IMI Descriptions of Fungi and Bacteria

Contents of Set 116 **1993**

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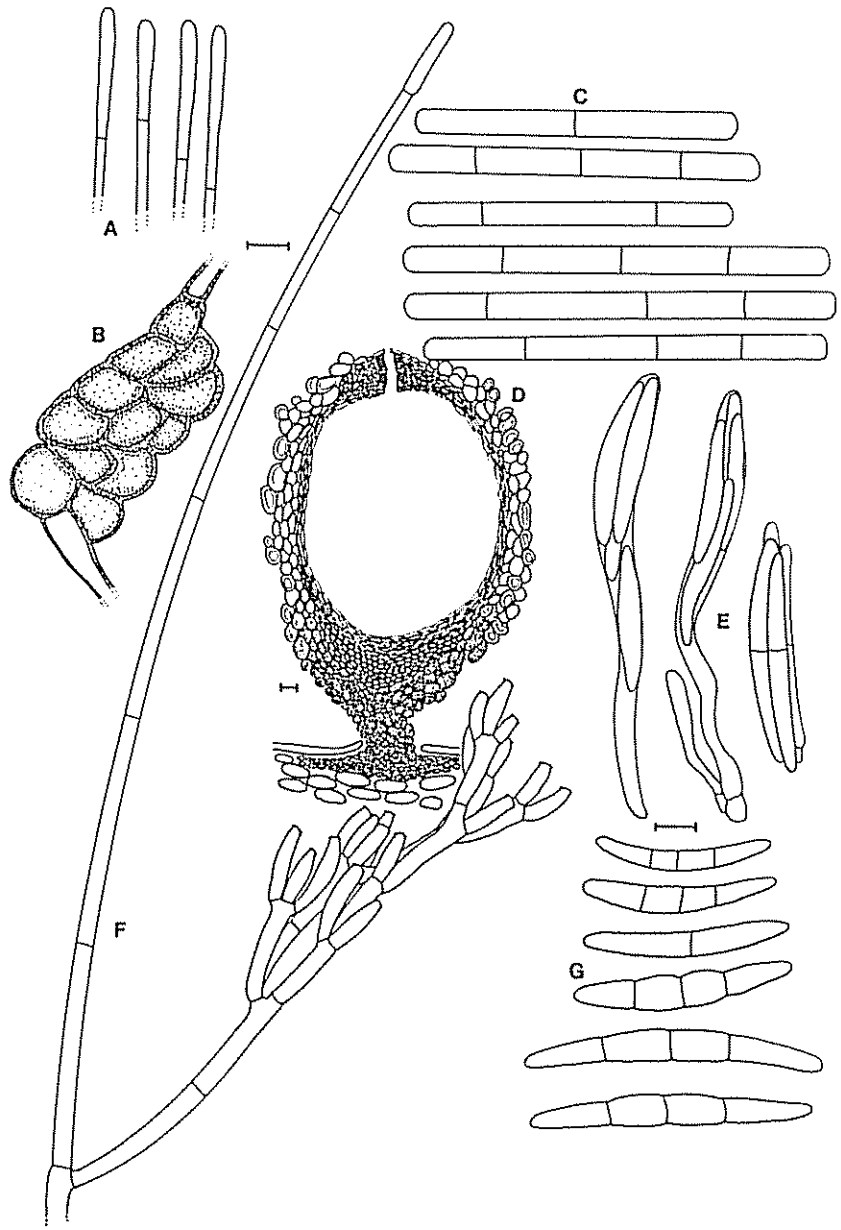
IMI DESCRIPTIONS OF FUNGI AND BACTERIA

The object of this series (formerly *CMI Descriptions of Pathogenic Fungi and Bacteria*, Sets 1–100 and *CMI Descriptions of Fungi and Bacteria*, Sets 101–102) is to provide, in convenient form, standardized, usually illustrated, descriptions of pathogens for use by plant pathologists and veterinary and medical mycologists. Besides a detailed description of the species, information is included on such subjects as the disease caused by the organism, its geographical distribution, physiologic specialization, transmission etc. Fungi of importance to other applied fields like biocontrol of insects and weeds, biodeterioration, biotechnology, industrial mycology etc. are also covered. References to key literature are also given. The information provided is based, wherever possible, on the *IMI Distribution Maps of Plant Diseases*, *the Review of Plant Pathology* (formerly *Review of Applied Mycology*) and the *Review of Medical and Veterinary Mycology*. The descriptions are published in sets of 10, four sets being issued each year.

Mycopathologia **122**: 45–46, 1993.

IMI Descriptions of Fungi and Bacteria No. 1151

CALONECTRIA COLHOUNII var. MACROCONIDIALIS



A. vesicles; B. chlamydospores; C. conidia formed on carnation leaf agar (bar = 10 μm); D. v.s. through a perithecium (bar = 20 μm); E. asci and ascospores; F. conidiophore; G. ascospores (bar = 10 μm).

Calonectria colhounii Peerally var. **macroconidialis** Crous, Wingfield & Alfenas, *Mycotaxon* **46**: 222, 1993.

Anamorph: *Cylindrocladium colhounii* Peerally var. *macroconidialis* Crous, Wingfield & Alfenas, *Mycotaxon* **46**: 222, 1993.

Perithecia globose to subglobose, 350–500 × 320–400 µm, with warty outer wall and papillate ostiole, yellow to orange, base and lower perithecial wall turning blood-red in 3% KOH. *Asci* hyaline, clavate, 80–180 × 15–30 µm, tapering to a long thin stalk, containing four ascospores. *Ascospores* hyaline, straight or curved, (1)-3-septate, slightly constricted at septa, (30)–51–(70) × (4)–5–(7.5) µm. *Conidiophore* filament septate, hyaline, terminating in a narrowly clavate vesicle, 3–5 µm diam.; stipes (240)–280–(320) µm long. *Conidiophore branches*: primary branches non-septate to 1-septate, (20)–30.5–(48) × (4)–4.5–(5) µm; secondary branches non-septate to rarely 1-septate, (20)–25–(30) × (4)–4.5–(5) µm; tertiary and quaternary branches non-septate, (18)–20–(30) × (4)–4.5–(5) µm. *Phialides* allantoid to cylindrical, hyaline, non-septate, (12)–20–(25) × (3.5)–4–(5) µm. *Conidia* cylindrical, straight, hyaline, (1)–3-septate, rounded at both ends, (86)–97–(112) × (5.5)–6.5–(8) µm. *Colony colour* after 6 d on 2% MEA (reverse) light brown. *Chlamydospores* in medium numbers, in coarse chains throughout the medium, forming microsclerotia. *Temperature requirements for growth*: minimum temp. above 8 °C; maximum temp. below 33 °C; optimum temp. 25 °C.

HOST: *Eucalyptus grandis* (Crous *et al.*, 1993a).

DISEASE: Leaf spot, root rot, wilt (Crous *et al.*, 1993b).

GEOGRAPHICAL DISTRIBUTION: South Africa (Crous *et al.*, 1993a, b).

PHYSIOLOGIC SPECIALIZATION: None reported.

TRANSMISSION: Splash dispersal in *Eucalyptus* cutting nurseries.

NOTES: *C. colhounii* var. *macroconidialis* was described as a new variety of *C. colhounii* to distinguish collections with larger conidia, longer stipes and cylindrical phialides from *C. colhounii* var. *colhounii* (Crous *et al.*, 1993a). The two varieties of *Cylindrocladium colhounii* belong to the only known *Calonectria* sp. characterized by yellow perithecia and four-spored asci. Isolates of the two varieties are morphologically similar in culture, having the same colony pigmentation and temperature requirements for growth. However, isolates of var. *macroconidialis* grow faster than those of var. *colhounii*. Whereas all isolates obtained of var. *colhounii* have been homothallic, no homothallic isolates have yet been found for var. *macroconidialis*. No single-conidial isolates studied have produced the *Calonectria* state in culture. Isolates were shown to be pathogenic to *Medicago truncatula* cv. Borung (alfalfa), *Glycine max* cv. Ibis (soybean), *Arachis hypogaea* cv. Sellie (peanut) and *Pisum sativum* cv. Novella (pea). However, pathogenicity could not be established on *Solanum tuberosum* cv. Vanderplank (potato) (Crous *et al.*, 1993b). Isolates were less pathogenic than those of *C. candelabrum* Viegas and *C. clavatum* Hodges & May on these hosts. Good control was achieved in *Eucalyptus* cutting nurseries using a benomyl (Benlate) drench.

LITERATURE: Crous, Wingfield & Alfenas, *Mycotaxon* **46**: 217–234, 1993a (description); Crous, Phillips & Wingfield, *Plant Pathology* **42**: in press, 1993b (pathogenicity).

