



Fungi Silvicolae Novazelandiae: 8

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Abstract

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

Caulicolous hyphomycetes: *Trimmatostroma betulinum* (Corda) S.Hughes on *Betula papyrifera* Marshall and *Betula pendula* Roth.;

Foliicolous coelomycetes: *Discula betulina* (Westendorp) Arx on *Betula pendula*; *Fusicoccum* sp. on *Ginkgo biloba* Linnaeus; and

Foliicolous hyphomycetes: *Trimmatostroma abietis* Butin & Pehl on *Pinus muricata* D.Don and *Pinus radiata* D.Don.

Keywords: fungi, New Zealand, fungal descriptions

Introduction

The purpose of this series of papers is to provide descriptions of fungi recently recorded in New Zealand. Most of these records come from specimens sent to the Forest Health Reference Laboratory at Scion for identification. In this eighth paper in the series, descriptions are provided for two coelomycetous and two hyphomycetous fungi. For examination, sections were cut using a freezing microtome. Sections and squash preparations were mounted in water.

The location record of local specimens examined is followed by the name of the arbitrarily defined geographical region (Crosby et al., 1998) to which the specimen belongs. The account of the New Zealand distribution of an organism is based principally on the Forest Health database maintained by Scion and it is presented for each geographical region, with the number of records for

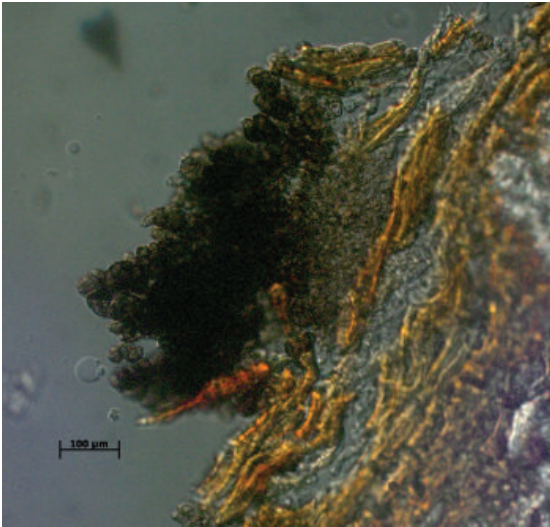
that region given in parentheses. Not all records in the database are supported by voucher specimens.

Description of Fungi

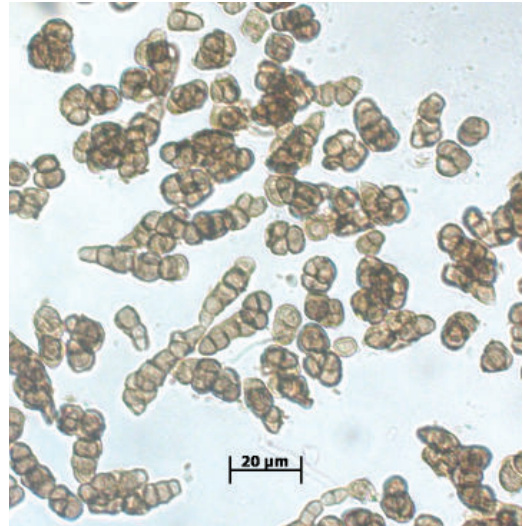
Caulicolous hyphomycetes

Trimmatostroma betulinum (Corda) S.Hughes, 1953 (Figures 1A & B) *Canadian Journal of Botany*, 31, 628.

Mycelium internal. Conidiomata stromatic, sporodochial, pulvinate, scattered, subepidermal, becoming erumpent through the bark, elongate-oval, black, pseudoparenchymatous, large, 1-3 x 0.5-1.5 mm. Conidiophores arising from the upper cells of the



A: Stroma (Bar = 100 µm)



B: Conidia (Bar = 20 µm)

FIGURE 1: *Trimmatostroma betulinum*

pseudoparenchyma, not branched, closely packed together forming sporodochia, dark brown, smooth, (15)-24-(35) µm long. Conidia formed in branched, flexuous basipetal chains, fragmenting, highly variable in shape, ellipsoidal, clavate, pyriform, subglobose to cylindrical, 1 to several transverse and oblique septa, (6)-14-(20) x (3)-12-(16) µm, brown, smooth.

