

FUNGI SILVICOLAE NOVAZELANDIAE: 5

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(Received for publication 30 June 2004; revision 21 April 2005)

ABSTRACT

The four fungi described in this paper are either new or have not been fully described from New Zealand. The fungi are:

Foliicolous Ascomycota: *Calonectria acicola* sp. nov. and its anamorph *Cylindrocladium acicola* sp. nov. on *Pinus radiata* D. Don.

Xylophilous Anamorphic fungi: Hyphomycetes: *Sporothrix nothofagi* sp. nov. on *Nothofagus fusca* (Hooker f.) Oersted.

Corticulous Ascomycota: *Valsaria rubricosa* on *Pinus radiata*.

Radicicolous Anamorphic fungi: Hyphomycetes: *Leptographium alethinum* on *Pinus radiata* and *P. strobus* L.

Keywords: fungi; New Zealand; new descriptions.

INTRODUCTION

In this fifth paper of the series, descriptions are provided for two new species — one fungus which has not been recorded from New Zealand, and one fungus which has been recorded but not fully described from New Zealand. For examination, herbarium material was rehydrated in a damp chamber. Sections were cut using a freezing microtome, and sections and squash preparations were mounted in water. Drawings were made with the help of a drawing tube.

The location record of specimens examined is followed by the name of the arbitrarily defined geographical region (Crosby *et al.* 1976) to which the specimen belongs. The account of the New Zealand distribution of an organism is based principally on data recorded on the Forest Health database maintained by the Forest Research Institute. Not all the records on the database are supported by voucher specimens.

DESCRIPTIONS OF FUNGI

Foliicolous Ascomycota

Calonectria acicola sp. nov. (Fig. 1)

Anamorph: *Cylindrocladium acicola* sp. nov. (Fig. 1).

Coloniae in agaro extracto malti (2%), brunneae, mycelio aereo albo-brunneae.

Catenaе chlamydosporarum brunneorum adsunt. Perithecia (solum in agaro folii

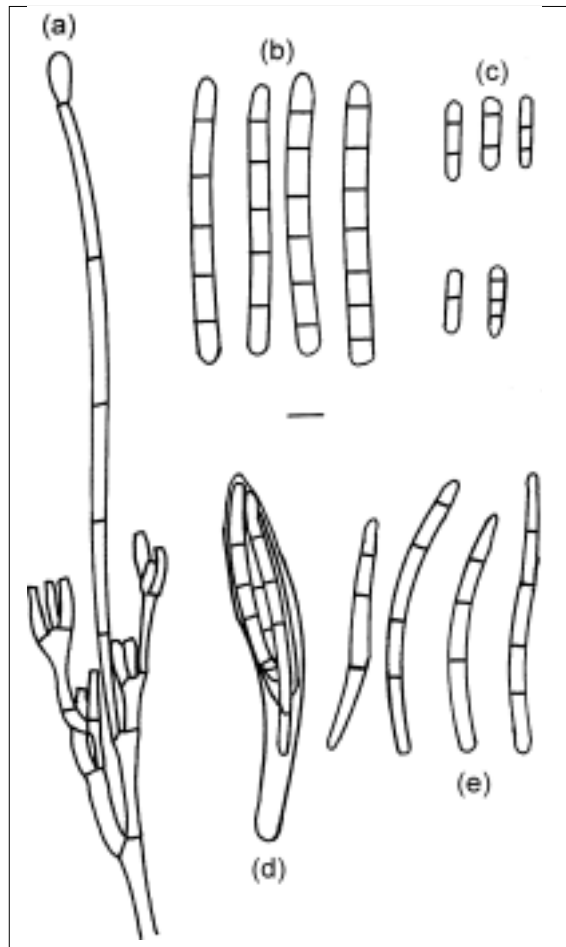


FIG. 1—*Calonectria acicola* and its anamorph *Cyllindrocladium acicola*.
 (a) Macroconidiophore, (b) conidia, (c) microconidia, (d) ascus, (e) ascospores.
 Bar = 10 μm .