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[Numbers in brackets, e.g. (**62**, 5055), refer to abstracts in the Review of Plant Pathology]

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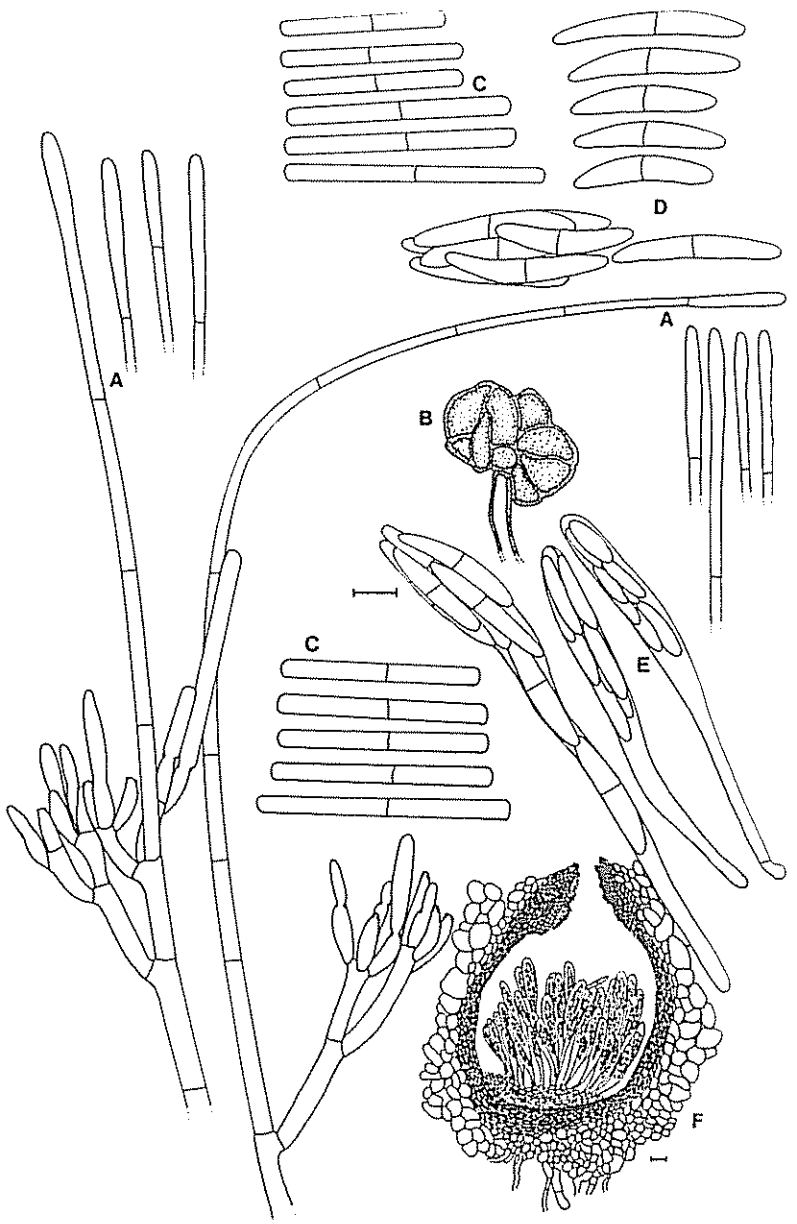
IMI Descriptions of Fungi and Bacteria No. 1152

CALONECTRIA GRACILIS



A. conidiophores and vesicles; B. chlamydospores; C. conidia; D. ascospores; E. asci (bar = 10 μm); F. v.s. through a perithecium (bar = 20 μm).

Calonectria gracilis Crous, Wingfield & Alfenas, *Mycotaxon* **46**: 224, 1993.

Anamorph: *Cylindrocladium gracile* (Bugnic.) Boesewinkel, *Transactions of the British Mycological Society* **78**: 554, 1982.

Cylindrocarpon gracile Bugnicourt, *Encyclopédie Mycologique* **11**: 162, 1939.

Perithecia superficial, borne singly or in small groups, globose to subglobose, 350–400 × 330–380 µm, with warty outer wall and papillate ostiole, red to red-brown, turning blood-red in 3% KOH. *Asci* hyaline, clavate, (75)–90–(100) × (8)–10–(15) µm, tapering to a long thin stalk, containing eight ascospores. *Ascospores* hyaline, straight or falcate, guttulate, 1-septate, not constricted at median septum, (27)–36.5–(50) × (4)–5–(6) µm. *Conidiophore* filament septate, hyaline, terminating in a narrowly clavate vesicle, (2.5)–3.5–(5) µm diam.; stipes (160)–220–(350) µm long. *Conidiophore branches*: primary branches non-septate or rarely 1-septate, (14)–18–(25) × (3.5)–4–(4.5) µm; secondary branches non-septate, (12)–14–(16) × (3.5)–4–(4.5) µm. *Phialides* doliiform to reniform, hyaline, non-septate, (10)–12.5–(15) × (3.5)–4–(4.5) µm. *Conidia* cylindrical, hyaline, 1-septate, rounded at both ends, (40)–56–(65) × (4)–4.5–(5) µm. *Colony colour* after 6 d on 2% MEA (reverse) light brown to linoleum brown. *Chlamydospores* abundant, densely scattered throughout medium, forming microsclerotia. *Temperature requirements for growth*: minimum temp. above 10 °C; maximum temp. above 35 °C; optimum temp. 30 °C.

HOSTS: *Argyreia splendens*, *Cocos nucifera*, *Eucalyptus* sp., *Malus sylvestris*, *Manilkara sapota*, *Medicago* sp., *Paludia cochinchinensis*, *Picea excelsa*, *Theobroma cacao*.

DISEASE: Root rot of *Eucalyptus*, crown and root rot of *Medicago* (**67**, 2994; **67**, 3493).

GEOGRAPHICAL DISTRIBUTION: Brazil, Canada, India, Malaysia, Vietnam.

PHYSIOLOGIC SPECIALIZATION: None reported.

TRANSMISSION: Probably wind and splash dispersed.

NOTES: Although this fungus is homothallic, not all isolates form the *Calonectria* teleomorph in culture. *Cylindrocladium gracile* is morphologically most similar to *C. clavatum* Hodges & May (IMI Description Sheet 422). It can, however, be distinguished from the latter by its larger conidia and longer stipes. Ascospores of *Calonectria gracilis* are fusoid, 1-septate, and similar in size to those of *C. kyotensis* Terashita, but smaller than those of *C. scoparia* Ribeiro & Matsuoka *ex* Peerally and *C. avesiculata* Schubert, El-Gholl, Alfieri & Schoulties. Although Peerally (1991) suggested that *C. brassicae* Panwar & Bohra was a synonym of *C. gracile*, the shorter stipes and conidia suggest that the former species should rather be placed in synonymy under *C. clavatum* Hodges & May.

LITERATURE: Boesewinkel, *Transactions of the British Mycological Society* **78**: 553–556, 1982 (comb. nov.); Booth, *Mycological Papers* **104**: 1–56, 1966; Bugnicourt, *Encyclopédie Mycologique* **11**: 1–206, 1939 (description); Crous, Wingfield & Alfenas, *Mycotaxon* **46**: 217–234, 1993 (description, teleomorph); Peerally, *Mycotaxon* **40**: 323–366, 1991.

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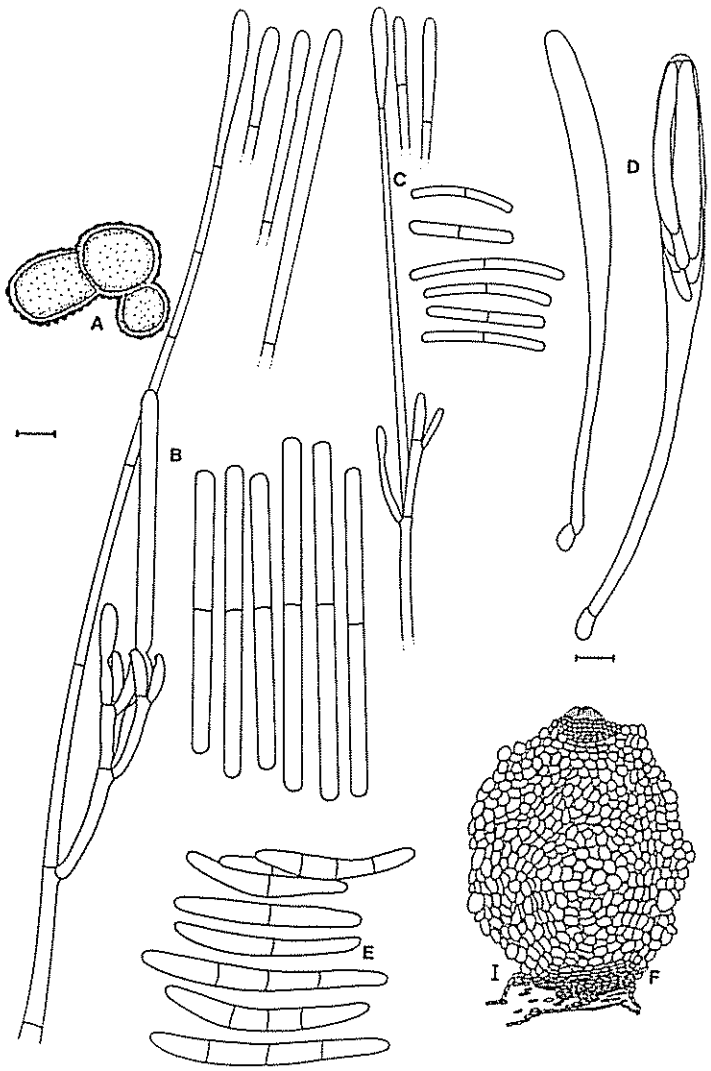
IMI Descriptions of Fungi and Bacteria No. 1153