Habitat: Bark of twigs and branches of *Betula papyrifera* Marshall and *Betula pendula* Roth. Also reported in New Zealand on twigs of *Salix cinerea* Linnaeus (PDD 81050).

Specimens examined: on bark of twigs and small branches of *Betula pendula*, Holmes Road (North), Waiouru Army Base, Waiouru (Taupo), 30.vi.2006, B.J. Rogan, NZFRI-M 5075; on bark of twigs of *Betula papyrifera*, Lake Tekapo (Mackenzie), 3.vi.2007, B.H. Doherty, NZFRI-M 5427.

New Zealand distribution: Taupo (1), Mackenzie (1), Mid-Canterbury (1).

Trimmatostroma betulinum is reported to be extremely common on fallen twigs and branches of *Betula* spp. in Britain (Ellis & Ellis, 1997). It is occasionally found on birch leaves and has also been isolated from pine litter (Ellis, 1971). Barengo et al. (2000) reported that in Switzerland, *T. betulinum* was the second most frequently isolated endophyte from twigs of *Betula pubescens* Ehrhart (the most common endophyte was *Ophiovalsa betulae* (Tulasne & C.Tulasne) Petrak). It was more common in 4-year-old shoots than in 1-year-old shoots. The fungus is regarded as a saprophyte.

Foliicolous coelomycetes

Discula betulina (Westendorp) Arx 1957 (Figure 2) *Verhandelingen der Koninklijke Nederlandse Akademie van Wetenschappen, Afd. Naturkunde, 2de Reeks, 51(3), 64.*
= *Gloeosporium betulinum* Westendorp 1867, in Kickx, *Flore Cryptogamique des Flandres*, 2, 94.

Teleomorph (not found in New Zealand): *Gnomonia intermedia* Rehm 1908, *Annales Mycologici* 6: 489.

Conidiomata acervular, gregarious, intra-epidermal, flat, pale brown, (115)-135-(165) µm in diameter, opening by irregular splitting of the upper wall. Conidiomata on large (up to 20 x 10 mm) brown, necrotic leaf spots on lower surfaces of leaves. Basal portion of the acervulus made of isodiametric yellowish cells, 10-12 µm thick. Conidiophores arising from the upper cells of the basal stratum, straight or curved, tapering towards the apices, hyaline, (13)-15-(17) µm x 3-5 µm, tapering to 1.5-2 µm at the apices. Conidia ellipsoidal to cylindrical, straight to slightly curved, 0-septate, (5)-8-(11) x 1.5-3 µm, smooth, hyaline.

Habitat: Living leaves of *Betula pendula*.

Specimen examined: on leaves of *Betula pendula*, Print Place, Riccarton, Christchurch (Mid-Canterbury), 27.ii.2007, P.M. Bradbury, NZFRI-M 5421; culture NZFS 2819.

New Zealand distribution: Mid-Canterbury (1).

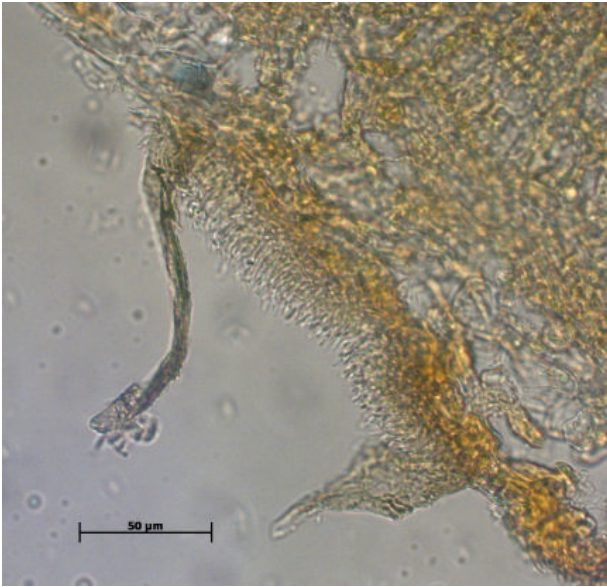


FIGURE 2: *Discula betulina* Conidioma (Bar = 50 µm)

