

Two new species of pyrenomycetous Ascomycetes from New Caledonia*

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Two new species of Pyrenomycetes from forest soil in New Caledonia, *Anthostomella pacifica* and *Chaetomium novae-caledonicum*, are described and illustrated. *Anthostomella pacifica* is characterized by non-ostiolate ascomata, cylindrical asci with an amyloid apical apparatus, and two-celled ascospores (dark apical cylindrical and hyaline basal dwarfed cells) with longitudinal germ slits. *Chaetomium novae-caledonicum* is characterized by ostiolate ascomata, straight terminal hairs, arcuate lateral hairs with a recurved tip, and very small, ovoid-flattened ascospores.

Key Words—*Anthostomella pacifica*; *Chaetomium novae-caledonicum*; New Caledonia; Pyrenomycetes; soil-borne fungi.

Various dematiaceous hyphomycetes have recently received attention with respect to their tropical distribution in New Caledonia (Mouchacca, 1990a, b; Mouchacca and Zucconi, 1994). We have also reported *Ascotricha novae-caledoniae* Udagawa, Uchiyama et Kamiya, a remarkable ascomycete of the family Xylariaceae collected from New Caledonian soil (Udagawa et al., 1994b).

In the course of exploratory survey of soil-borne ascomycetes as producers of secondary metabolites useful to the pharmaceutical industry, two interesting pyrenomycetous fungi were further isolated from soil samples of New Caledonia. These are based on collections taken by the Cryptogamic Expedition Party of the National Science Museum, Tokyo (TNS), during the period 3–23 June 1993. On account of their distinctive characteristics, these ascomycetes represent new species of *Anthostomella* (Xylariaceae) and *Chaetomium* (Chaetomiaceae) as described below.

Anthostomella pacifica Udagawa, Uchiyama et Kamiya, sp. nov. Figs. 1, 2

Coloniae in agar cum decocto tuberorum et carotarum (PCA) effusae, floccosae, planae, ex mycelio basali coacto tenuiter constantes, ascomatibus nigris abundantibus formantes, cum hyphis aeriis albis obiectae; reversum flavo-album vel bubalinum. Coloniae in agar cum decocto tuberorum (PDA) effusae, floccosae, planae, ex mycelio basali coacto tenuiter constantes, ascomatibus abundantibus formantes, flavo-albae vel paulo bubalinae; reversum incoloratum vel flavo-album vel bubalinum.

Coloniae in agar cellulosa effusae, plus minusve floccosae, tenues, ex mycelio vegetativo submerso constantes, ascomatibus abundantibus formantes, brunneo-aurantiacae vel bubalinae; reversum incoloratum vel aurantiogriseum vel bubalinum.

Stromata non visa. Ascomata superficialia vel immersa, dispersa, atro-brunnea vel fere nigra, non ostiolata, globosa vel subglobosa, 150–350 μm diam, cum hyphis rectis vel flexuosis dense obiecta; peridium brunneum, tenue, 7.5–12.5 μm crassum, membranaceum, "textura epidermoidea" et "textura angularis." Asci irregulariter dispositi, saepe contorti, 8-sporei, cylindracei, 100–120 \times 5–6.5 μm , superne rotundati, inferne brevistipitati; annuli apicali obturamentiformes, 3–5 \times 2.5–4 μm , in solutionibus Melzeri caerulei. Paraphyses hyalinae, filiformes, septatae, 2–4 μm diam, mox evanescentes. Ascosporeae uniseriatae, primum unicellulares, hyalinae, ellipsoideae, deinde inferne uniseptatae; cellula superior olivaceo-brunnea vel brunnea, incrasata, levis, ovoidea vel aliquanto cylindracea, 8–12 \times 4–5 μm , utrinque plus minusve truncata, cum fissura germinali longitudinali praedita; cellula inferior saepe pumila, hyalina, tenuis, triangularis, 1–2.5 \times 2–3 μm ; vagina gelatina tenuis. Anamorphosis abest.

Holotypus BF 44319, colonia exsiccata in cultura ex solo silvae, prope Tao, Prov. Nord, in Nova Caledonia, 12.vi.1993, a S. Uchiyama et S. Kamiya isolata et ea collectione fungorum, Musei et Instituti Historiae Naturalis Chiba (CBM) conservata. Isotypus: TNS.