CALONECTRIA PTERIDIS



A. chlamydospores; B. macroconidiophore, vesicles and conidia formed on carnation leaf agar (CLA) (bar = 10 μm); C. microconidiophore, vesicles and conidia on CLA; D. developing asci; E. ascospores (bar = 10 μm); F. perithecium (bar = 20 μm).

Calonectria pteridis Crous, Wingfield & Alfenas, *Mycotaxon* **46**: 228, 1993.

Anamorph: *Cylindrocladium pteridis* Wolf, *Journal of the Elisha Mitchell Scientific Society* **42**: 59, 1926. *Cylindrocladium macrosporum* Sherb., *Phytopathology* **18**: 222, 1928.

Perithecia superficial, borne singly or in small groups, globose to subglobose, 400–500 × 300–350 μm, with warty outer wall and papillate ostiole, red to red-brown, turning blood-red in 3% KOH. *Asci* hyaline, clavate, (100)–

120–(180) × (9)–15–(27) µm, tapering to a long thin stalk, containing 1–8 ascospores. Ascospores hyaline, straight or falcate, 1–(3)–septate, generally not constricted at septa, (30)–51.5–(75) × (4.5)–5.5–(7) µm. *Ascospores* with up to six septa when discharged from ascus. *Macroconidiophore* filament septate, hyaline, terminating in a clavate vesicle, (4)–4.5–(5.5) µm diam.; stipes (150)–240–(300) µm long. *Conidiophore branches*: primary branches non-septate or rarely 1-septate, (18)–28–(32) × (4)–4.5–(6) µm; secondary branches non-septate, (16)–20–(30) × (3.5)–4–(5.5) µm; tertiary branches non-septate, (14)–18–(22) × (3.5)–4–(4.5) µm. *Phialides* cylindrical, doliiform to reniform, hyaline, (12)–15.5–(22) × 4–(5) µm. *Macroconidia* cylindrical, hyaline, 1–(3)-septate, rounded at both ends, (62.5)–82–(121) × 5–(6) µm. *Microconidiophore* filament septate, hyaline, terminating in a clavate vesicle. *Conidiophore branches*, primary branches non-septate to rarely 1-septate, (20)–28–(50) × (3)–4.5–(5) µm; secondary branches non-septate to rarely 1-septate, (18)–20–(30) × (2.5)–3–(3.5) µm; tertiary branches non-septate, (16)–18–(23) × (2.5)–3 µm. *Phialides* arising at the ends of branches, in groups of 2–4; phialides cylindrical, hyaline, (10)–15–(21) × (2.5)–3–(3.5) µm, collarettes absent in some isolates, inconspicuous in others. *Microconidia* cylindrical, curved or straight, hyaline, 1-septate with obtuse ends, (19)–29.5–(40) × (2.5)–3.5–(4) µm. *Colony colour* after 6 d on 2% MEA (reverse) light to amber brown. *Chlamydospores* abundant, in dense clusters, forming large microsclerotia. *Temperature requirements for growth*: minimum temp. above 10 °C; maximum temp. above 35 °C; optimum temp. between 30–33 °C.

HOSTS: *Arachis hypogaea*, *Arachnoides adiantiformis* (**62**, 687; **63**, 4469), *Arecastrum romanzoffianum*, *Asparagus plumosus*, *Callistemon* spp., *Cedrella vulgaris*, *Chamadorea elegans*, *Cocos nucifera*, *Collinia elegans*, *Dryopteris*, *Eucalyptus* spp., *Heliconia bihai*, *Howea* spp., *Lupinus* spp., *Melaleuca leucadendron* (**48**, 609), *Pinus caribaea* var. *hondurensis*, *P. oocarpa*, *Rhododendron obtusum*, *Scolopendrium* sp., *Solanum tuberosum* (**61**, 4007), *Strelitzia reginae*, *Washingtonia robusta*.

DISEASE: Associated with leaf spots and root disease of various hosts. Leaf spot of oil palm on the Ivory Coast (**53**, 1502; **59**, 1835), of *Camellia sinensis* in Mauritius (**41**: 358; **53**, 1669), and needle blight of *Pinus caribaea* (**61**, 6624) have been reported.

GEOGRAPHICAL DISTRIBUTION: Africa, Australia, Brazil (**61**, 5172), India, Malaysia (**53**, 4211), Sabah, U.S.A. (Florida).

PHYSIOLOGIC SPECIALIZATION: None reported.

TRANSMISSION: Probably wind and splash dispersed.

NOTES: This species is heterothallic. Not all isolates produce the microconidial state, or pair in culture to produce the teleomorph. *C. pteridis* has the largest conidia of all 1-septate *Cylindrocladium* spp., frequently being longer than 100 µm. Furthermore, it is the only *Cylindrocladium* sp. that produces curved microconidia (Peerally, 1991). Soil sterilization and spraying seedlings with a Bordeaux mixture or thiram gives good control (**61**, 6624), while benomyl and chlorothalonil are also effective (**67**, 4689; 69, 2569).

LITERATURE: Crous, Wingfield & Alfenas, *Mycotaxon* **46**: 217–234, 1993 (description, teleomorph); Ferreira, *Patologia Florestal: Principais Doenas Florestais No Brasil*, Viçosa, MG, Brasil, 1989 (life cycle); Peerally, *Mycotaxon* **40**: 323–366, 1991; Sobers, *Phytopathology* **58**: 1265–1270, 1968 (morphology, synonomy); Sobers & Alfieri, *Proceedings of the Florida State Horticultural Society* **85**: 366–369, 1972; Wolf, *Journal of the Elisha Mitchell Scientific Society* **42**: 55–62, 1926 (description, anamorph).

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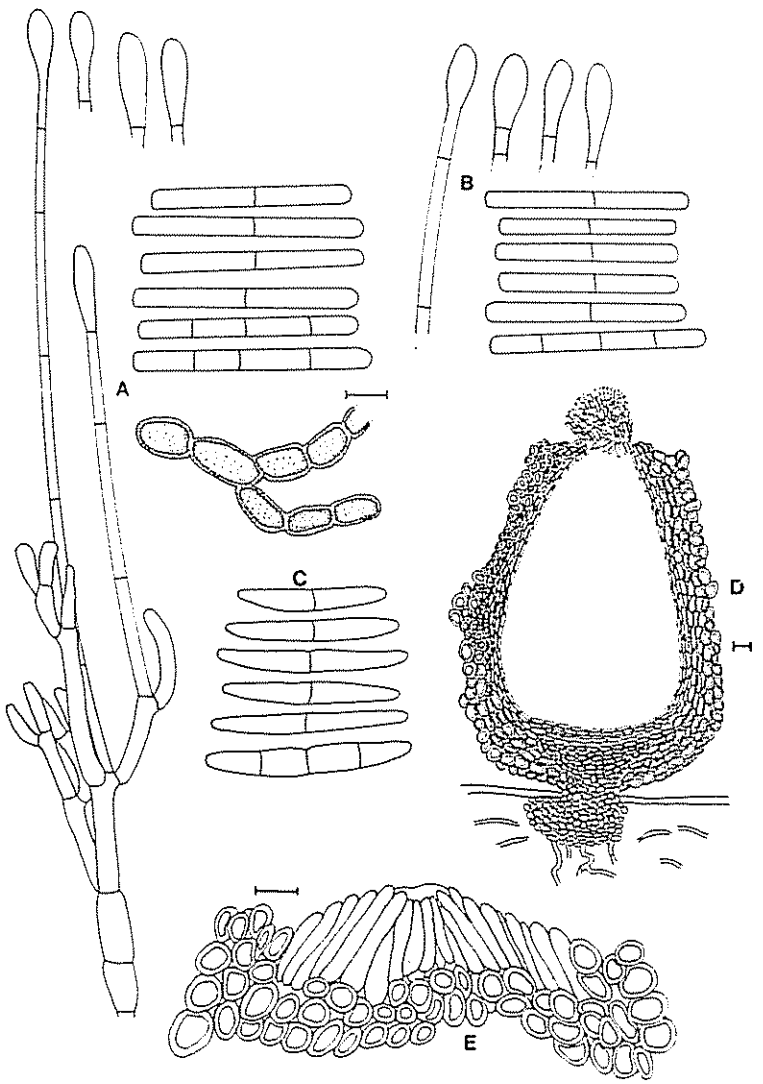
IMI Descriptions of Fungi and Bacteria No. 1154

CALONECTRIA SPATHULATA



A. conidiophore, vesicles, conidia and chlamydospores formed on carnation leaf agar (CLA); B. vesicles and conidia on CLA (bar = 10 μm); C. ascospores; D. v.s. of a perithecium (bar = 20 μm); E. ostiolar region of a perithecium (bar = 10 μm).

