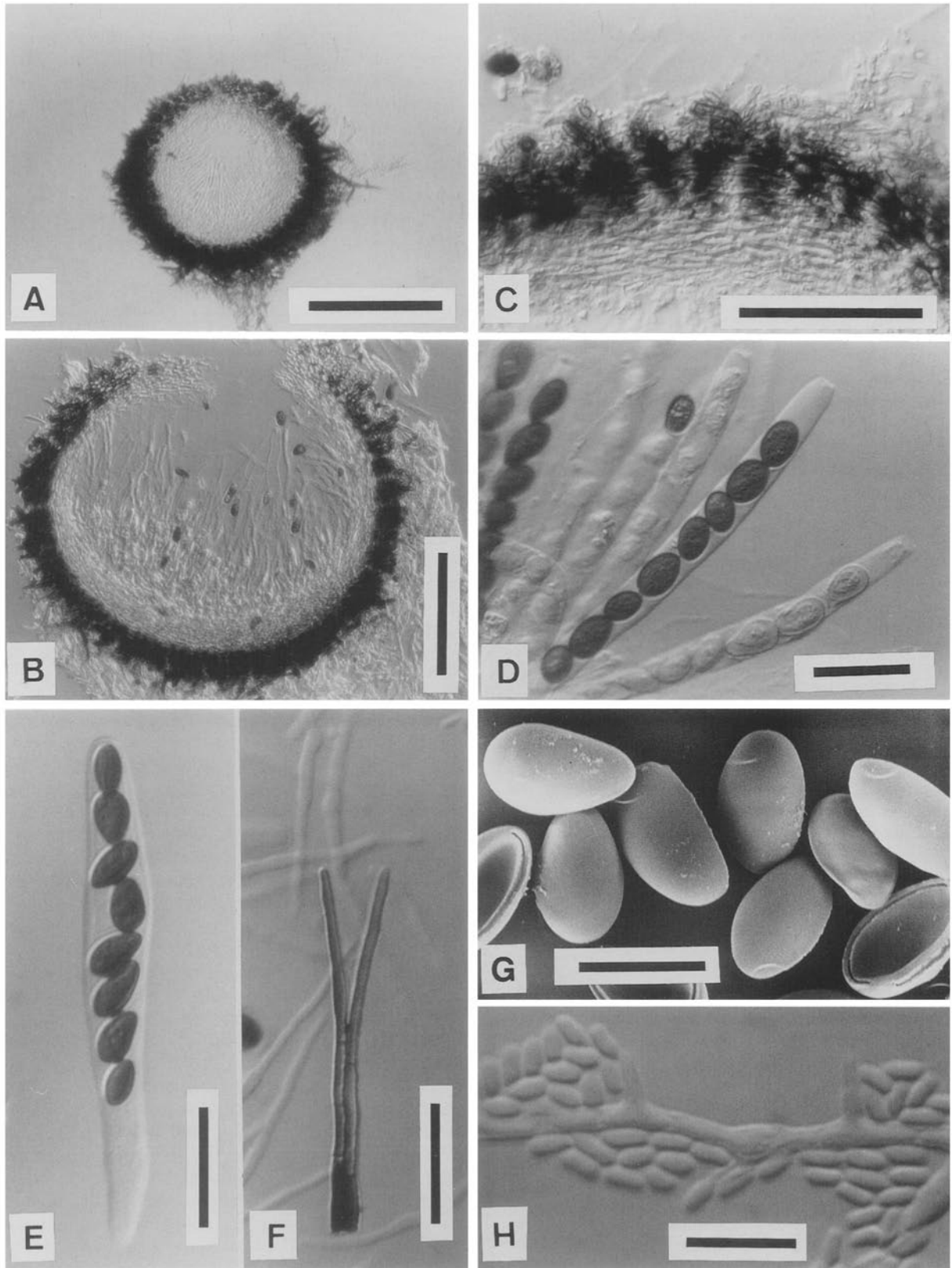


Fig. 2. *Coniochaeta cephalothecoides*, BF 35344.
 A, B. Section through a mature ascoma. C. Section through lateral ascomatal wall. D, E. Asci. F. Ascumatal setae. G. Ascospores (SEM). H. Conidiogenous cells and conidia.
 Scale bars: A = 200 μm ; B = 100 μm ; C = 50 μm ; D–F = 20 μm ; G, H = 10 μm .