Etymology: Latinized from the name Pacific, referring to the region of the type locality.

Colonies on PCA growing rapidly, attaining a diameter of 65 mm or more in 21 days at 25°C, floccose, plane, consisting of a thin mycelial felt, producing abun-

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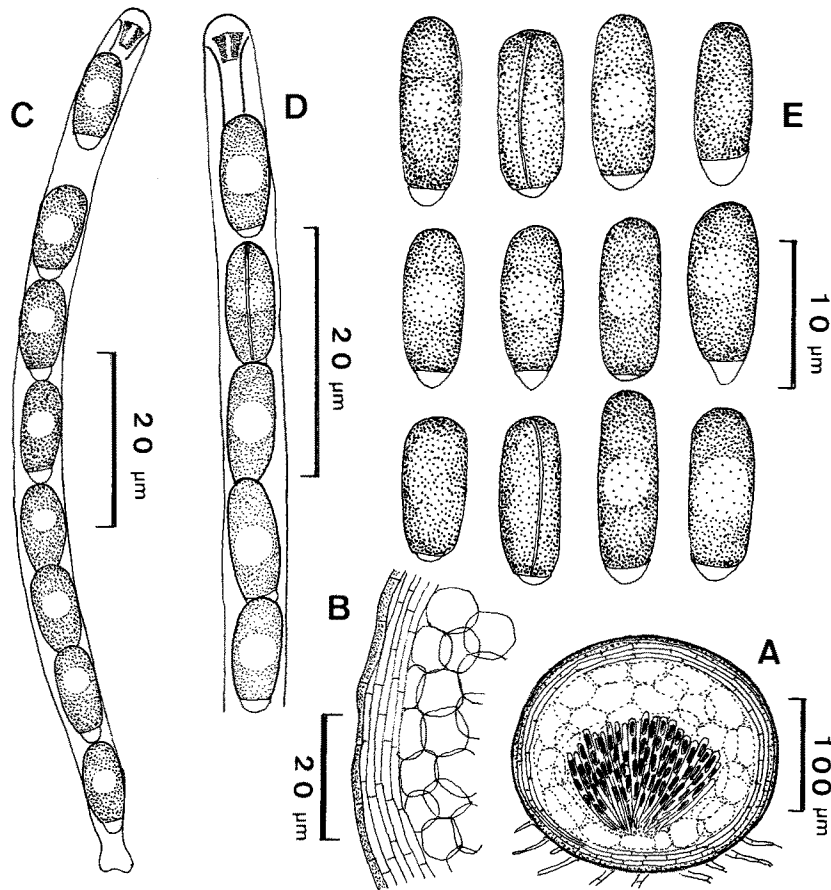


Fig. 1. *Anthostomella pacifica*, BF 44319.

A. Ascoma. B. Cross section of ascomatal peridium. C. Ascus. D. Upper part of an ascus with apical apparatus. E. Ascospores.

dant ascomata on the agar surface or into the substratum as black dots, overgrown by a loose network of white aerial hyphae; reverse Yellowish White (M. 4A2, after Kornerup and Wanscher, 1978) or Buff (Rayner, 1970). Colonies on PDA-Half strength growing rapidly, floccose, plane, consisting of a thin mycelial felt; ascomata produced as above, Yellowish White (M. 4A2) or slightly Buff (R); odor musty; reverse uncolored to Yellowish White (M. 4A2) or Buff (R). Colonies on cellulose agar (Udagawa, 1960) growing rapidly, attaining a diameter of 50–55 mm in 21 days at 25°C, more or less floccose, thin, vegetative mycelium submerged, producing abundant ascomata as on PCA, with limited development of aerial hyphae, Brownish Orange (M. 5C3) or Buff (R); reverse uncolored to Orange Grey (M. 5B2) or Buff (R).