Dianthi caryophylli — CLA carnation leaf agar), singula vel gregaria, superficialia, globosa vel subglobosa, pariete exteriori verrucosis, rubra usque ad rubri-brunnea, 190–320 μm diametro; paries peritheci duorum stratorum: strato exteriori texturae globulosae 15–45 μm lato, strato interiori texturae angularis 6–8 μm lato. Asci clavati, stipite longo basali, parietibus tenuibus, octospori, (75)-85-(110) \times (15)-27-(40) μm . Ascospores elongato-fusoidae, 3–4-septatae, (50)-70-(90) \times 5–7 μm , laeves, hyalinae. Macroconidiophora ex stipite, extensione sterile et phialidibus composita. Stipes hyalinus, laevis, 60–90 \times 6–9 μm ; extensio sterilis 45–70 \times 5–6 μm , in vesiculum anguste clavatum terminans; phialides stipite vel ramulis primariis exorientes, singulares vel in gregibus 2–4, 15–20 \times 4–5 μm . Conidia cylindracea, recta, 5–7-septata, (65)-75-(80) \times 6–8 μm , hyalina, laevia, guttulata. Microconidia cylindracea, recta vel curvata, 2–3-septata, 10–30 \times 3–5 μm , hyalina, laevia.

Habitat in foliis vivis sed decoloratis *Pinus radiatae* D. Don.

Holotypus hic designatus: Cultura in siccitate (NZFRI-M 5213), ex foliis *Pinus radiatae*, Waipu Forest (Northland), 6.v.2003, M.R. Twaddle.

Colonies on 2% malt extract agar dark tan brown, aerial mycelium moderate, whitish brown. Chains of dark brown chlamydospores present. Ascomata (seen only on carnation leaf agar) perithecial, solitary or in small groups, superficial, globose to subglobose, surface warted, red to red-brown, 100–320 µm in diameter, perithecial wall in two layers: outer layer of textura globosa, 15–45 µm wide, inner layer of textura angularis, 6–8 µm wide. Asci clavate with a long basal stalk, thin-walled, 8-spored, (75)-85-(110) × (15)-27-(40) µm. Ascospores elongate-fusoid, tapering to rounded ends, 3–4-septate, (50)-70-(90) × 5–7 µm, smooth, hyaline. Macroconidiophores composed of a stipe, a sterile extension and phialides. Stipe hyaline, smooth, 60–90 × 6–9 µm, stipe extension not commonly observed, 45–70 × 5–6 µm, terminating in a narrowly clavate vesicle, phialides arising directly from the stipe or from primary branches, singly or in groups of 2–4, 15–10 × 4–5 µm. Conidia cylindrical, straight, 5–7-septate, (65)-75-(80) × 6–8 µm, hyaline, smooth, guttulate. Microconidia cylindrical, straight or curved, 2–3-septate, 10–30 × 3–5 µm, smooth, hyaline.

On living but discoloured needles of *Pinus radiata*.

In addition to the dried holotype culture deposited in the New Zealand Forest Research Institute Herbarium – Mycology (NZFRI-M), subcultures of the holotype have been preserved under water at the New Zealand Forest Research Institute Culture Collection (NZFS 1011) and also deposited at the International Collection of Micro-organisms from Plants (ICMP 15572).

New Zealand distribution: Northland.

The fungus was isolated from living but discoloured needles of *Pinus radiata*. It did not fit the descriptions of any species described in a monograph of *Calonectria* and *Cylindrocladium* species (Crous 2002). Cultures were sent to the Centraalbureau voor Schimmelcultures, Utrecht, who considered it to be an undescribed species although it was morphologically similar to *Cylindrocladium hurae* (Linder & Whetzel) Crous and, based on beta tubulin sequence data, to *C. retaudii* (Bugnicourt) C. Booth/ *C. multiseptatum* Crous & Wingfield (P. Crous, pers. comm.). It has no pathological significance.

Xylophilous Anamorphic fungi: Hyphomycetes

Sporothrix nothofagi sp. nov. (Fig. 2)

Teleomorphosis ignota.

Coloniae in agar extracto malti (2%) post 14 dies 40 mm diametro a 25°C; atro-olivaceae ad fere atrae cum partibus nitentibus. Mycelium aerium sparsum, cinereo-album. Reversum atro-olivaceum. Hyphae submersae brunneae, septatae, laeves, 2–3 µm latae, interdum fasciculatae. Cellulae conidiogenae in hyphis non differentiatas oriundae, rectae vel flexuosae, aciculares, 20–80 µm longae et 1.5–2.5 µm latae; pars apicalis incremento sympodiali conidia formans ex rachi flexuosa, irregulari consistens, denticulis laxe dispositis praedita. Conidia fusiformia ad clavata, aseptata, 5–7.5 × 2–3.5 µm, laevia, hyalina.