cells measuring 5–12.5 × 5–10 μm . Asci 8-spored, cylindrical, 75–100 × 7.5–12.5 μm , rounded or truncated above, with a small apical ring (ca. 1.5–2 μm in diam), non-amyloid in Meltzer's reagent, with a short stipe measuring 17.5–38 μm long; paraphyses hyaline, filiform, septate, simple, 2.5 μm in diam. Ascospores arranged obliquely uniseriately, hyaline to yellowish brown when young, dark brown at maturity, variable in shape, ovoid to almond-shaped or pyriform, 8–13 × 5–7.5 × 4–5 μm , aseptate, smooth, provided with a longitudinal germ slit (in side view seen as a straight line running lengthwise); gelatinous sheath thin.

Anamorph: *Lecythophora* sp.

Mycelium composed of hyaline, branched, septate, smooth-walled, 1.5–3 μm diam hyphae, often forming bundles. Conidiophores undifferentiated. Conidiogenous cells phialidic, terminal or lateral, borne on branched hyphae, hyaline, variable in shape, mostly ampulliform, sometimes ovoid or cylindrical, 5–15 × 2.5–3.5 μm , with a distinct collarette; reduced conidiogenous cells often present, borne as a small peg on the hyphae, 2–5 × 1–2 μm . Conidia hyaline, one-celled, ovoid to ellipsoidal or allantoid, 2.5–5 × 1–2 μm , smooth-walled, aggregated in slimy heads measuring 5–12.5 μm in diam.

At 37°C, growth is somewhat slower than at 25°C, and ascomatal production is nil.

Specimen examined: a dried culture isolated from cultivated soil, Okabe-cho, Oosato-gun, Saitama-ken, Japan, 2 Jan. 1992, BF 35344, holotype. The type specimen is deposited in the Natural History Museum and Institute, Chiba, Japan (CBM).

Coniochaeta cephalothecoides is quite distinct from all other species of the genus with the only exceptions of *C. areolaturubra* Checa, Barrasa et Moreno (Checa et al., 1988) and the following new species *C. dumosa*. In the three species, ascomata have a distinct cephalothecoid peridium characterized by the arrangement of peridial cells to form plate-like complexes (Malloch and Cain, 1970). *Coniochaeta cephalothecoides* differs from both in having ascospores that are variable from ovoid, almond-shaped to pyriform instead of uniformly ellipsoidal in shape.

Coniochaeta dumosa Kamiya, Uchiyama et Udagawa, sp. nov. Figs. 3, 4

Coloniae in "PCA" effusae, planae, tenues, ex mycelio vegetativo submerso constantes, cum hyphis aeriis limitatae, in areis submarginalibus ascomatibus nigris lente producentes; conidiogenesis conspicua, alba vel aurantio-alba vel aliquantum roseo-bubalina; reversum incoloratum.

Ascomata dispersa, semiimmersa vel superficialia, ostiolata, subglobosa vel ovoidea vel pyriformia, 360–480 × 300–400 μm , nigra, dense pilosa; collum nigrum, breve, papillatum vel late conicum, (35–)80–95 × (60–)120–130 μm ; setae nigrae, rectae, 16–40 × 2–2.5 μm , simplices, leves, gradatim attenuatae; pili hypharum hyalini vel dilute brunnei, flexuosi, usque 140–160 μm longi, 2–3 μm diam, septati, leves; peridium 25–30 μm crassum, atro-brunneum, cephalothecoideum, multi-stra-

tum, ex "textura intricata" et "textura angularis" compositum. Asci 8-sporei, cylindracei, 90–100 × 6–8 μm , annulo apicali parvo praediti, cum iodo non reagentes, brevi-stipitati; paraphyses filiformes, septatae, simplices. Ascosporae oblique uniseriatim ordinatae, valde olivaceo-brunneae, ellipsoideae vel fusiformes, (13–)14–16(–17.5) × 3.5–5 μm , utroque apiculatae, leves, cum fissura germinali longitudinali praeditae; vagina gelatinosa tenuis. Status anamorphus: *Lecythophora* sp.

Holotypus: BF 42889, colonia exsiccata in cultura ex solo sylvae, Kochi, in Japonia, 4.iii.1993, a S. Uchiyama et S. Kamiya isolata et ea collectione fungorum, Musei et Instituti Historiae Naturalis Chiba (CBM) conservata.