Ascomata non-stromatic, superficial or often immersed, scattered, dark brown to nearly black, non-ostiolate, globose to subglobose, 150–350 µm in diam, densely covered by straight or flexuous, hyaline, branched, septate, smooth-walled, 1–1.5 µm wide hyphal coverings; peridium brown, thin, 7.5–12.5 µm thick, membranaceous, of textura epidermoidea and textura angularis; outer layer consisting of brown, irregular to somewhat angular, thick-walled cells measuring 6–10 × 3–5 µm; inner layer of hyaline, thin-walled, flattened cells.

Asci irregularly disposed in the cavity, often contorted, 8-spored, cylindrical, 100–120 × 5–6.5 µm, rounded above, below with a short stalk measuring 18–30 µm long; apical apparatus amyloid, stopper-shaped, 3–5 × 2.5–4 µm; paraphyses hyaline, filiform, septate, 2–4 µm wide, early evanescent. Ascospores uniseriately arranged, at first one-celled, hyaline and ellipsoidal, becoming uniseptate in lower portion; upper cell olive-brown to brown, thickened, smooth-walled, ovoid to somewhat cylindrical, 8–12 × 4–5 µm, with more or less truncated ends, provided with a longitudinal germ slit measuring 7–9 µm long; lower cell often dwarfed, hyaline, thin-walled, triangular, 1–2.5 × 2–3 µm; whole spore surrounded by a thin gelatinous sheath. Anamorph not observed.

At 37°C, growth is nil.

Specimen examined: BF 44319 (holotype), in dried culture isolated from forest soil, near Tao, Prov. Nord, New Caledonia, 12 June 1993. The holotype has been deposited with the Natural History Museum and Institute, Chiba, Japan (CBM). Isotype: TNS.

When Francis (1975) monographed European species of the genus *Anthostomella* Sacc. occurring on Angiosperms and Gymnosperms, she showed the genus to be characterized by the following features: ascomata

