

FUNGI SIVICOLAE NOVAZELANDIAE: 4

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ABSTRACT

The five fungi recorded in this paper have not been previously described from New Zealand. The fungi are:

Corticulous Ascomycota: *Nectria fuckeliana* C.Booth on *Pinus radiata* D.Don.

Caulicolous Ascomycota: *Ophiovalsa betulae* (L.Tulasne & C.Tulasne) Petrak on *Betula pendula* Roth.

Caulicolous anamorphic fungi: *Coryneum betulinum* Schulzer on *Betula pendula*; *Fusarium merismoides* Corda on *Acmena smithii* (Poiret) Merrill & Perry, *Corokia cotoneaster* Raoul, *Cotoneaster* sp., *Hoheria* sp., *Paulownia tomentosa* (Thunberg) Steudel, *Podocarpus totara* Bennett ex D.Don, *Prumnopitys ferruginea* (Bennett ex D.Don) de Laubenfels, *Sorbus aucuparia* Linnaeus.

Follicolous anamorphic fungi: *Leptomelanconium australiense* B.Sutton on *Eucalyptus ficifolia* F.J.Mueller.

Keywords: fungi, New Zealand.

INTRODUCTION

In this fourth paper of the series, descriptions are provided for five fungi previously undescribed 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.

The location record of specimens examined is followed by the name of the arbitrarily defined geographical region (Crosby *et. al.* 1976) to which the particular 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 and is presented for each region, with the number of records for that region in parentheses. Not all records on the database are supported by voucher specimens.

DESCRIPTIONS OF FUNGI

Corticulous Ascomycota

Nectria fuckeliana C. Booth 1959

Mycological Papers 73: 56.

Anamorph: *Cylindrocarpon cylindroides* var. *tenue* Wollenweber 1928

Zeitschrift für Parasitenkunde 1: 153.

Stromata discrete, erumpent, applanate, pseudoparenchymatous, dark-coloured, up to 10 mm long × 6 mm wide and 1–2 mm high. Ascomata perithecial, gregarious, in groups of 30–100 or more on a single stroma, superficial, globose, bright red when young, becoming dark maroon red, perithecial wall finely roughened, 0.2–0.3 mm in diameter, ostiole papillate and surrounded by a dark ostiolar disc 40–60 µm in diameter. Perithecial wall pseudoparenchymatous, cells 8–12 µm wide, cell walls pigmented, about 1 µm thick. Asci cylindrical, monostichous, later distichous at the apex, 90–110 × 9–12 µm. Paraphyses filamentous, hyaline. Ascospores broadly elliptical, 1-septate, slightly constricted at the central septum, 14–18 × 6–7 µm, hyaline, smooth or verruculose.

Cultural characters: (on 2% malt extract agar)

Colonies slow-growing (60–75 mm after 21 days at 20°C), creamy yellow in colour with a mealy appearance. Conidiophores variable in length, up to 110 µm long and up to 5 µm wide at the base, tapering towards the apex, single or sparingly branched, sometimes sparsely verticillate, septate, hyaline. Macroconidia formed only in paired cultures, particularly on sterilised pieces of pine wood, formed in gloeoid masses, cylindrical, ends obtuse, (2)–3–4–(6)-septate, 29 × 4.5 µm (3-septate: 21–42 × 4 µm; 4-septate: 31.5–45 × 5 µm); hyaline, smooth. Microconidia abundant, formed in gloeoid masses, oval, 0-septate, 5–7 × 2–3 µm, hyaline, smooth.

Globose, orange perithecial initials formed in some isolates. Perithecia formed only in paired cultures, particularly on sterilised pieces of pine wood.

Habitat: on pruned branch stubs and bark on stems and on dead fallen branches of *Pinus radiata*.

Specimens examined: on a canker on stem of *Pinus radiata*, Kaitangata Forest (Dunedin), 9.x.1997, R.Thum, culture NZFS 312; on a canker on stem of *P. radiata*, Dipton Forest (Southland), 20.xi.2001, R.Thum, NZFRI-M 4613; on a canker on stem of *P. radiata*, Wether Hill, near Lumsden (Southland), 18.iv.2002, R.Thum, NZFRI-M 4635; on a canker on stem of *P. radiata*, Tokoit Forest, near Milton (Dunedin), 8.xi.2002, M.A.Dick, NZFRI-M 4814.

New Zealand distribution: Dunedin (3), Southland (3).

