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


Perithecia superficial, borne singly or in small groups, globose or subglobose, 280–520 × 280–400 μm, red-brown to red, with rough warded outer wall and papillate ostiole. Ascii hyaline, clavate, (72-)90(-120) × (6-)8(-15) μm, tapering to a long thin stalk, containing 1–8 ascospores. Ascospores hyaline, straight to falcate, 1-septate, not or slightly constricted at central septum, (28-)41(-68) × (4-)5(-6.5) μm; developing up to three septa once discharged from ascus. Conidiophore filament septate, hyaline, terminating in an ellipsoid to obpyriform vesicle, (6-)8(-10) μm diam.; stipes (105-)180(-290) μm long. Conidiophore branches: primary branches non-septate or rarely 1-septate, (13-)18.5(-27) × (3-)3.5(-4) μm; secondary branches non-septate, (10-)15(-22) × (3-)3.5(-4) μm; tertiary branches non-septate, (10-)14(-16) × (3-)3.5(-4) μm. Phialides doliiform to reniform, hyaline, (7.5-)13(-19) × (3-)3.5(-4) μm. Conidia cylindrical, hyaline, 1-septate rounded at both ends, (33-)45(-66) × (3.5-)4(-4.5) μm. Colony colour after 6 d on 2% Malt extract agar (reverse) amber brown to buckthorn brown or sayal brown. Chlamydospores abundant, in chains or clusters, forming microsclerotia in moderate numbers. Temperature requirements for growth: minimum temp. above 5°C; maximum temp. above 35°C; optimum temp. between 25–30°C.


DISEASE: Damping off, root rot, cutting rot, stem cankers, leaf spotting, seedling and shoot blight.

GEOGRAPHICAL DISTRIBUTION: Australia, Brazil, India, Kenya, Mauritius, South Africa.

PHYSIOLOGIC SPECIALIZATION: None reported.

TRANSMISSION: Wind and splash dispersal.

NOTES: Although this species is heterothallic, and perithecia are obtained with difficulty in culture, the teleomorph occurs readily in nature. This species is morphologically similar to Cylindrocladium floridanum Sobers & Seymour, C. ovatum El-Gholl, Alfenas, Crous & Schubert and C. scoparium Morgan. It can be distinguished by the shape of its ellipsoid to obpyriform vesicles. Those of C. floridanum, C. ovatum and C. scoparium are sphaeropedunculate, ovate and pyriform respectively.


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CALONECTRIA SPATHIPHYLLI

A. conidiophore, vesicles and conidia; B. asci; C. chlamydosores; D. ascospores (bar = 10 μm).


DISEASE: Root and foliar disease (62, 1077) of Spathiphyllum spp.

GEOGRAPHICAL DISTRIBUTION: Australia, Italy (70, 3351), Florida, Hawaii, U.S.A.

PHYSIOLOGIC SPECIALIZATION: None reported.

TRANSMISSION: Probably wind and splash dispersed.

NOTES: Isolates of this species are heterothallic. C. spathiphylli is the only Cylindrocladium sp. with globose vesicles. This taxon is further distinguished from C. parasitica Crous, Wingfield & Alfenas (= C. crotaleariae (Loos) Bell & Sober) (which has sphaeroponcufacate vesicles), by having primarily 1-septate, and not 3-septate conidia. Other Cylindrocladium spp. with 1-septate conidia and sphaeroponcufacate vesicles are distinguished from C. spathiphylli by having curved conidia (C. curvatum) or lateral stipes and smaller conidia (C. floridanum). Spathiphyllum floribundum ev. Mini, S. cannifolium and the hybrid S. lechlerianum × S. floribundum are reported to be resistant (66, 1507). Good disease control achieved with triflumizole (67, 816), prochloraz and triflumizole being more effective than benomyl (66, 3855).


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CALONECTRIA VARIABILIS
A. macroconidiophore, vesicles and conidia; B. microconidiophore and conidia; C. asci and ascospores (bar = 10 μm); D. v.s. through a peritheciun (bar = 20 μm).