Etymology: Latin *dumosus*=bushy, referring to its hairy ascomata.

Anamorph: *Lecythophora* sp.

Mycelium ex hyphis hyalinis, ramosis, septatis, levibus, 1.5–3 μm diam, saepe fasciculatis compositum. Conidiophora indistincta. Cellulae conidiogenerae (phialides) hyalinae, cylindraceae, plerumque 7.5–30 μm longae, 1.5–2 μm diam, saepe deminutae. Conidia hyalina, ellipsoidea vel allantoida, 2.5–6.5 × 1.5–2.5 μm , levia, in capitulis mucidis connexa. Status teleomorphus: *Coniochaeta dumosa* Kamiya, Uchiyama et Udagawa.

Holotypus: BF 42889, loc. cit.

Colonies on PCA growing rapidly, attaining a diameter of 65 mm or more in 21 days at 25°C, plane, thin, consisting of a submerged vegetative mycelium, with limited development of aerial hyphae; black ascomata slowly produced in the submarginal areas; conidiogenesis abundant, white to Orange White (M. 6A2) or somewhat Rosy Buff (R); reverse uncolored. Colonies on OA growing rapidly as on PCA, plane, thin, consisting of a spreading, submerged vegetative mycelium, producing black ascomata in clusters in the submarginal areas; conidiogenesis conspicuous, Pale Orange (M. 6A3) or Salmon (R); reverse Pale Orange (M. 5A3) or Salmon (R).

Ascomata scattered, semiimmersed to superficial, ostiolate, subglobose to ovoid or pyriform, 360–480 × 300–400 μm , black, densely clothed by setae and hyphal hairs, maturing 4–5 wk after inoculation; neck black, short, papillate to broadly conical, (35–)80–95 × (60–)120–130 μm ; setae black, straight, 16–40 × 2–2.5 μm , unbranched, septate, smooth, gradually tapering to a rounded tip; hyphal hairs hyaline to pale brown, flexuous, up to 140–160 μm long and 2–3 μm in diam, septate, smooth, often forming bundles; peridium 25–30 μm thick, dark brown and opaque, multi-layered; outer surface composed of textura intricata with a loosely interwoven network of hyphae, middle layer cephalothecoid, of elongate, thick-walled cells, and inner layer of textura angularis, hyaline, thin-walled, 10–15 μm diam flatten cells. Asci 8-spored, cylindrical, 90–100 × 6–8 μm , truncate above, with a small apical ring, non-amyloid in Meltzer's reagent, with a short stipe measuring up to 24 μm long; paraphyses hyaline, filiform, septate, simple, 2.5–4 μm in diam. Ascospores arranged obliquely uniseriately, hyaline when young, dark olivaceous brown at maturity, ellipsoidal to fusiform, (13–)14–16(–17.5) × 3.5–5 μm , apiculate at the ends, aseptate,