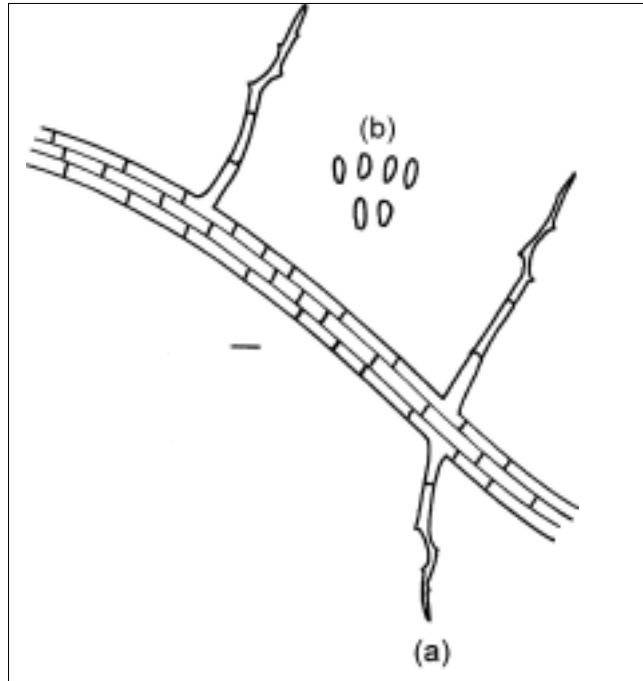


FIG. 2—*Sporothrix nothofagi*. (a) hyphae and conidiogenous cells, (b) conidia. Bar = 10 μ m.

Habitat in ligno decolorato *Nothofagi fuscae*, cuniculis scarabeorum consociato.

Holotypus hic designatus: Cultura in siccitate (NZFRI-M 5214) ex ligno *Nothofagi fuscae*, Kaimanawa State Forest Park (Taupo), 1972, W. Faulds.

Colonies on 2% malt extract agar reaching a diameter of 40 mm in 14 days at 25°C, dark olive green to almost black, flat with some shiny patches owing to production of conidia; aerial mycelium greyish white, sparse. Reverse dark olive green. Submerged hyphae brown, smooth, septate, 2–3 μ m wide, sometimes fasciculate. Aerial hyphae pale brown, septate. Conidiogenous cells arising from undifferentiated hyphae, sometimes in a terminal position but more commonly integrated in small side branches; straight or flexuous, septate, acicular, widest at base and tapering towards the apex, 20–80 \times 1.5–2.5 μ m; the apical part forming conidia by sympodial growth giving rise to a short, denticulate conidiiferous rachis; hyaline. Conidiogenous cells may proliferate at, or a little below the apex, giving rise to other short denticulate conidiiferous rachides. Conidia fusiform to narrowly clavate, 0-septate, 5–7.5 \times 2–3.5 μ m, smooth, hyaline. Conidia are also formed laterally on undifferentiated hyphae.

Teleomorph not known.

In stained sapwood of *Nothofagus fusca*, associated with tunnels of pinhole borers.

In addition to the dried holotype culture deposited in the New Zealand Forest Research Institute Herbarium – Mycology (NZFRI-M), subcultures of the holotype have been preserved under water at the New Zealand Forest Research Institute Culture Collection

(NZFS 519) and also deposited at the International Collection of Micro-organisms from Plants (ICMP 15573).

New Zealand distribution: Taupo. Also recorded from Auckland, Bay of Plenty, Taupo, Hawke's Bay, Westland, North Canterbury, and mid Canterbury, but these records are not represented by cultures in any permanent culture collection.

Sporothrix nothofagi differs from other *Sporothrix* species for which no teleomorphic stage is known (de Hoog 1974) in its ability to colonise living sapwood of *Nothofagus* spp. and in combining the characters of possessing long, tapering, conidiogenous cells, short acicular conidiiferous rachides, and small denticles.