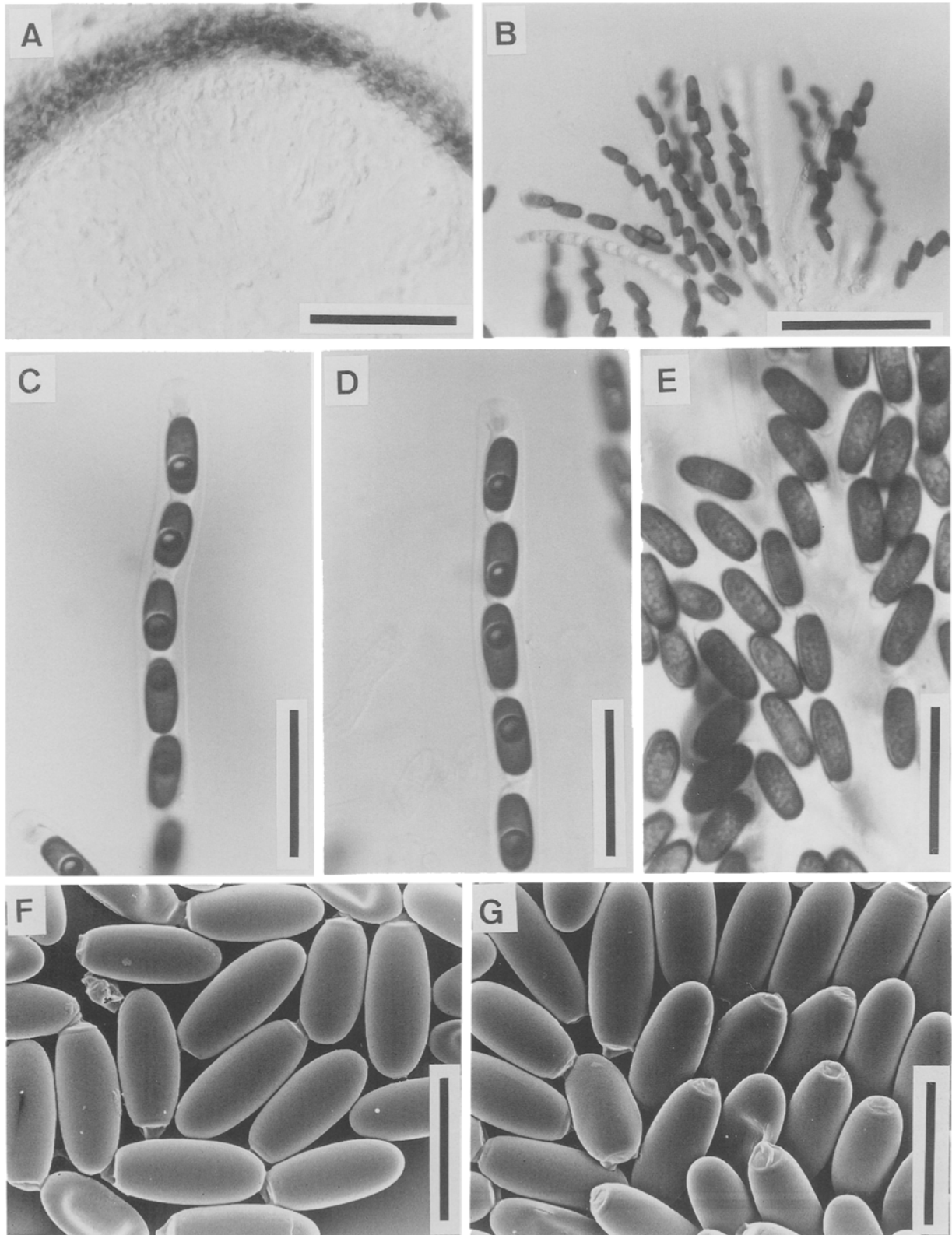


Fig. 2. *Anthostomella pacifica*, BF44319.

A. Cross section of ascomatal peridium. B. Asci. C, D. Upper parts of asci with apical apparatus. E. Ascospores. F, G. Ascospores (SEM). Scale bars: A, B=50 μm ; C-E=20 μm ; F, G=10 μm .