Nectria fuckeliana is one of three similar species of *Nectria* recorded on living conifers. One of the other two, *N. pinea* Dingley, has been recorded on *Pinus radiata* in New Zealand (Dingley 1951). The third, *N. neomacrospora* Booth & Samuels, is not present in this country. The characteristics of the three species are given in Table 1.

TABLE 1—Characteristics of *Nectria fockeliana*, *N. neomacrospora*, and *N. pinea*

Characteristics	<i>Nectria fockeliana</i> *	<i>Nectria neomacrospora</i> †	<i>Nectria pinea</i> ‡
Stroma	Well-developed, erumpent	Well-developed, erumpent	Weakly developed, barely erumpent
Ascomata	Red to dark maroon red, dark ostiolar disc, aggregated in groups of 30–100 or more, 0.2–0.3 mm dia.	Orange to red to reddish brown, dark ostiolar disc, aggregated in groups of 30 to 100, 0.3–0.6 mm dia.	Orange-yellow to reddish brown, dark ostiolar disc, solitary or aggregated in groups of up to 30, 0.2–0.5 mm dia.
Asci	Cylindrical, 90–110 × 9–12 µm	Cylindrical, 85–130 × 9–12 µm	Cylindrical, 75–100 × 6–10 µm
Ascospores	Broadly elliptical, 1-septate, 14–18 × 6–7 µm, smooth or verruculose	Broadly fusoid, 1-septate, 10–22 × 4–7 µm, verrucose	Elliptical, 1-septate, 13.5–16 × 4.5–6 µm, smooth
Microconidia	Oval, 0-septate, 5–7 × 2–3 µm, smooth	Oval, 0-septate, 5–8 × 2–3 µm, smooth	None
Macroconidia	Cylindrical, 2–6-septate, 21–45 × 4–5 µm, smooth	Cylindrical, 3–7-septate, 30–90 × 3–7 µm, smooth	Cylindrical, 3–6-septate, 45–80 × 4–7 µm, smooth
Main hosts	<i>Pinus radiata</i> *, <i>Picea</i> spp.†	<i>Abies</i> spp.	<i>Pinus</i> spp.
Nitrogen utilisation	No growth on media with nitrate as the sole nitrogen source	Good growth on media with nitrate as the sole nitrogen source	No growth on media with nitrate as the sole nitrogen source

* Authors' data

† Data from Booth (1966) and Ouellette (1972).

‡ Data from Dingley (1951) and from observations of the authors

Nectria pinea can be readily distinguished from the other two *Nectria* species on conifers by its barely erumpent, weakly developed stromata, ascomata which are either solitary or in groups of less than 30 and lack of microconidia in culture. The differences between *N. fuckeliana* and *N. neomacrospora* are less marked. *Nectria neomacrospora* has slightly longer ascospores and longer macroconidia than *N. fuckeliana*. It can also, unlike *N. fuckeliana*, utilise nitrate as a nitrogen source. The major difference between the species lies in their pathogenicity to species of *Abies* and *Picea*. Ouellette (1972) carried out pathogenicity tests on both species and showed that *N. fuckeliana* was a weak wound parasite, mainly of *Picea* spp., whereas *N. neomacrospora* was a primary pathogen, capable of causing dieback in species of *Abies*.

Nectria fuckeliana has been frequently reported as an invader of wounds, mainly of *Picea* spp. (and, rarely, of *Abies* spp.) in Europe (Laing 1947; Delatour 1976; Roll-Hansen & Roll-Hansen 1980; Huse 1981; Vasiliauskas *et al.* 1996; Metzler 1997; Vasiliauskas & Stenlid 1998) and in North America (Smerlis 1969; Ouellette 1972). Roll-Hansen & Roll-Hansen (1979) showed that the presence of *N. fuckeliana* in apparently undamaged stems was always traceable to healed old stem wounds or dead branch traces. Pathogenicity tests carried out in this laboratory on 4-year-old *Pinus radiata* have shown that the New Zealand isolates of *N. fuckeliana* are able to colonise wounds and slowly invade sound wood.

In New Zealand, this fungus has been consistently found on pruning wounds associated with narrow, long cankers which may extend several metres, both up and down the trunk. Cankers extend considerably further up the stem from the point of initial infection than downwards. Affected stems often become deeply fluted and badly malformed. Trees are usually not killed but may become prone to wind breakage. The damage associated with the fungus is restricted to small groups of trees within a stand.

Caulicolous Ascomycota

Ophiovalsa betulae (L. Tulasne & C. Tulasne) Petrak 1966 (1965)

Sydowia 19: 275.