Sporothrix nothofagi is the only *Sporothrix* species which has been isolated from stained sapwood associated with tunnels of three species of native pin-hole borers, *Platypus apicalis* White, *P. gracilis* Broun, and *Treptoplatypus caviceps* (Broun) (Milligan 1979). These three borers attack living trees of all *Nothofagus* species in New Zealand and *P. apicalis* and *P. gracilis* attack living *Weinmannia racemosa* Linne fil. *Platypus apicalis* also attacks *Cordyline australis* (Forster fil.) Endlicher and *P. gracilis* attacks *Carpodetus serratus* J.R. & G. Forster. Tunnels bored by the beetles normally extend radially in the sapwood to a zone near the heartwood boundary where they branch tangentially. A bluish-black stain, up to 250 mm long and 5 mm wide, tapering gradually towards both ends, is always associated with these tunnels (Faulds 1973). Milligan (1974) reported that severe pinhole borer attack (13 or more holes per 100 cm²) and the subsequent invasion of the sapwood by *S. nothofagi* were associated with the death of mature *Nothofagus* trees. Faulds (1977) simulated pinhole borer attack by drilling small (2.5 mm in diameter) holes which reached the heartwood in *N. fusca* trees (dbh 31–45 cm) and inoculated each hole with 1 ml of a mycelial suspension of *S. nothofagi*. The number of holes drilled per 100 cm² of bark surface varied from 9 to 21. All inoculated trees wilted and died within 4 to 40 months of inoculation; uninoculated control trees with similar diameters and similar density of holes remained healthy. Faulds (1977) reported that *S. nothofagi* was also isolated from wilting *Platypus*-attacked *N. solandri* (Hooker fil.) var. *cliffortioides* (Hooker fil.) Poole (from Mount Ruapehu) and *N. truncata* (Colenso) Cockayne (from Clevedon, Auckland). Payton (1989) recovered *S. nothofagi* from stained sapwood associated with *Platypus* tunnels in completely wilted trees of *W. racemosa*. The maximum density of *Platypus* holes in these trees varied from 1.5 to 2 holes per 100 cm². He also simulated *Platypus* attack on *W. racemosa* trees (dbh 19–47 cm) using the technique of Faulds (1977). Five holes were drilled per 100 cm² of bark. All trees inoculated with *S. nothofagi* wilted and died within 7.5 to 16.5 months of inoculation while uninoculated trees remained healthy. These experiments clearly showed that *S. nothofagi* is a pathogen of *Nothofagus* spp. and *W. racemosa*. Initial establishment of the pathogen in the host tissue requires its introduction into the inner sapwood. Pinhole borers are the only insects in New Zealand which make tunnels in this zone. It seems probable that adults emerging from infected material carry propagules of *S. nothofagi* as accidental contaminants and that these are transferred to the sapwood as the adults bore into fresh material. Faulds (1977) recorded that uninoculated drilled holes, if left unplugged, became contaminated by *S. nothofagi* showing that the fungus can invade wounds in the absence of pinhole borer beetles.

Both Faulds (1977) and Payton (1989) noted that mortality of trees attacked by *Platypus* spp. was associated with moisture stress induced either through waterlogging or drought.

Milligan (1974) recorded that even lightly attacked trees succumbed to *S. nothofagi* when a drought occurred in the following summer, even without a second attack in the drought year.

Corticolous Ascomycota

Valsaria rubricosa (Fries: Fries) Saccardo 1876

Nuovo Giornale Botanico Italiano 8: 183

= *Sphaeria rubricosa* Fries: Fries 1828

Elenchus Fungorum 2: 63

Ascomata stromatic, multiloculate, scattered, 3–12 × 2–4 mm, erumpent through bark, surface tuberculate, rusty red, wrinkled and cracked, inside greyish with darker areas surrounding the locules, locules 115–230 µm wide with necks of varying lengths. Asci cylindrical, short-stipitate, 85–110 × 12–15 µm, paraphyses filiform, numerous. Ascospores monostichous, oblong-ovoid, 1-septate, 12–16 × 6–10 µm, smooth, deep brown.

Cultures on 2% malt extract agar salmon-red to brick-red, with hyphae producing conidia from 1–3 lateral conidiogenous loci. Conidia oval to elongate, 0-septate, 5–10 × 2–3 µm, smooth, hyaline, collecting in masses around the conidiogenous loci.

Habitat: on bark of *Pinus radiata*, wood under bark stained a rather fetching purplish pink.

Specimen examined: on bark of *P. radiata*, Cpt 8, Pamo Forest (Gisborne), 27.iv.2004, B.J. Rogan, NZFRI-M 5181, culture NZFS 1597. The description given above is based on this specimen.

Other specimens examined: on bark of *Nothofagus solandri* (Hooker fil.) Oersted var. *cliffortioides* (Hooker fil.) Poole, Mt Ruapehu (Taupo), x.1949, J.M.Dingley, PDD 16000; on bark of *Elaeocarpus dentatus* (J.R. & G. Forster) Vahl, Te Whaiti (Bay of Plenty), 15.v.1950, J.M.Dingley, PDD 32719; on bark of *Nothofagus fusca*, Totara Flats (Buller), iv.1955, J.M.Dingley, PDD 14529; on bark of *Nothofagus fusca*, Lake Waikaremoana (Gisborne), ix.1955, J.M.Dingley, PDD 15570. The stromata on these earlier collections of *V. rubricosa* are black rather than rusty red and in that they resemble *V. insitiva* (Tode: Fries) Cesati & de Notaris. As Saccardo (1876) and Müller and von Arx (1962) have pointed out, the two species are very closely related.