**Perithecia** superficial, solitary or in groups of 2–3, globose to ovoid, 260–450 × 220–350 μm, with warty outer wall and papillate ostiole, red, turning blood-red in 3% KOH; perithecial wall consisting of two regions: outer region 35–60 μm wide, of elongate to angular cells (darkly pigmented), becoming globose on the very end (lighter pigmented), inner layer up to 20 μm wide, of hyaline, thin-walled, elongate cells; peritheciial base 100–150 μm wide, consisting of angular cells, blackened around point of attachment. **Asci** hyaline, clavate, 90–120 × 10–20 μm, tapering to a long thin stalk, containing eight ascospores. **Ascospores** hyaline, straight or falcate, 1(-3) septate, not or slightly constricted at septa, guttulate when young, becoming granular at maturity, (34-)42(-60) × (4.5-)5(-6) μm. **Macroconidiophore** filament septate, hyaline, terminating in a sphaeropodendulate or ellipsoid to clavate vesicle, (6-)9(-11) μm diam.; **stipes** (130-)180(-250) μm long. **Conidiophore branches:** primary branches non-septate or rarely 1-septate, (15-)20(-30) × (3.5-)4(-5) μm; secondary branches non-septate, (10-)13(-18) × (3.5-)4(-5) μm; tertiary branches rare, non-septate, (8-)11(-14) × (3.5-)4(-5) μm. **Phialides** clavate, doliiform to reniform, hyaline, non-septate, (9-)13(-18) × (3-)3.5(-4) μm. **Conidia** cylindrical, hyaline, (1-)3(-4) septate, rounded at both ends, straight but frequently curved, widest in the middle of lower cell, with prominent taper to base, (48-)60(-75) × (4-)5(-5.5) μm. **Microconidiophore:** filament septate, hyaline, terminating in a clavate to ellipsoid vesicle when present. **Conidiophore branches:** primary branches non-septate, (12-)15(-20) × (3.5-)3.5(-4) μm; secondary branches non-septate, (9-)10(-12) × (2.5-)3.5 μm. **Phialides** allantoid to navicular, hyaline, non-septate, (9-)13.5(-17) × (3-)3.5(-4) μm, colarettes absent. **Conidia** cylindrical, hyaline, 1-septate with obuse ends, (12-)26.5(-36) × (3-)3.5(-4) μm. Colony colour after 6 d on 2% Malt extract agar (reverse) amber brown. Chlamydosporces abundant, dense, forming microsclerotia. Temperature requirements for growth: minimum temp. above 8°C; maximum temp. below 35°C; optimum temp. 25°C.

**HOSTS:** *Didymopanax morototoni*, *Eucalyptus* spp., *Theobroma grandiflorum*.

**DISEASE:** Leaf spots.

**GEOGRAPHICAL DISTRIBUTION:** Brazil.

**PHYSIOLOGIC SPECIALIZATION:** None reported.

**TRANSMISSION:** Wind and splash dispersal of conidia and ascospores.

**NOTES:** Isolates of *C. variabilis* readily produce a teleomorph and a microconidial state on carnation-leaf agar. Although isolates of *Cylindrocladium variabile* are similar to that of *C. parasiticum* Crous, Wingfield & Alfenas (= *C. crotalariae* (Loos) Bell & Sobers) regarding cultural characteristics, and in having sphaeropodendulate vesicles, they are distinct by also having clavate to ellipsoid vesicles. Furthermore, using isoyme and total DNA banding patterns (Crous et al., 1993), *C. variabilis* could be distinguished from morphologically similar species such as *C. citri* (Fawcett & Klotz) Boedijn & Reitsma, *C. illicicola* (Hawley) Boedijn & Reitsma, *C. spathulatum* El-Gholl, Kimbrough, Barnard, Alifieri & Schouties and *C. parasiticum*. All isolates thus far obtained of *C. variabilis* were found to consistently produce a microconidial state. Macroconidia are primarily 3-septate, are frequently slightly curved, and widest at the first basal septum.


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CYLINDROCLADlUM OVATUM

IMI Descriptions of Fungi and Bacteria
No. 1177
A. macroconidiophore, vesicles and conidia; B. microconidiophore, vesicles and conidia; C. chlamydospores; D. macroconidia and vesicles (bar = 10 μm).