Anamorph: *Disculina betulina* (Saccardo) Höhnelt 1916

Sitzungsberichten der Kaiserlichen Akademie der Wissenschaften in Wien, Mathematisch-naturwissenschaftliche Klasse, Abteilung I, 125: 108.

Stroma conical, pseudoparenchymatous, dark brown to black, up to 3 mm in diameter at the base and 1 mm high, erumpent through bark, rupturing the periderm and exposing a dark brown to black disc on which up to 10 protruding ostioles are visible as black papillae. Ascomata perithecial, aggregated in a group of up to 10, embedded in irregular layers in the cortex at the base of the stroma with their necks (up to 400 μm long) collectively erumpent through the stroma. Perithecia oval to globose with a flattened base, black, 0.4–0.6 mm in diameter, wall up to 60 μm thick. Asci cylindrical, 70–125 \times 5–9 μm , easily detached and lying free. Ascospores cylindrical-fusoid, slightly curved, ends rounded, 0-septate, 30–75 \times 3–8 μm , smooth, hyaline. Conidia developing in locules on the sides of the stroma, cylindrical, curved, ends rounded, 30–70 \times 3–6 μm , smooth, hyaline.

Habitat: on dead and dying branches of *Betula pendula*.

Specimens examined: on dead branches of *Betula pendula*, Central Park, Wellington (Wellington), 12.vi.2001, B.J.Rogan, NZFRI-M 4537; on dead and dying branches of *B. pendula*, St Mary's Church, New Plymouth (Taranaki), 7.viii.2002, B.J.Rogan, NZFRI-M 4812.

New Zealand distribution: Taranaki (1), Wellington (1).

The fungus was found on silver birch trees showing dieback of branches. Its pathogenicity has not been tested but the fungus is generally regarded as a saprophyte (Reid & Booth 1987). It has been beautifully figured (as *Cryptospora betulae*) by Tulasne & Tulasne (1863).

Caulicolous Anamorphic fungi

Coryneum betulinum Schulzer 1882

Rad Jugoslavenske Akademije Znanosti i Umjetnosti, Matematičko-Prirodoslovnoga Razreda 64: 3.

Conidiomata acervular, discrete, scattered, abundant, subepidermal becoming erumpent, rupturing the periderm, elongate oval, dark brown, 0.6–0.8 mm long. Conidiophores formed from the upper cells of the acervulus, cylindrical, branched, pale brown. Conidiogenous cells holoblastic, cylindrical, pale brown. Conidia holoblastic, formed singly from the apex of each conidiogenous cell, broadly fusiform, straight, tapering towards the obtuse apex, base truncate, often with a part of the conidiogenous cell attached, 2–5 distoseptate, 24–35 × 12–15 µm, cell lumina considerably reduced, smooth, light brown, apical cell paler than the rest.

Habitat: on dead branches and twigs of *Betula pendula*.

Specimen examined: on dead branches and twigs of *Betula pendula*, Central Park, Wellington (Wellington), 12.vi.2001, B.J.Rogan, NZFRI-M 4532.

New Zealand distribution: Wellington (1).

Identification of this fungus has been based on the description given by Sutton (1975). He pointed out that the application of the name was tentative as he had not seen the type or authenticated material of the species. The fungus has been found growing in mixture with *Ophiovalsa betulae*. Pathogenic status of this fungus is uncertain.

Fusarium merismoides Corda 1838

Icones Fungorum 2: 4.

Description of cultures:

On Potato Dextrose agar

Colonies slow growing (40 mm in diameter after 10 days at 25°C), some appear as a slimy, apricot to orange mass without any visible mycelium; others have sparse, felted orange-yellow to orange mycelium with a white fringe.

On Carnation Leaf agar

Chlamydoconidia absent. Conidiophores either simple lateral phialides (conidiogenous cells) formed in groups on the hyphae or a cluster of 3–9

phialides may arise from a basal cell. Phialides often aggregated to form pinnote, apricot to orange, sporodochia. Phialides obclavate to cylindrical, with a wide apical pore, $12\text{--}20 \times 3\text{--}5 \mu\text{m}$. Macroconidia enteroblastic, fusoid, straight, 3–5-septate, $35\text{--}44 \times 3\text{--}5 \mu\text{m}$, smooth, hyaline, apex rounded and slightly hooked, foot cell notched. Microconidia absent.

Habitat: on dead or dying twigs of many host species.