Valsaria rubricosa is regarded as saprophyte without any pathological significance. Its presence in New Zealand was recorded by McKenzie *et al.* (2000).

Radicalous Anamorphic fungi: Hyphomycetes

Leptographium alethinum Jacobs, Wingfield & Uznovic 2001

Mycological Research 105: 493.

Colonies on 2% malt extract agar olivaceous to dark olivaceous, aerial mycelium sparse, not zoned, colony edge uneven, hyphae of submerged mycelium olivaceous, smooth, 7–8.5 µm wide. Optimum growth at 20°C with an average colony diameter of 74 mm after 6 days' growth, no growth at 30°C, little growth below 5°C. Conidiophores arising singly or in groups of up to six, erect, (450)-690-(910) µm long,

rhizoids present. Stipe dark olivaceous, smooth, cylindrical, 7–11-septate, (350)–520–(750) μm long, (6.0)–8.5–(12.5) μm wide below primary metulae, simple, bearing 2–4 primary metulae. Three to four additional series occur above the primary metulae each giving rise to 2–3 further metulae at the apex. Primary metulae olivaceous, subsequent metulae olivaceous to hyaline. Conidiogenous cells discrete, 2–3 per metula, tapering slightly, 12–22 μm long, hyaline. Conidia obovoid with truncate ends, 0-septate, (4.5)–5.0–(5.5) \times 2.5–3.0 μm , smooth, hyaline, accumulating in a mucilaginous mass.

Habitat: on roots and butts of *Pinus radiata* and *P. strobus*.

Specimens examined: on roots of *P. radiata*, Queen Charlotte Forest (Marlborough), 7.v.1993, B.Getz, culture NZFS 168b; on roots of *P. radiata*, Kaingaroa Forest (Taupo), 29.iii.1995, J.A.Bartram, culture NZFS 168d; on roots of *P. strobus*, Mohaka Forest (Hawke's Bay), 7.vi.1995, B.J.Rogan, culture NZFS 168c; on roots of *P. radiata*, Gwavas Forest, (Rangitikei), 13.v.1997, J.A.Bartram, culture NZFS 168e; on roots of *P. radiata*, Matakana Island (Bay of Plenty), 18.vi.1998, M.A.Dick, culture NZFS 168f/2; on roots of *P. radiata*, Underwood Farm (Marlborough), 17.iv.1999, B.H.Doherty, culture NZFS 180.01; on roots of *P. radiata*, Tangoia Forest (Hawke's Bay), 22.xii.1999, J.Pascoe, culture NZFS 180.04; on roots of *P. radiata*, Kaweka Forest (Hawke's Bay), 8.iii.2000, B.J.Rogan, culture NZFS 180.05.

New Zealand distribution: Bay of Plenty, Taupo, Hawke's Bay, Rangitikei, Marlborough.

This is a segregate from collections originally tentatively identified as *Verticicladiella procera* (= *Leptographium procerum*) (Wingfield and Marasas 1983). Jacobs *et al.* (2001) examined many isolates of *L. procerum* sensu lato and determined that four morphologically different groups could be distinguished. One of these groups represented *L. procerum* sensu stricto and the other three were described as new species — *L. alethinum* (from England and Scotland), *L. pityophilum* (from Italy), and *L. euphyes* (from New Zealand). A re-examination of cultures of *L. procerum* and of unidentified *Leptographium* species held in the New Zealand Forest Research Institute culture collection (NZFS) showed that a number fitted closely with the description of *L. alethinum* provided by Jacobs *et al.* (2001). The description of *L. alethinum* given above is based on these cultures. It should be noted that the conidiophores in the New Zealand collections are shorter (450–910 μm) than those described by Jacobs *et al.* (2001) (560–1270 μm), and that rhizoids are consistently present in the New Zealand collections while they are described as being occasionally present by Jacobs *et al.* (2001).

ACKNOWLEDGMENTS

We thank Judy Gardner for technical help, the collectors of the described specimens, and the Curator of PDD (Eric McKenzie). We are very grateful to Shaun Pennycook and Peter Johnston for their helpfully critical comments.

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