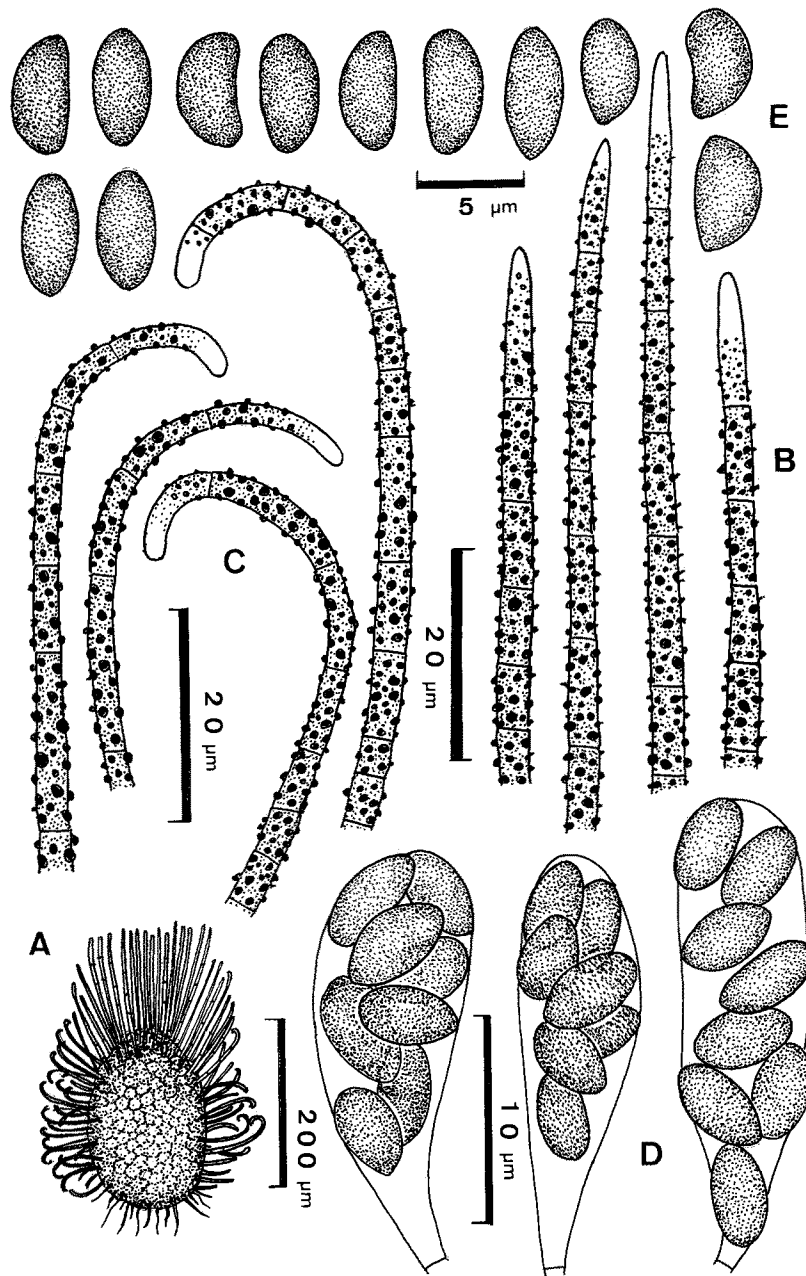


Fig. 3. *Chaetomium novae-caledonicum*, BF 47541.

A. Ascoma. B. Terminal hairs. C. Lateral hairs. D. Asci. E. Ascospores.

separate, immersed, brown, papillate and usually clypeate; asci unitunicate, cylindrical, the apex rounded and equipped with an amyloid apical apparatus, the base tapered to a short stalk; ascospores uniseriate, brown, one-celled or two-celled with a large brown cell and a small hyaline dwarfed cell, ellipsoidal with both sides equal or unequal and laterally compressed in some species, with a longitudinal germ slit. The anamorphs of *Anthostomella* species are *Nodulisporium* Preuss or *Virgariella* Hughes (Martin, 1969; Francis et al., 1980).

The most distinctive characters of the new species are the cylindrical asci with an amyloid apical apparatus

in shape of a cube and two-celled ascospores (dark apical cylindrical and hyaline basal dwarfed cells) with a longitudinal germ slit. Although the ascomata are cleistothecoid and without distinct development of darkened clypei, other characters led us to place it in the genus *Anthostomella*. So far as we are aware, the production of cleistothecoid ascomata has hitherto been not reported for *Anthostomella* (Martin, 1969; Francis, 1975; Francis et al., 1980; Yip, 1989). In pyrenomycetous ascomycetes, the cleistothecoid type of ascomata is considered as the result of a progressive evolution away from dispersal of ascospores by means of air currents im-