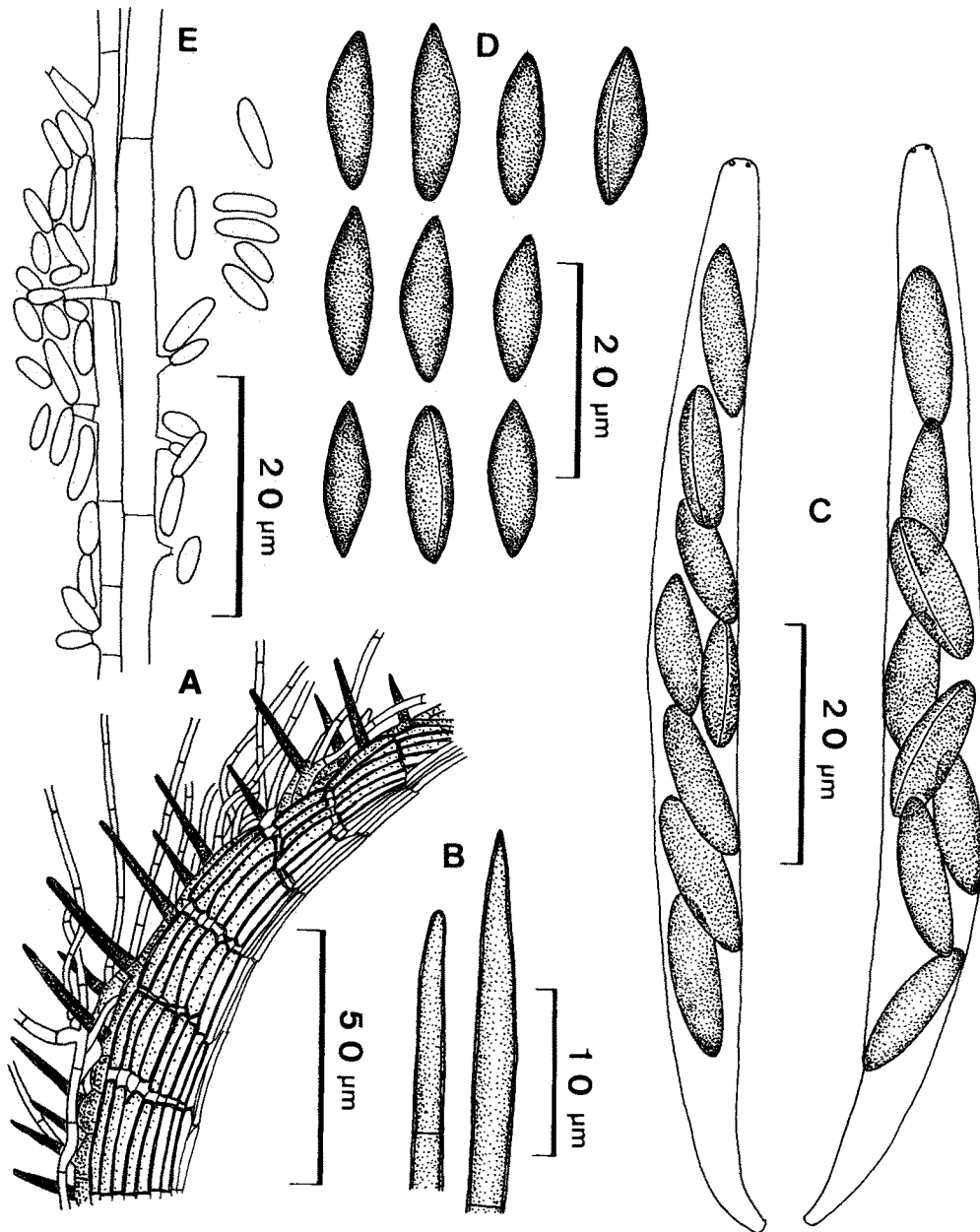


Fig. 3. *Coniochaeta dumosa*, BF 42889.

A. Part of lateral ascomatal wall. B. ascomatal setae. C. Asci. D. Ascospores. E. Conidiogenous cells and conidia.

smooth, provided with a distinct longitudinal germ slit; gelatinous sheath thin.

Anamorph: *Lecythophora* sp.

Mycelium composed of hyaline, branched, septate, smooth-walled, 1.5–3 µm diam hyphae, often forming bundles. Conidiophores undifferentiated. Conidiogenous cells phialidic, either single on short lateral branches or often in clusters as reduced protrusions along the hyphae, hyaline, cylindrical, mostly 7.5–30 µm long, 1.5–2 µm wide, or wedge-shaped, 1.5–5 × 1–2 µm, with a distinct collarette. Conidia hyaline, one-celled, ellipsoidal to allantoid, 2.5–6.5 × 1.5–2.5 µm, smooth-

walled, aggregated in slimy heads measuring 7.5–10 µm in diam.

At 37°C, growth-rate is slightly less than at 25°C, and ascomatal production is nil.

Specimen examined: a dried culture isolated from forest soil, Tosashimizu-shi, Kochi-ken, Japan, 4 March 1993, BF 42889, holotype. The type specimen is deposited in the Natural History Museum and Institute, Chiba, Japan (CBM).

Coniochaeta dumosa becomes the third species of the genus known to produce ascomata with a cephalothecoid peridium. The cephalothecoid nature of