Calonectria spathulata El-Gholl, Kimbrough, Barnard, Alfieri & Schoulties, *Mycotaxon* **26**: 159, 1986.

Anamorph: *Cylindrocladium spathulatum* El-Gholl, Kimbrough, Barnard, Alfieri & Schoulties, *Mycotaxon* **26**: 159, 1986.

Perithecia globose to ovoid, 318–536 × 273–457 μm, with warty outer wall and papillate ostiole, orange-red in colour, turning blood-red in 3% KOH. Asci hyaline, clavate, 87–162 × 10–24 μm, tapering to a long thin stalk, containing eight ascospores. *Ascospores* hyaline, straight or falcate, 1–(3)-septate, not or slightly constricted at

central septum, (25)–39.5–(48) × (4.5)–5–(6.5) µm. *Conidiophore* filament septate, hyaline, terminating in a clavate to spathulate vesicle, (3.5)–6–(9) µm diam; stipes (105)–173–(225) µm long. *Conidiophore branches*: primary branches non-septate or rarely 1-septate, (12)–22–(37) × (3.5)–4–(5) µm; secondary branches non-septate, (12)–18–(25) × (3.5)–4–(4.5) µm; tertiary branches non-septate, (14)–16–(20) × 3.5–(4) µm. *Phialides* cylindrical, doliiform to reniform, hyaline, (11)–14–(18) × (3.5)–4–(4.5) µm. *Conidia* cylindrical, hyaline, 1–(3)-septate, rounded at both ends, (48)–57.5–(75) × (4.5)–5–(5.5) µm. *Colony colour* after 6 d on 2% MEA (reverse) pale-yellow orange to light brown. *Chlamydospores* in moderate numbers (less than *C. ilicicola* (Hawley) Boedijn & Reitsma), scattered or in chains, forming microsclerotia. *Temperature requirements for growth*: minimum temp. below 5 °C; maximum temp. below 33 °C; optimum temp. 25 °C.

HOSTS: *Araucaria angustifolia*; *Eucalyptus viminalis*, *E. cloeziana*, *E. grandis*, *Pteridium* sp.

DISEASE: Leaf spots (**65**, 6198).

GEOGRAPHICAL DISTRIBUTION: Brazil.

PHYSIOLOGIC SPECIALIZATION: None reported.

TRANSMISSION: Probably wind and splash dispersed.

NOTES: This species is morphologically similar to *C. ilicicola*. The two species have similar vesicle, phialide and conidium morphology. Conidia of *C. spathulatum* are 1-3-septate, (as *C. ilicicola*), but primarily 1-septate on carnation leaf agar (CLA), and after 7 d hardly any 3-septate conidia can be found. *C. ilicicola*, however, has primarily 3-septate conidia on CLA. Furthermore, isolates of *C. spathulatum* may be distinguished from *C. ilicicola* by forming moderate, and not abundant chlamydospores, as is typical for *C. ilicicola*. *C. spathulatum* is also a low temperature species, as opposed to *C. ilicicola*, which is favoured by high temperatures. The two species also have distinct isozyme and total DNA electrophoretic profiles (Crous *et al.*, 1993).

LITERATURE: Crous, Janse, Victor, Marais & Alfenas, *Systematic and Applied Microbiology* **16**: in press, 1993 (DNA comparisons); El-Gholl, Kimbrough, Barnard, Alfieri & Schoulties, *Mycotaxon* **26**: 151–164, 1986 (description); Peerally, *Mycotaxon* **40**: 323–366, 1991.

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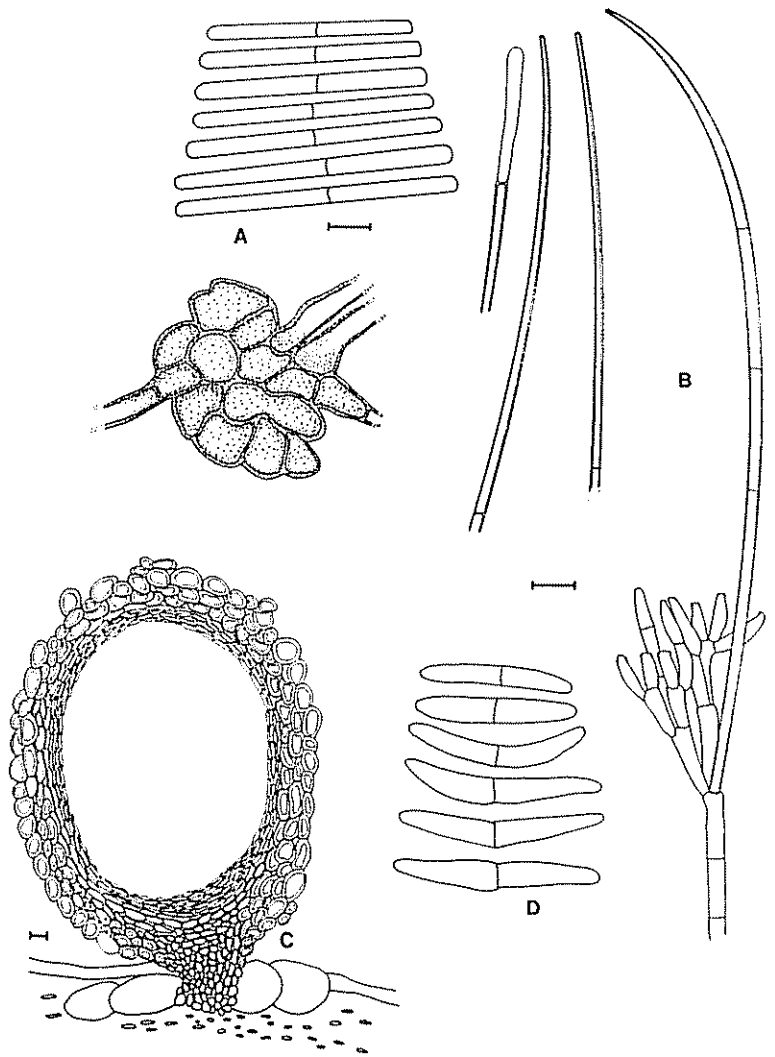
IMI Descriptions of Fungi and Bacteria No. 1155

CALONECTRIA AVESICULATA



A. conidia and chlamydospores; B. vesicles and conidiophore on carnation leaf agar (bar = 10 μm); C. v.s. through a perithecium; D. ascospores.

Calonectria avesiculata Schubert, El-Gholl, Alfieri & Schoulties, *Canadian Journal of Botany* **67**: 2415. 1989.

Anamorph: *Cylindrocladium avesiculatum* Gill, Alfieri & Sobers, *Phytopathology* **61**: 60. 1971.

Perithecia globose, red to orange-red in colour, 340–520 × 300–500 μm, with warted outer wall and papillate ostiole, turning blood-red in 3% KOH. *Asci* hyaline, clavate, 82–190 × 13–30 μm, tapering to a long thin stalk, containing eight ascospores. *Ascospores* hyaline, straight or falcate, 1-septate, not or slightly constricted at central septum, (22)–40–(50) × (4)–5.5–(6.5) μm. *Conidiophore* filament septate, hyaline, terminating in an avesiculate to clavate vesicle, (1.5)–2.5–(4) μm diam.; stipes (190)–265–(360) μm long. *Conidiophore branches*:

primary branches non-septate or rarely 1-septate, (13)–17–(25) × (4)–4.5–(5) µm; secondary branches non-septate, (10)–13–(15) × (3.5)–4–(4.5) µm; tertiary branches non-septate, rarely observed, (8)–12–(13) × (3.5)–4–(4.5) µm. *Phialides* cylindrical, doliiform to reniform, hyaline, (9)–12–(16) × (3)–3.5–(4.5) µm. *Conidia* cylindrical, hyaline, 1-septate, rounded at both ends, (57)–64–(77) × (4.5)–5–(6.5) µm. *Colony colour* after 6 d on 2% MEA (reverse) amber brown to light brown. *Chlamydospores* abundant, dense, forming large microsclerotia. *Temperature requirements for growth*: minimum temp. above 8 °C; maximum temp. below 35 °C; optimum temp. 25 °C.