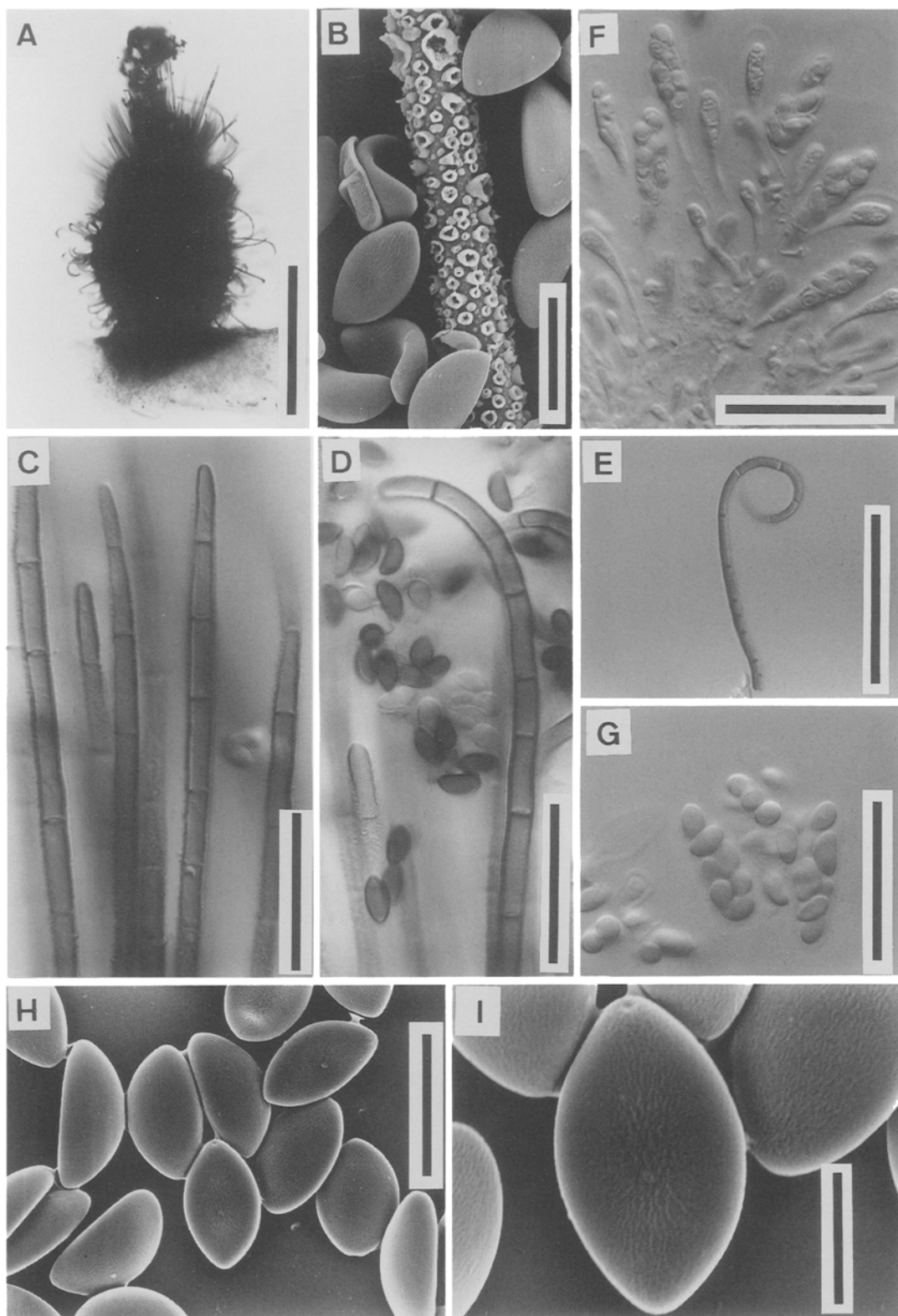


Fig. 4. *Chaetomium novae-caledonicum*, BF 47541.

A. Ascoma. B. Ornamentation on terminal hair (SEM). C. Terminal hairs. D, E. Lateral hairs. F, G. Asci. H. Ascospores (SEM). I. Ascospore, showing the apical germ pore (SEM). Scale bars: A=200 μm ; B=5 μm ; C, D=20 μm ; E=50 μm ; F, G=20 μm ; H=5 μm ; I=2 μm .

mediately following their production (Cain, 1956, 1972). Several examples are well known for the soil-borne species in the Ceratostomataceae, Chaetomiaceae, Lasiosphaeriaceae, Microascaceae and Sordariaceae. In the Xylariaceae, we recently reported that such morphological adaptations were observed on two new species of *Ascotricha* with non-ostiolate ascomata (Udagawa et al., 1994a, b). The progressive convergence in the ascomatal characters of *Anthostomella pacifica* is also considered to be an adaptation to its terrestrial habitat analogous to those in other cleistothecial ascomycetes.

Despite the difference shown by the ascomata, *A. pacifica* is also characterized by its small, equilateral, cylindrical ascospores.

Chaetomium novae-caledonicum Udagawa, Uchiyama et Kamiya, sp. nov. Figs. 3, 4

Coloniae in agar farinae avenaceae mixto effusae, tenues, ex mycelio vegetativo submerso constantes, ascomatibus numerosis formantes, obscuro-virentes vel viridi-griseae; reversum flavum vel bubalinum.