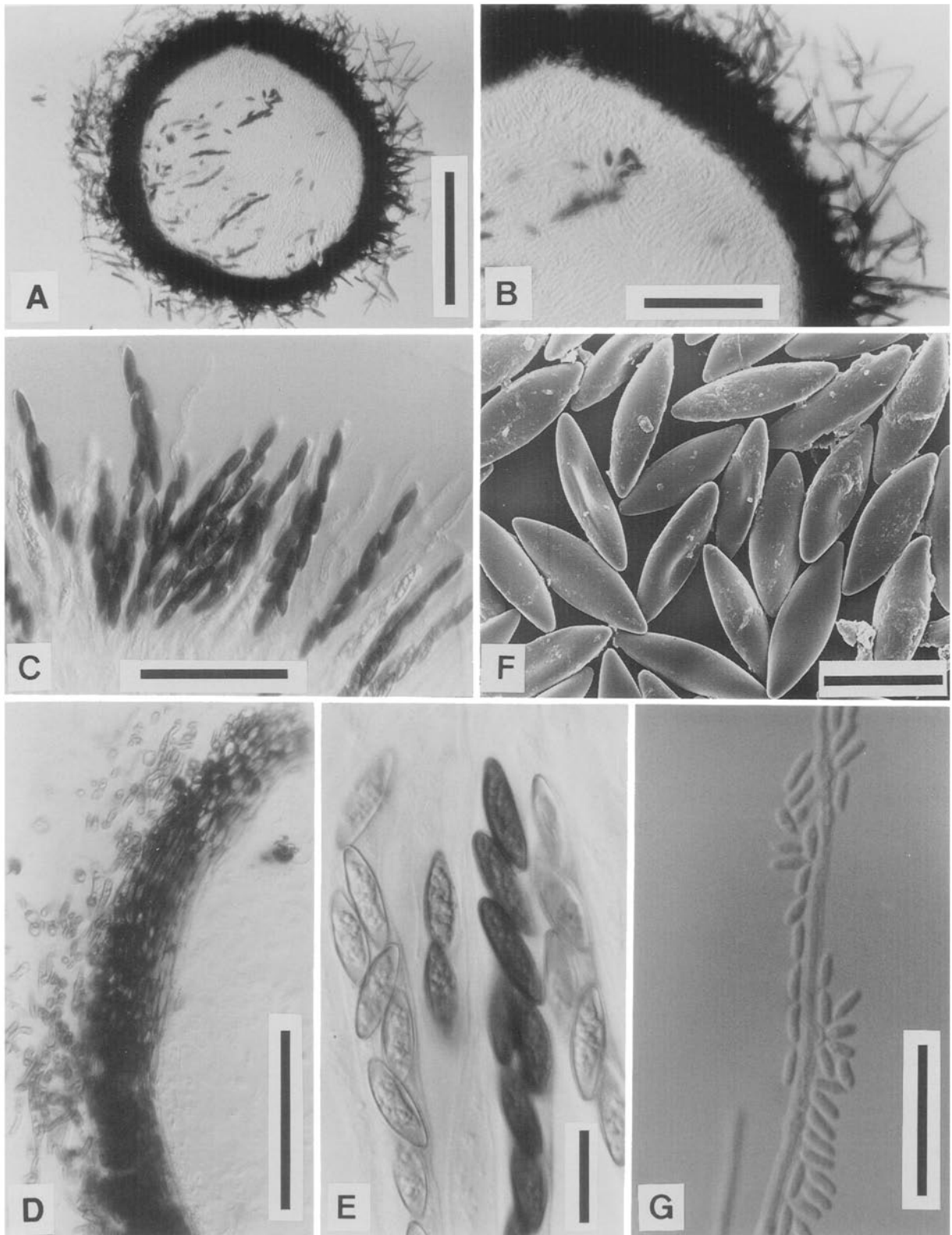


Fig. 4. *Coniochaeta dumosa*, BF 42889.

A. Section through a mature ascoma. B. Peridial part with setae and hairs. C. Asci. D. Section through lateral ascomatal wall. E. Young ascospores in the asci. F. Ascospores (SEM). G. Conidiogenous cells and conidia.
 Scale bars: A=200 μm ; B=100 μm ; C, D=50 μm ; E, F=10 μm ; G=20 μm .

the peridium of this species is rather indistinct in surface view, because the ascomatal peridium is densely covered with long hyphal hairs as its outermost layer. *Coniochaeta areolatirubra* (Checa et al., 1988) differs from this species in having ascomata with a reddish brown peridium, only one type of ascomatal hair, long asci, and ellipsoidal ascospores with rounded ends, and in lacking an anamorph. Also, ascospores of *C. areolatirubra* measure $10-13 \times 6-7 \times 5-6 \mu\text{m}$ as compared with $(13-14-16(-17.5) \times 3.5-5 \mu\text{m})$ in this species.

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