HOSTS: *Ilex* spp., *Leucothoë axillaris* (**59**, 1284), *Pyrancantha coccinea*, *Rhododendron obtusum*.

DISEASE: Leaf spotting, twig die-back and defoliation.

GEOGRAPHICAL DISTRIBUTION: U.S.A. (Florida, Georgia).

PHYSIOLOGIC SPECIALIZATION: None reported.

TRANSMISSION: Probably wind and splash dispersed.

NOTES: Isolates of this species are heterothallic (**69**, 920). *C. avesiculatum* is characterized by having large 1-septate conidia, and thick-walled avesiculate stipes. The nature of the stipe is unique to this species, and easily distinguishes it from all other *Cylindrocladium* spp. Meyer (1959) illustrated a collection of *C. scoparium* from Zaire, which in spite of the slightly smaller conidia (40–48 × 3.5–4 µm), strongly resembled *C. avesiculatum*.

LITERATURE: Gill, Alfieri & Sobers, *Phytopathology* **61**: 58–60, 1971 (anamorph); Leahy, *Florida Department of Agriculture and Consumer Services, Plant Pathology Circular* No. 278, 1985; Meyer, *Publications de L'institut National pour L'etude agronomique du Congo Belge* **75**: 7–211, 1959; Schubert, El-Gholl, Alfieri & Schoulties, *Canadian Journal of Botany* **67**: 2414–2419, 1989 (teleomorph).

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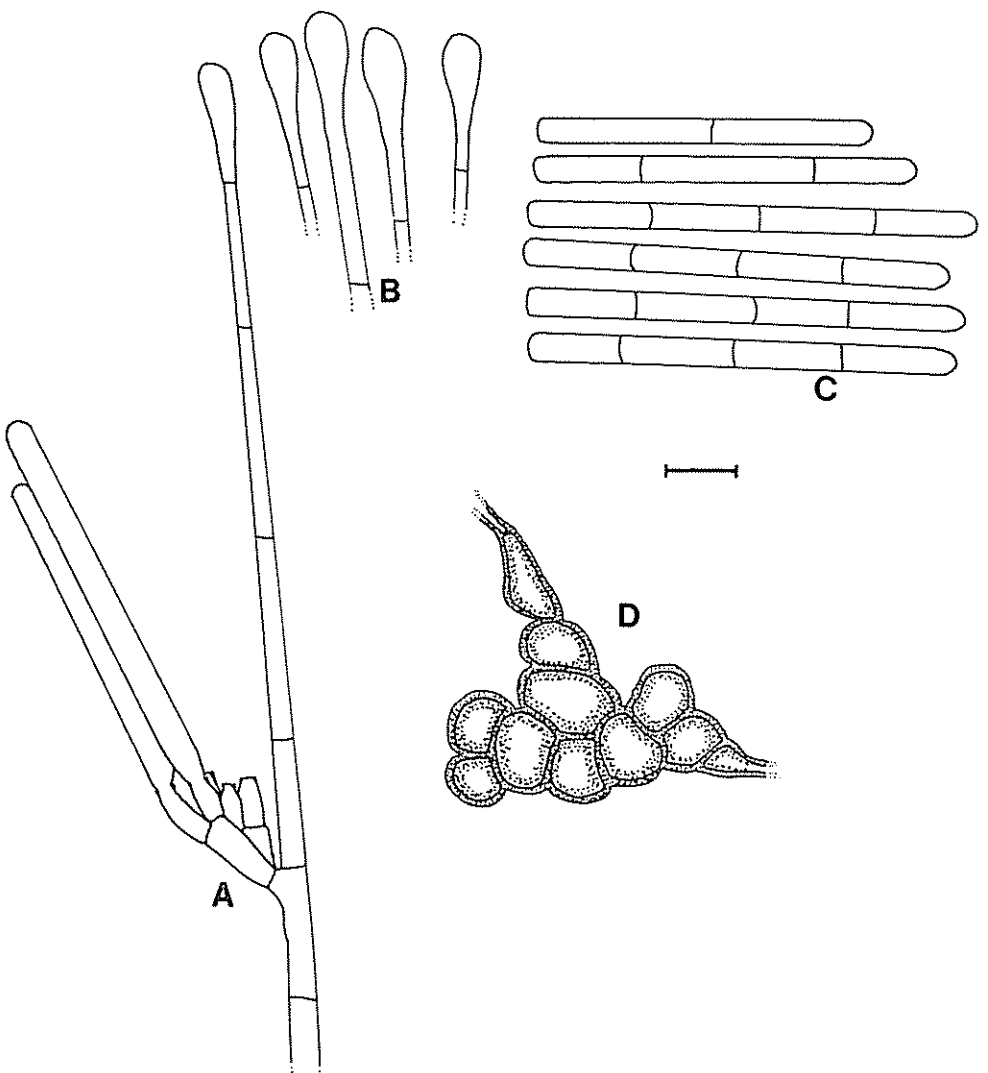
IMI Descriptions of Fungi and Bacteria No. 1156

CYLINDROCLADIUM CITRI



A. conidiophore; B. vesicles; C. conidia; D. chlamydospores on carnation leaf agar (bar = 10 μm).

Cylindrocladium citri (Fawcett & Klotz) Boedijn & Reitsma, *Reinwardtia* **1**: 57, 1950.
Candelospora citri Fawcett & Klotz, *Mycologia* **29**: 213, 1937.
Cylindrocladium penicilloides (Tub.) Tubaki, *Journal of the Hattori Botanical Laboratory* **20**: 154, 1958.
Candelospora penicilloides Tubaki, *Nagaoa* **2**: 58, 1952.

Conidiophore filament septate, hyaline, terminating in an obovoid to spathulate vesicle, (4.5)–7–(10) μm diam; stipes (115)–127–(170) μm long. *Conidiophore branches*: primary branches non-septate or 1-septate, (10)–15.5–(26) × (3.5)–4–(5) μm; secondary branches non-septate, (10)–11–(12) × (2.5)–3–(3.5) μm. *Phialides* doliiform to reniform, hyaline, (8)–10–(11) × (3)–3.5–(4) μm. *Conidia* cylindrical, hyaline, (1)–3-septate, rounded at

both ends, (50)–57.5–(65) × (3)–4–(4.5) µm. *Colony colour* after 6 d on 2% MEA (reverse) light brown. *Chlamydospores* in moderate numbers, scattered throughout the medium or in chains, forming microsclerotia. *Temperature requirements for growth*: minimum temp. below 5 °C; maximum temp. below 33 °C; optimum temp. 25 °C.

HOSTS: *Citrus sinensis*, *Prunus* sp.

DISEASE: Decay of citrus fruits.

GEOGRAPHICAL DISTRIBUTION: Japan, U.S.A (Florida).

PHYSIOLOGIC SPECIALIZATION: None reported.

TRANSMISSION: Probably wind and splash dispersed.

NOTES: The vesicles of this species are very variable, as was noted by Zumpetta (1976). Although Boedijn & Reitsma (**30**, 346) did not illustrate the exact nature of the vesicle, Sobers & Alfieri (**53**, 1716) described it as 'mostly ellipsoidal'. On carnation leaf agar, however, they appear to be more obovoid to spathulate in shape, being similar to those of *C. ilicicola*, which are clavate to spathulate. *C. citri* is distinguishable in being a low temperature species, while *C. ilicicola* is a high temperature species. The type culture of *C. citri* was also found to have the same total DNA electrophoretic profile as that of *C. penicilloides*, suggesting the latter name to be a synonym of the former (Crous *et al.*, 1993).

LITERATURE: Crous, Janse, Victor, Marais & Alfenas, *Systematic and Applied Microbiology* **16**: in press, 1993 (synonymy); Fawcett & Klotz, *Mycologia* **29**: 207–215, 1937 (description); Sobers & Alfieri, *Proceedings of the Florida State Horticultural Society* **85**: 366–369, 1972; Zumpetta, M.Sc. thesis, California State College, Pennsylvania, 91pp, 1976.