Discula betulina is reported from North America and Europe on many species of birch, causing premature defoliation. The disease is most prominent on the lower branches and may move upwards from the base of the tree (Phillips & Burdekin, 1982; Sinclair & Lyon, 2005). Green (2004) found that *D. betulina* was one of the main colonisers of both diseased and healthy shoots of *B. pendula* and *B. pubescens* in Scotland. In a pathogenicity trial, she found that *D. betulina* caused lesions on stems and shoots of both birch species, including non-wounded current shoots. The fungus has caused little damage in New Zealand. The anamorph-teleomorph connection has been established only recently (Green & Castlebury, 2007).

Fusicoccum sp. (Figures 3A & B)

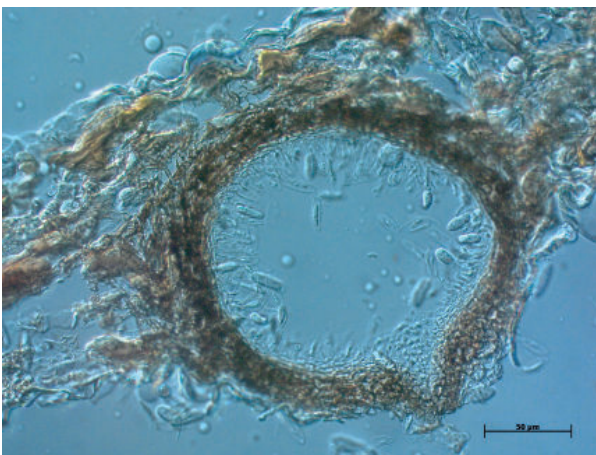
Conidiomata stromatic, pycnidial, gregarious, globose to oval, uniloculate, ostiolate, immersed, black, (130)-165-(180) µm in diameter, wall composed of 2-4 layers of isodiametric brown cells, (15)-23-(30) µm thick, with an inner layer of flattened hyaline cells, 5-9 µm thick. Conidiomata on large, angular light brown to straw-coloured lesions with a darker brown margin on the upper surfaces of leaves, covering a large part of the leaf in many cases, up to 40 mm wide and 35 mm deep. Conidiophores formed from the inner cells of the pycnidial wall, cylindrical, straight, hyaline, (10)-12-(14) µm long, conidiogenous cells holoblastic, producing a single apical conidium. Conidia fusiform, straight to slightly curved, 0-septate, (16)-19-(23) x (3)-5-(6) µm, smooth, hyaline, eguttulate, apex obtuse, base truncate. Cultures on 2% malt extract agar fast growing (20 mm per day at 25 °C), colonies floccose, greenish grey with abundant greyish aerial mycelium, pycnidia formed within 4 days, exuding whitish tendrils of conidia after 8-9 days. Conidia produced in culture identical to those found in nature.

Habitat: Living leaves of *Ginkgo biloba* Linnaeus.

Specimen examined: on leaves of *Ginkgo biloba*, Central Reserve, Portage Road, Otahuhu, Auckland City (Auckland), 14.ii.2007, S.K. Jones, NZFRI-M 5418, culture NZFS 2818.

New Zealand distribution: Auckland (1).

Ginkgo biloba is notable for its resistance to infection by fungi (Hepting, 1971). The *Fusicoccum* sp. described here is the first fungus to be recorded in New Zealand on leaves of *G. biloba*. Only three other fungal species have been recorded as possible leaf pathogens of



A: Conidioma (Bar = 50 µm)



B: Conidia (Bar = 20 µm)

FIGURE 3: *Fusicoccum* sp.

G. biloba in other parts of the world – *Colletotrichum* state of *Glomerella cingulata* (Stoneman) Spaulding & Schrenk causing anthracnose (Sinclair & Lyon, 2005), *Phomopsis occulta* var. *ginkgoina* Grove (Grove, 1935) with alpha conidia measuring 5-8 x 2 µm and beta conidia 18-25 x 1-1.5 µm and *Phyllosticta ginkgo* Brunaud (Hepting, 1971) with ovoid conidia measuring 3-8.5 x 2 µm. In an attempt to identify the *Fusicoccum* to species level, DNA was extracted from mycelium scraped from the surface of cultures growing on 2% malt extract agar plates; the internal transcribed spacer (ITS) regions of the ribosomal DNA repeat were amplified and sequenced. The Basic Local Alignment Search Tool (BLAST) was then applied in a search of sequences deposited in GenBank. Sequence data from 35 species from closely related anamorphic genera within the Botryosphaeriaceae, including *Fusicoccum* have been deposited in Gen Bank but no close match was found to any of these. Although the identity of this fungus still needs to be confirmed, it is important to describe this find as it is the first time a fungus has been found on living leaves of *Ginkgo biloba* in New Zealand.