*Macroconidiophore* filament septate, hyaline, terminating in an ellipsoid to oval vesicle, (8-)10(-14) μm diam.; stipes (185-)205(-230) μm long. *Conidiophore branches*: primary branches non-septate or rarely 1-septate, (15.5-)25.5(-40) × (3.5-)4.5(-5) μm; secondary branches non-septate, (10.5-)19.5(-29) × (3.5-)4.5(-5) μm; tertiary branches non-septate, (10.5-)17.5(-24) × (3.5-)4(-4.5) μm. *Phialides* doliform to reniform, hyaline, (7.5-)14.5(-29) × (3-)4(-4.5) μm. Conidia cylindrical, hyaline, 1(-3) septate, rounded at both ends, straight or slightly curved, (36-)65(80) × (4-)4.5(-5.5) μm. Microconidiophore filament septate, hyaline, terminating in an ellipsoid to oval vesicle when present. *Conidiophore branches*: primary branches non-septate or rarely 1-septate (9-)20(-30) × (2.5-)3.5(-4) μm; secondary branches non-septate, (8-)10(-12) × (2.5-)3.5(-4) μm. Phialides allantoid to navicular or doliform, hyaline, with collarettes, (8-)15(-8) × (2.5-)3(-3.5) μm. Conidia cylindrical, hyaline, 1-septate with obtuse ends, (11-)21(-28) × (2-)2.5(-3.5) μm. Colony colour after 6 d on 2% Malt extract agar (reverse) amber brown. Chlamydospores abundant, dense, forming microsclerotia. Temperature requirements for growth: minimum temp. above 10°C; maximum temp. above 35°C; optimum temp. 25°C.

HOSTS: Eucalyptus spp.

**DISEASE**: Leaf spot.

**GEOGRAPHICAL DISTRIBUTION**: Amazonia, Brazil.

**PHYSIOLOGICAL SPECIALIZATION**: None reported.

**TRANSMISSION**: Probably wind and splash dispersed.

**NOTES**: Not all isolates have the ability to form the microconidial state, and the majority can only produce 1-septate conidia (not curved as some in the holotype), and generally do not have septate vesicles as frequently produced by the type culture. Vesicles of *C. ovatum* are ovate (widest in the middle), and are between those of *C. canceldarum* Viegas which are obpyriform (widest below the middle), and *C. scoparium* Morgan which are pyriform (widest above the middle). It is probable that this species is heterothallic, as is the case for *C. scoparium* and *C. canceldarum*. However, although all available isolates of *C. ovatum* were paired, only protoperithecia were observed, suggesting that the correct strains have not yet been collected to produce a teleomorph with viable progeny. As expected, pairings with mating types of *C. scoparium* and *C. cancellarum* were also unsuccessful.


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A. penicillate conidiophore and vesicles; B. conidia and chlamydospores (bar = 10 μm).


Penicillate conidiophore filament non-septate, hyaline, terminating in a clavate to ellipsoidal vesicle, (4-)5 (-6) μm diam.; stipes unbranched, in the middle of conidiophore, having one basal septum, (65-)92(-125) μm long; primary branches 0(-1)-septate, (10-)15(20) × 3(-3.5) μm; secondary branches non-septate, (10-)11.5 (-16) × 3(-3.5) μm. Phialides doliiform to reniform to cymbiform, (11-)12(-15) × 3(-3.5) μm with collarettes. Subverticillate conidiophores sparse to absent. Conidia (0-)1-septate, (12.5-)14.5(-18) × 2(-3) μm, abnormal conidia with 1–3 septa (up to 44 μm long) also formed. Colony colour after 6 d on 2% Malt extract agar (reverse) maize yellow. Chlamydosporae form in medium numbers, and are arranged in chains. Temperature requirements for growth: minimum temp. above 5°C; maximum temp. below 30°C; optimum temp. 20°C.

HOSTS: Arachis hypogaea, Eucalyptus leaf litter.

DISEASE: Found on peanut roots, leaf litter and in soil. South African isolates have been found to be pathogenic to Medicago truncatula (alfalfa), Arachis hypogaea (peanut), Glycine max (soybean) and Pisum sativum (pea).

GEOGRAPHICAL DISTRIBUTION: South Africa.