Ascomata superficialia, dispersa, valde griseo-viridia vel fere nigra, ostiolata, elongato-ovoidea, $200\text{--}250 \times (130\text{--})160\text{--}200 \mu\text{m}$, tarde maturescentia; peridium atrobrunneum, tenue, membranaceum, "textura epidermoidea" et "textura angularis;" pili terminales valde olivaceo-brunnei, recti vel aliquanto arcuati, simplices, $150\text{--}300 \times 3\text{--}3.5 \mu\text{m}$, incrassati, conspicue asperati, septati, apice gradatim angustati et pallescentes; pili laterales valde olivaceo-brunnei, inferne recti, arcuati, apice frequenter recurvati, $100\text{--}150 \times 2.5\text{--}3.5 \mu\text{m}$, simplices, conspicue asperati, septati. Asci 8-sporei, clavati, $20\text{--}28 \times 4\text{--}5.5\text{--}(7.5) \mu\text{m}$, brevi-stipitati, evanescentes. Ascosporeae biseriatae, valde olivaceo-brunneae, ovoideae, a latere visus reniformes vel lunatae, $(4\text{--})5\text{--}6.5 \times 2.5\text{--}3 \times (2\text{--})2.5\text{--}3 \mu\text{m}$, utrinque subapiculatae, leves, cum poro germinali apicali praeditae. Anamorphosis abest.

Holotypus BF 47541, colonia exsiccata in cultura ex solo silvae, Noumea-Yaté, Prov. Sud, in Nova Caledonia, 21.vi.1993, a S. Uchiyama et S. Kamiya isolata et ea collectione fungorum, Musei et Instituti Historiae Naturalis Chiba (CBM) conservata. Isotypus: TNS.

Etymology: Latinized from the name New Caledonia, referring to the country of the type locality.

Colonies on oatmeal agar growing rapidly, attaining a diameter of 42–46 mm in 28 days at 25°C, thin, vegetative mycelium submerged, producing numerous ascomata in an uneven layer at the agar surface to give a granular appearance, overgrown by a loose network of aerial hyphae, Dull Green to Greenish Grey (M. 28E3–27E2; R); no exudate produced; odor lacking; reverse Greenish Yellow (M. 4B3) or Buff (R).

Ascomata superficial, scattered, dark grayish green to nearly black, ostiolate, elongate-ovoid, $200\text{--}250 \times (130\text{--})160\text{--}200 \mu\text{m}$, firmly attached by dark brown rhizoids, maturing within 28 days; peridium dark brown, thin, membranaceous, of textura epidermoidea to textura angularis; outer layer consisting of irregular,

thick-walled cells; inner layer of angular, thin-walled cells measuring $6.5\text{--}12 \times 5.5\text{--}12 \mu\text{m}$. Terminal hairs dark olive-brown, straight or slightly curved, unbranched, $150\text{--}300 \times 3\text{--}3.5 \mu\text{m}$, thick-walled, coarsely roughened, regularly septate, gradually tapering and paling to a somewhat pointed tip, forming a dense tuft around the ascomatal ostiole. Lateral hairs dark olive-brown, straight and arcuate below, apically often recurved, unbranched, $100\text{--}150 \times 2.5\text{--}3.5 \mu\text{m}$, coarsely roughened, regularly septate, with a rounded tip. Asci 8-spored, clavate, $20\text{--}28 \times 4\text{--}5.5\text{--}(7.5) \mu\text{m}$ (p.sp. 16–22 μm long), short-stipitate, evanescent. Ascospores biserially arranged, dark olive-brown, ovoid in face view, reniform or lunate in lateral view, $(4\text{--})5\text{--}6.5 \times 2.5\text{--}3 \times (2\text{--})2.5\text{--}3 \mu\text{m}$, with subapiculate ends, smooth-walled, provided with an apical germ pore. Anamorph not observed.

At 37°C, growth is nil.

Specimen examined: BF 47541 (holotype), in dried culture isolated from forest soil, between Noumea and Yaté, Prov. Sud, New Caledonia, 21 June 1993, by S. Uchiyama and S. Kamiya. The holotype has been deposited with the Natural History Museum and Institute, Chiba, Japan (CBM). Isotype: TNS.

Chaetomium novae-caledonicum is a very distinctive species, and unlikely to be confused with other species in the genus (von Arx et al., 1986). It has two unusual features: (1) very small, ovoid-flattened ascospores, and (2) the arcuate lateral hairs with a recurved tip but almost straight terminal hairs. *Chaetomium aureum* Chivers is probably related to the new species but the former has large ascospores ($9\text{--}12 \times 5\text{--}7 \mu\text{m}$), arcuate to apically circinate or coiled terminal hairs and straight lateral hairs (Udagawa, 1960; Ames, 1963; Seth, 1972; Dreyfuss, 1976; von Arx et al., 1986).

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