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[Numbers in brackets, e.g. (**62**, 5055), refer to abstracts in the Review of Plant Pathology]

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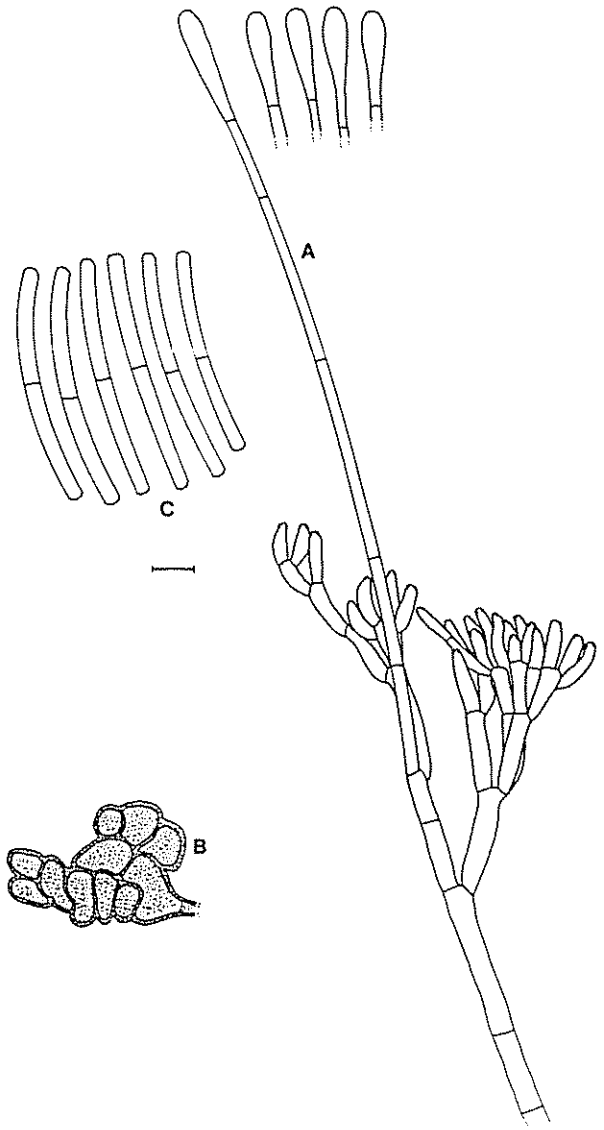
IMI Descriptions of Fungi and Bacteria No. 1157

CYLINDROCLADIUM HAWKSWORTHII



A. conidiophore and vesicles; B. chlamydospores; C. conidia on carnation leaf agar (bar = 10 μm).

Cylindrocladium hawksworthii Peerally, *Mycotaxon* **40**: 375, 1991.

Conidiophore filament septate, hyaline, terminating in an ellipsoid, pyriform or clavate vesicle, (6)–6.5–(8.5) μm diam.; stipes (150)–200–(250) μm long. *Conidiophore branches*: primary branches non-septate or rarely 1-septate, (18)–29.5–(45) × (4)–4.5–(5) μm; secondary branches non-septate, (13)–16.5–(25) × (4)–4.5–(5) μm; tertiary and quaternary branches non-septate, (10)–12–(15) × (3.5)–4–(5) μm. *Phialides* doliiform to reniform, hyaline, (10)–14–(16) × (3.5)–4–(4.5) μm long. *Conidia* cylindrical, hyaline, curved, 1-septate, rounded at both

ends, (42)–55.5–(76) × (3.5)–4–(4.5) µm. *Colony colour* after 6 d on 2% MEA (reverse) linoleum brown. *Chlamydospores* abundant, densely scattered throughout the medium, forming microsclerotia. *Temperature requirements for growth*: minimum temp. above 5 °C; maximum temp. below 35 °C; optimum temp. 30 °C.

HOSTS: *Nelumbo nucifera*, *Nymphaea lotus*.

DISEASE: Leaf spot.

GEOGRAPHICAL DISTRIBUTION: Mauritius.

PHYSIOLOGIC SPECIALIZATION: None reported.

TRANSMISSION: Probably wind and splash dispersed.

NOTES: This species is morphologically similar to *C. scoparium*, except that it has curved conidia. It is distinguished from *C. curvatum* by having larger conidia and an elliptical vesicle.

LITERATURE: Peerally, *Mycotaxon* **40**: 367–376, 1991.

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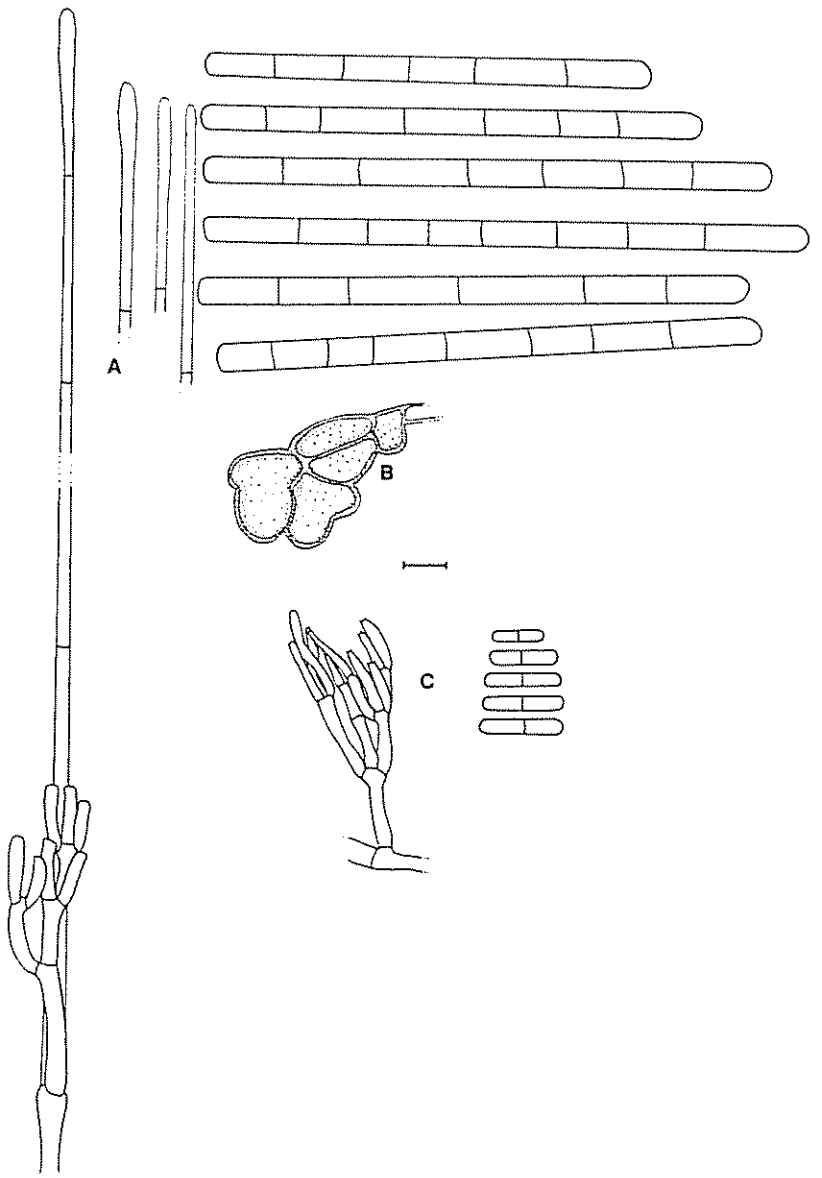
IMI Descriptions of Fungi and Bacteria No. 1158

CYLINDROCLADIUM HEPTASEPTATUM



A. macroconidiophore, vesicles and conidia; B. chlamydospores on carnation leaf agar (CLA); C. microconidiophore and conidia on CLA (bar = 10 μm).

Cylindrocladium heptaseptatum Sobers, Alfieri & Knauss, *Phytopathology* **65**: 333, 1975.