Specimens examined: on dead twigs of *Acmena smithii*, Kerikeri (Northland), 11.vi.1994, W.Hastings, culture NZFS 275; on dead and dying twigs of *Cotoneaster* sp., Kaiwharawhara Highway Reserve, Wellington (Wellington), 31.viii.2000, B.J.Rogan, culture NZFS 484; on dead twigs of *Corokia cotoneaster*, Virginia Lake, Wanganui (Wanganui), 6.iii.2001, B.J.Rogan, culture NZFS 662; on dead and dying twigs of *Hoheria* sp., Victoria Esplanade, Palmerston North (Wanganui), iii.1999, B.J.Rogan, culture NZFS 275.02; on dead and dying twigs of *Paulownia tomentosa*, Truby King Dell, New Plymouth (Taranaki), 16.xi.2000, B.J.Rogan, culture NZFS 558; on dead and dying twigs of *Podocarpus totara*, Waimate (Northland), 14.xi.1998, D.A.Bartram, culture NZFS 275.01; on dead and dying twigs of *Podocarpus totara*, Marshland Hill, New Plymouth (Taranaki), 13.vi.2000, J.A.Bartram, culture NZFS 434; on dead and dying twigs of *Prumnopitys ferruginea*, Titi Creek, Akatarawa Forest ((Wellington), 28.iii.2000, R.Blake, culture NZFS 373; on dead twigs of *Sorbus aucuparia*, Heads Road cemetery, Wanganui (Wanganui), 12.ix.2000, B.J.Rogan, culture NZFS 487.

New Zealand distribution: Northland (3), Bay of Plenty (1), Taranaki (2), Wanganui (3), Wellington (2).

Identification of *F. merismoides* was based on comparison with cultural descriptions of this species published by Booth (1971), Domsch *et al.* (1980), and Nelson *et al.* (1983). Rossman *et al.* (1999) have recorded that the *Fusarium* anamorphs of two New Zealand species of *Cosmospora* (*C. dingleyae* Lowen and *C. obscura* Lowen) are characterised by slow-growing, slimy, orange cultures similar to *F. merismoides*. Cultures of these two species have not been compared with our isolates. A comparison of our cultures with the published descriptions of cultures of the two species shows several apparent differences, particularly in the morphology of the conidiophores. Another difference is that our cultures were obtained from plant tissue from specimens that bore no fungal fructifications, whereas the *Cosmospora* cultures were from ascospores. These differences are, however, not conclusive, mainly because the media used by Rossman *et al.* (1999) are different from those used in our study. Our identification of *F. merismoides* must therefore be held to be tentative.

This fungus has been associated with dieback on *Cotoneaster* sp., *Hoheria* sp., *Paulownia tomentosa*, *Podocarpus totara*, and *Prumnopitys ferruginea*. Pathogenicity tests in this laboratory have shown it to be a weak wound pathogen of *Podocarpus totara*. Its pathogenicity must be held to be doubtful, however, as *F. merismoides* is primarily a soil fungus (Domsch *et al.* 1980) and there are no reliable records of its association with any plant disease.

Foliicolous anamorphic fungi

Leptomelanconium australiense B. Sutton 1974

Nova Hedwigia 25: 163.

Leaf spots amphigenous, angular, vein limited, up to 15 × 10 mm, often confluent and then much larger (up to 40 mm long), light greyish brown with a dark brown margin. Conidiomata acervular, hypophyllous, scattered, abundant, subepidermal becoming erumpent, pushing up a flap of the epidermis, brown, 0.1–0.3 mm in diameter. Conidiogenous cells arising from the upper cells of the acervulus, holoblastic, cylindrical to doliiform, pale brown, verruculose towards the apices, medium brown, with 1–2 annellations. Conidia formed singly at the apex of the conidiogenous cells, irregular in shape but mainly ellipsoid, 0-septate (very occasionally 1-septate), 8–12 × 4–6 µm, verruculose, medium brown, apex obtuse, base truncate.

Habitat: on living leaves of *Eucalyptus* spp.

Specimens examined: on living leaves of *Eucalyptus ficifolia*, Ahuriri Park, Napier (Hawke's Bay), 19.ix.2002, C.Kay, NZFRI-M 4817; on living leaves of *E. ficifolia*, Link Road, Mount Maunganui (Bay of Plenty), 31.x.2002, L.Renney, NZFRI-M 4888.

New Zealand distribution: Bay of Plenty (1), Hawke's Bay (1).

Pathogenic status of this fungus in unknown.

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