Foliicolous hyphomycetes

Trimmatostroma abietis Butin & Pehl 1996
(Figure 4) *Antonie van Leeuwenhoek*, 69, 204.

Mycelium internal. Conidiomata stromatic, sporodochial, pulvinate, gregarious, stromata black, originating in substomatal chambers, forming a cushion, finally becoming erumpent through the stomatal opening, up to 50-70 mm high and 30-80 µm wide but stroma highly variable in morphology, often limited to a few basal cells developing in the stomata. Conidiophores arising from the surface of the erumpent stroma, closely packed together forming a sporodochium, dark brown. Conidia formed in unbranched, basipetal chains, fragmenting, subspherical to cylindrical, septation variable but most commonly 1-septate, 7-12 x 4-6 µm, olivaceous brown to dark brown, smooth.

Habitat: Living needles of *Pinus muricata* D. Don and *Pinus radiata* D. Don.

Specimens examined: in needles of *Pinus muricata*, Mairs Beach, Westport (Nelson), 1.vii.2001, P.M. Bradbury, NZFRI-M 4490; in needles of *P. radiata*, Rugby League Park, Wellington (Wellington), 4.ix.2001, B.J. Rogan, NZFRI-M 4552.

New Zealand distribution: Auckland (1), Wellington (2), Nelson (1), Buller (1), Mid-Canterbury (6), South Canterbury (2), Southland (1).

In Europe, *T. abietis* has been isolated from a remarkable variety of substrates – Butin et al. (1996)

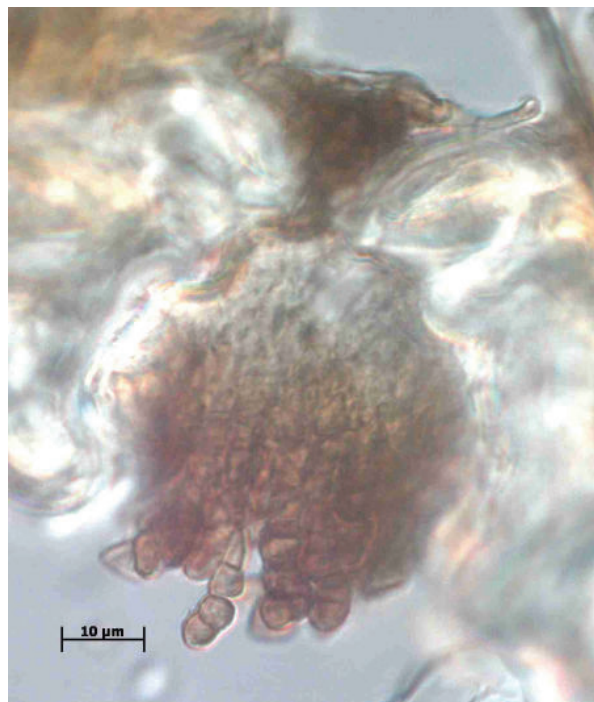


FIGURE 4: *Trimmatostroma abietis* Stroma
(Bar = 10 µm)

list isolates from needles of *Abies* and *Pinus* spp., foodstuffs, sandstone and skin lesions of human patients. In New Zealand, it has been found only on and in needles of conifers. It is often associated with black banding of dead portions of living needles. In cross section, such bands are seen to be colonised by dark brown hyphae which yield cultures of *T. abietis*. The fungus went unidentified for a long time because it is often limited to a few basal cells developing in the plant stomata and only recently were the larger, conidia-bearing stromata found. Although it is often found inside dead portions of living needles, isolates used in a pathogenicity test were not capable of invading living needles of *P. radiata*.

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