Macroconidiophore filament septate, hyaline, terminating in a narrowly clavate vesicle, (3.5)–4–(5) μm diam.; stipes (320)–420–(550) μm long. *Macroconidiophore branches*: primary branches non-septate, (16)–22–

(30) × (4)–4.5–(5) µm; secondary branches non-septate, (14)–17–(25) × (4)–4.5–(5) µm. *Phialides* cylindrical to allantoid, hyaline, (14)–17–(20) × (3.5)–4–(5) µm. *Macroconidia* cylindrical, hyaline, (1)–7–(8)-septate, rounded at both ends, (96)–118–(144) × (6.5)–8–(9) µm. *Microconidiophore* filament septate, hyaline, terminating in a clavate vesicle when present. *Microconidiophore branches*: primary branches non-septate, (11)–19–(29) × (2.5)–3–(5) µm; secondary branches non-septate, (9)–13.5–(20) × (2)–2.5–(4) µm. *Phialides* arising from the ends of branches, in groups of 2–4; cylindrical, hyaline, (7)–14–(17) × (2)–3–(3.5) µm, collarettes present. *Microconidia* cylindrical, hyaline, 1-septate with obtuse ends, (12)–16–(22) × (2)–3–(3.5) µm. Isolates vary in their ability to form the microconidial state. *Colony colour* after 6 d on 2% MEA (reverse) amber brown to light brown. *Chlamydospores* abundant, in coarse chains, forming microsclerotia. *Temperature requirements for growth*: minimum temp. above 10 °C; maximum temp. below 33 °C; optimum temp. 25 °C.

HOSTS: *Eucalyptus* sp., *Polystichum adiantiforme*, *Rumohra adiantiformis* (**63**, 4469).

DISEASE: Leaf spots and stem lesions (**54**, 4961).

GEOGRAPHICAL DISTRIBUTION: Honduras, Thailand, U.S.A (Florida).

PHYSIOLOGIC SPECIALIZATION: None reported.

TRANSMISSION: Probably wind and splash dispersed.

NOTES: *C. heptaseptatum* has large, multi-septate conidia and clavate vesicles. Other *Cylindrocladium* spp. with multi-septate conidia and clavate vesicles are *C. colhounii* var. *colhounii* Peerally & var. *macroconidialis* Crous, Wingfield & Alfenas, *C. theae* (Petch) Subram. and *C. quinqueseptatum* Boedijn & Reitsma. *C. heptaseptatum* is distinguished from these species by having conidia that are 7-septate. The other species mentioned above all have 3-septate conidia, except *C. quinqueseptatum*, which has 5-septate conidia.

LITERATURE: Chase, *Plant Disease* **68**: 514–516, 1984; El-Gholl, Chase, Alfieri & Schoulties, *Canadian Journal of Botany* **65**: 1733–1735, 1987 (microconidia); Marousky Risse, Wildt & Dow, *Proceedings of the Florida State Horticultural Society* **94**: 100–102, 1982 (control); Marousky & Wildt, *Plant Disease* **66**: 1029–1031, 1982; Sobers, Alfieri & Knaus, *Phytopathology* **65**: 331–333, 1975 (description).

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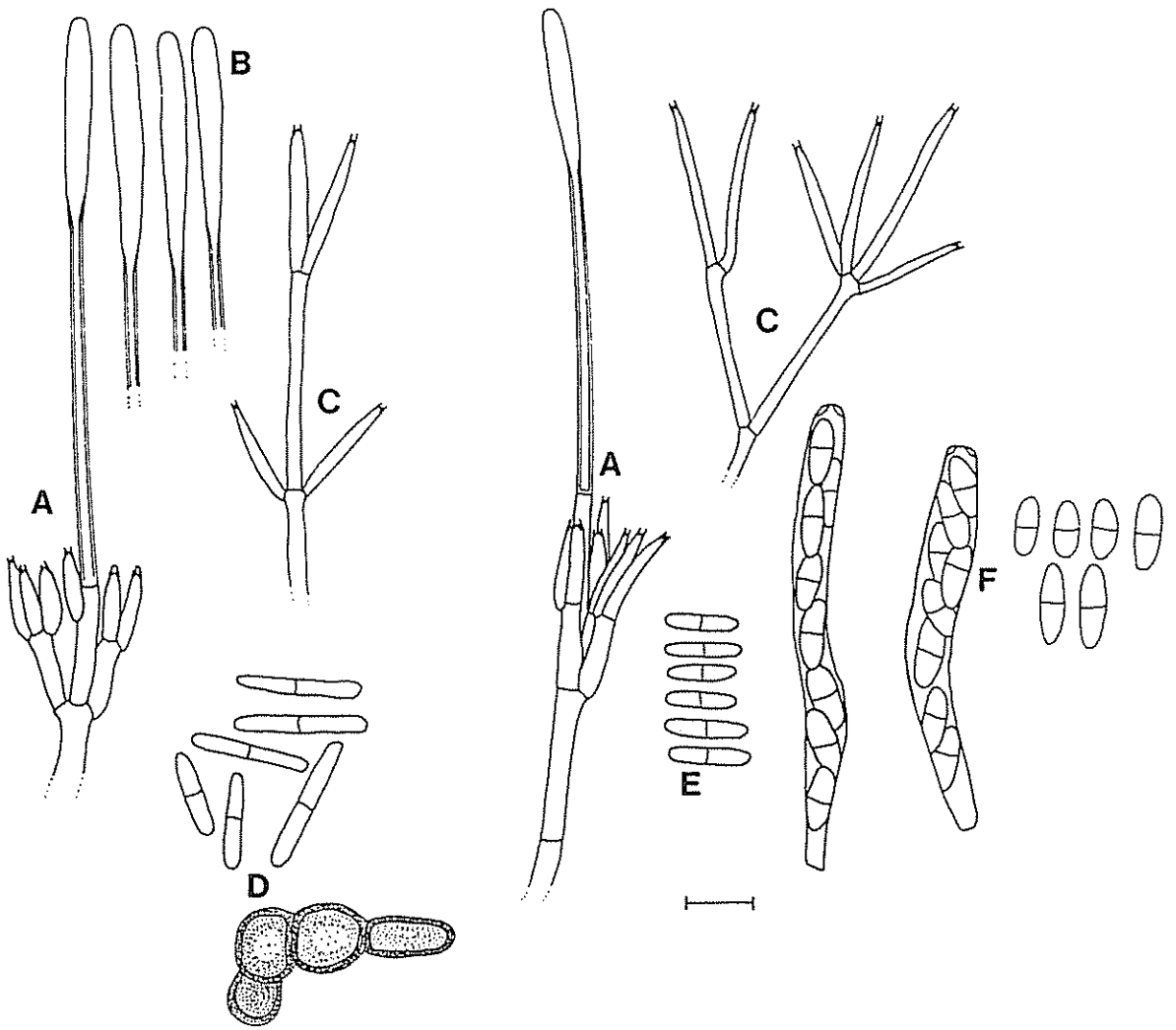
IMI Descriptions of Fungi and Bacteria No. 1159

NECTRIA CAMELLIAE



A. penicillate conidiophore; B. vesicles; C. subverticillate conidiophore; D. conidia and chlamydospores; E. conidia; F. asci and ascospores (bar = 10 μm).

Nectria camelliae (Shipton) Boesewinkel, *Canadian Journal of Botany* **60**: 2293, 1982.
Calonectria camelliae Shipton & Booth, *Transactions of the British Mycological Society* **69**: 59, 1977.
Calonectria camelliae Shipton, *Transactions of the British Mycological Society* **72**: 163, 1979.
Nectria camelliae (Shipton) Boesewinkel, *Transactions of the British Mycological Society* **78**: 555, 1982.
Anamorph: *Cylindrocladiella infestans* Boesewinkel, *Canadian Journal of Botany* **60**: 2290, 1982.
Cylindrocladium infestans (Boesew.) Peerally, *Mycotaxon* **40**: 337, 1991.

Perithecia 200–345 × 150–290 μm, turning blood-red colour in 3% KOH. Outer wall layer 15–20 μm wide, comprising elongated to angular cells, inner wall layer 3–5 μm wide, comprising elongated cells. *Asci* clavate

to cylindrical, 50–68 × 5–7 µm, without visible apical apparatus. *Ascospores* 1-septate, ellipsoid to clavate, uni- to biseriate 7–12 × 3–4 µm. *Penicillate conidiophore* filament non-septate, hyaline, terminating in a lanceolate to cylindrical vesicle, (3)–3.5–(4) µm diam.; stipes unbranched, arising from middle of conidiophore, having one basal septum, (71)–88–(130) µm long; primary branches 0–(1)-septate, (10)–13.5–(18) × (3)–3.5 µm; secondary branches non-septate, (8)–10–(12) × (2.5)–3–(3.5) µm. *Phialides* doliiform, reniform to cymbiform (7)–10–(13) × (2)–3–(3.5) µm, collarettes abundant. *Subverticillate conidiophores* abundant. *Phialides* cymbiform to cylindrical, (15)–20–(25) × (2.5)–3–(3.5) µm. *Conidia* (0)–1-septate, (10)–14.5–(22.5) × (2)–2.5–(3) µm. *Colony colour* after 6 d on 2% MEA (reverse), buff yellow to champagne. *Chlamydospores* form in moderate numbers, often in chains. *Temperature requirements for growth*: minimum temp. above 8 °C; maximum temp. below 35 °C; optimum temp. 25 °C.