PHYSIOLOGIC SPECIALIZATION: None reported.
TRANSMISSION: Probably occurs by wind and splash dispersal.

NOTES: No teleomorph has yet been found, and mating studies have thus far been unsuccessful. Some conidia formed in the type culture have the ability to stay attached longer to phialides than normal. These conidia become misformed, abnormally long, and can develop up to three septa. This phenomenon was observed after 7 d on Carnation Leaf Agar as well as on Malt extract agar, but disappeared with subsequent subculturing. No other obvious differences were observed between the type and other collections of C. elegans regarding their vesicle morphology or temperature requirements for growth. C. elegans can be distinguished from all other Cylindrocladiella spp. based on its colony colour in culture, temperature requirements for growth, and vesicle morphology.


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


*Penicillate conidiophore* filament non-septate, hyaline, terminating in a lageniform to ovoid vesicle, (9-)12
(-18) μm diam.; stipes unbranched, in the middle of conidiophore, having one basal septum, (63-)80(-120) μm long; primary branches 0(-1)-septate, (10-)14(-20) × (2.5-)3(-3.5) μm; secondary branches non-septate, (8-)11 (-15) × (2-)2.5(-3) μm. Phialides doliiform to reniform to cymbiform, (8-)10(-14) × (2-)2.5(-3) μm with collarettes. Subverticillate conidiophores sparse to medium in number. Conidia (0-)1-septate, (9-)11.5(-15) × (1.5-)2 μm. Colony colour after 6 d on 2% Malt extract agar (reverse) sayal brown, while colonies give a diffuse reddish colour to the growth medium. Chlamydospores abundant, arranged in chains. Temperature requirements for growth: minimum temp. above 5°C; maximum temp. below 35°C; optimum temp. 25°C.

HOSTS: Eucalyptus sp.

DISEASE: Isolated from stems of dying Eucalyptus cuttings.

GEOGRAPHICAL DISTRIBUTION: Brazil.

PHYSIOLOGICAL SPECIALIZATION: None reported.

TRANSMISSION: Splash dispersal in Eucalyptus cutting nurseries.

NOTES: One isolate produced a few red, Nectria perithecia in culture. The ability to form perithecia was, however, lost with subculturing. This species is primarily distinguished from similar species such as C. camelliae and C. infestans by its wide, lageniform vesicles. A diffuse reddish pigment can also be observed in the growth medium. Although subverticillate conidiophores are present, they occur less commonly than in C. camelliae and C. infestans. Furthermore, they also frequently branch at more than one level, a characteristic previously ascribed only to C. infestans.


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A. penicillate conidiophore and vesicles; B. conidia; C. chlamydospores (bar = 10 μm).


*Penicillate conidiophore* filament non-septate, hyaline, terminating in a irregularly lanceolate vesicle, (3.5-)5 (-9) μm diam.; stipes unbranched, in middle of conidiophore, having one basal septum, (95-)103(-125) μm long; primary branches 0(-1)-septate, (9-)11.5(-16) × (3-)3.5 μm; secondary branches non-septate, (8-)10(-15) × (3-)3.5 μm. *Phialides* doliform to reniform, (8-)10.5(-15) × (3-)3.5(-4) μm, collarettes present in moderate numbers. *Subverticillate conidiophores* rare to absent. *Conidia* (0-)1-septate, (11.5-)14.5(-25) × (2-)2.5(-3.5) μm. *Colony colour* after 6 d on 2% Malt extract agar (reverse) light orange-yellow. *Chlamydospores* slight in number, arranged in chains. *Temperature requirements for growth*: minimum temp. below 5°C; maximum temp. below 30°C; optimum temp. 20°C.
HOST: *Rhododendron indicum*.

DISEASE: Isolated from roots of *R. indicum*.

GEOGRAPHICAL DISTRIBUTION: New Zealand.

PHYSIOLOGICAL SPECIALIZATION: None reported.

TRANSMISSION: Probably wind and splash dispersed.

NOTES: This species is known from one collection only. The most distinct criteria distinguishing this species from others are its very slow growth rate, sparse chlamydospore formation, irregular lanceolate vesicle, and penicillate conidiophores.


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