HOSTS: *Eucalyptus* sp., *Pinus pinea* (**62**, 925).

DISEASE: Isolated from roots and stems of dying *P. pinea* seedlings (**62**, 925), and roots of dying *Eucalyptus* cuttings.

GEOGRAPHICAL DISTRIBUTION: Australia, Brazil, New Zealand, Papua New Guinea (Crous & Wingfield, 1993).

PHYSIOLOGIC SPECIALIZATION: None reported.

TRANSMISSION: Probably wind and splash dispersed.

NOTES: Not all isolates have the ability to produce the teleomorph. Matsushima (1971) illustrated (Fig. 142) a collection of *C. parva* (Anderson) Boesewinkel from Papua New Guinea that had morphological characteristics similar to those of *C. infestans*. Although identified as *C. parva*, he illustrated the vesicles as being cylindrical, with subverticillate conidiophores branching at more than one level. Type material of this species, which is lodged in Matsushima's personal herbarium (MFC 2687), could not be obtained. There can be little doubt, however, that this collection also represents *C. infestans*, and that this fungus, therefore, also occurs in Papua New Guinea.

LITERATURE: Boesewinkel, *Canadian Journal of Botany* **60**: 2288–2294, 1982 (anamorph); Crous & Wingfield, *Mycological Research* **97**: in press, 1993 (monograph); Matsushima, *Microfungi of the Solomon Islands and Papua-New Guinea*, 1971; Shipton, *Transactions of the British Mycological Society* **69**: 59–62, 1977; Shipton, *Transactions of the British Mycological Society* **72**: 161–164, 1979 (teleomorph).

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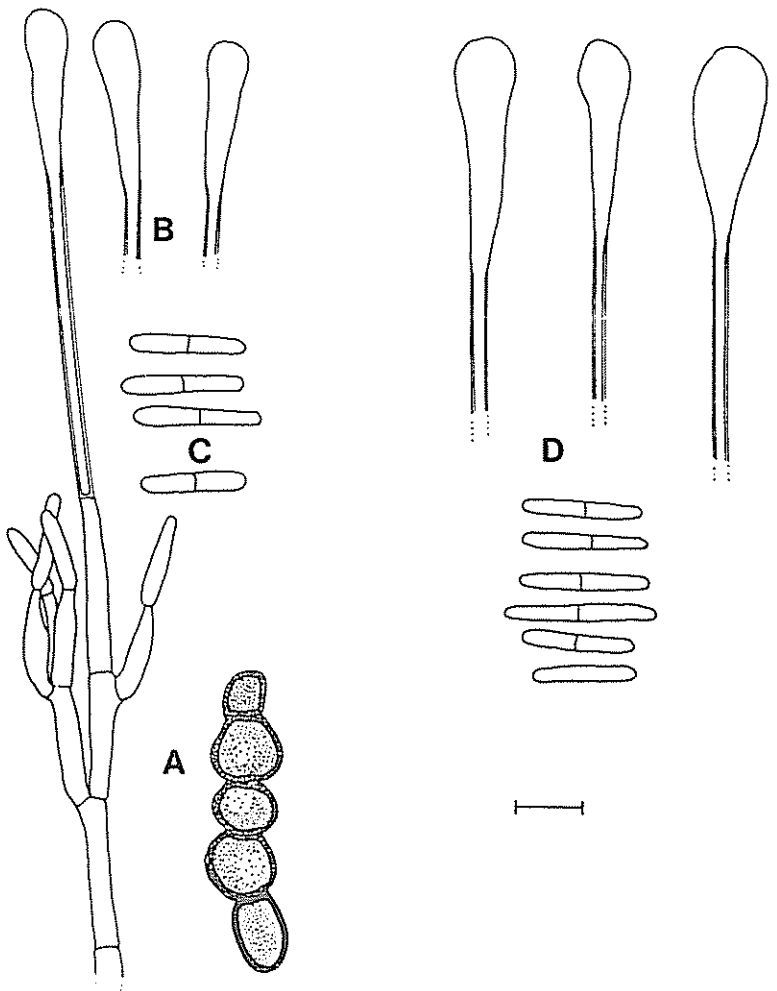
IMI Descriptions of Fungi and Bacteria No. 1160

CYLINDROCLADIELLA PARVA



A. penicillate conidiophore and chlamydospores on carnation leaf agar; B. clavate vesicles; C. conidia; D. pyriform vesicles and conidia (bar = 10 µm).

Cylindrocladiella parva (Anderson) Boesewinkel, *Canadian Journal of Botany* **60**: 2289, 1982.

Cylindrocladium parvum Anderson, *Massey Agricultural Experiment Station Bulletin* **183**: 37, 1918.

Penicillate conidiophore filament non-septate, hyaline, terminating in a clavate to spathulate or pyriform vesicle, (4)–5.5–(8) µm diam.; stipes unbranched, arising from middle of conidiophore, having one basal septum, (65)–75–(90) µm long; primary branches non-septate (13)–18–(24) × (3)–3.5–(4) µm; secondary branches non-septate (10)–15–(20) × (2.5)–3–(3.5) µm. *Phialides* doliiform to cymbiform, (9)–14–(17) × (3)–3.5–(4.5) µm, collarettes rare or absent. *Subverticillate conidiophores* rare or absent. *Conidia* (0)–1-septate, (13.5)–17–(19.5) × (2)–2.5–(3) µm. *Colony colour* after 6 d on 2% MEA (reverse) tawny-olive to mustard brown. *Chlamy-*

dospores abundant, in chains. *Temperature requirements for growth*: minimum temp. below 5 °C; maximum temp. below 33 °C; optimum temp. 25 °C.

HOSTS: *Annona cherimola*, *Camellia japonica*, *Eucalyptus* spp. (**66**, 2526), *Macadamia integrifolia*, *Pelargonium* sp., *Persea americana*, *Phaseolus vulgaris*, *Pinus contorta*, *P. radiata*, *Psidium guajava*, *Rheum rhaponticum*, *Rosa* sp., *Spondias mangifera*, *Telopea speciosisima*, *Vitis vinifera*, *Xanthosoma sagittifolium*.

DISEASE: Seedling blight, damping off, root rots.

GEOGRAPHICAL DISTRIBUTION: Australia, Brazil, Costa Rica, Great Britain, Hong Kong, India, Japan, Java, Malawi, Mauritius, New Zealand, South Africa, U.S.A. (Florida, Hawaii, Massachusetts), West Indies.

PHYSIOLOGICAL SPECIALIZATION: None reported.

TRANSMISSION: Probably wind and spash dispersed.

NOTES: *C. parva* is characterized by being a fast growing, low temperature species, which characteristically has only penicillate conidiophores (Crous & Wingfield, 1993). Generally isolates also have wider conidia (up to 2.5 µm) than other *Cylindrocladiella* species, with pyriform to spathulate or clavate vesicles. This fungus can be baited from soil with human hair (**38**, 460) or azalea leaf traps. It is able to decompose pectin. Growth is inhibited by *Suillus brevipes* (**69**, 7729). The C/N ratio of the growth medium has been shown to influence microsclerotium production (**56**, 573). Sobers & Alfieri (**53**, 1716) regarded their isolates to all be saprophytic, but Sharma & Mohanan (**62**, 768) found *C. parva* causing damping-off and seedling blight on *Eucalypus* spp. In South Africa isolates have been found to be pathogenic to *Pinus* spp., *Medicago truncatula* (alfalfa), *Glycine max* (soybean), *Arachis hypogaea* (peanut), *Eucalyptus* and *Pisum sativum* (pea) (Crous *et al.*, 1993). The fungus has been considered a weak pathogen of rhubarb in New Zealand (**61**, 521), associated with root rot of black walnut seedlings in the USA (**61**, 411), and found on coffee trees in India (**53**, 4456). Good control was reported using benomyl (**69**, 2569) and complete control using carbendazim (**70**, 8068).

LITERATURE: Boesewinkel, *Canadian Journal of Botany* **60**: 2288–2294, 1982 (characterization); Crous, Phillips & Wingfield, *Plant Pathology* **42**: in press, 1993 (pathogenicity); Crous & Wingfield, *Mycological Research* **97**: in press, 1993 (monograph); Domsch, Gams & Anderson, *Compendium of Soil Fungi*, Academic Press, 1980 (relative importance); Griffin, *Transactions of the British Mycological Society* **43**: 583–596, 1960; Sharma & Mohanan, *European Journal of Forest Pathology* **12**: 129–136, 1982 (pathogenicity); Sharma & Mohanan, *European Journal of Forest Pathology* **21**: 17–26, 1991; Sobers & Alfieri, *Proceedings of the Florida State Horticultural Society* **85**: 366–369, 1972.

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