Background: Descriptions of five species of fungi recorded on trees and shrubs are given in this paper. Three species are recorded from New Zealand for the first time, a new combination is proposed for one species and the fifth species has been recorded only once before. The fungi are:

Fungal species described:

Corticolous Ascomycota: *Rugonectria castaneicola* (W.Yamamoto & Oyasu) Hirooka & P.Chaverri on *Quercus robur* Linnaeus × *canariensis* Willdenow.

Folicolous Ascomycota: *Acrospermum gaubae* Petrak on *Banksia ericifolia* Linné fil. × *spinulosa* J.E.Smith and on *B. spinulosa* J.E.Smith; *Dictyothyrium hibisci* (F.Stevens) comb. nov. on *Hibiscus rosa-sinensis* Linnaeus.

Folicolous coelomycetes: *Pestalotiopsis adusta* (Ellis & Everhart) Steyaert on *Macadamia tetraphylla* L.A.S.Johnson; *Septoriella halensis* B.Sutton & Melnik on *Pachystegia insignis* (Hooker fil.) Cheeseman.

Keywords: Fungi; New Zealand; Fungal descriptions; Trees; Shrubs

Background

The purpose of this series of papers is to provide descriptions of fungi recently recorded on trees and shrubs in New Zealand. Most of these records come from specimens sent to the Forest Health Reference Laboratory at this Institute (the New Zealand Forest Research Institute trading as Scion) for identification. In this tenth paper of the series, descriptions are provided of three ascomycetous and two coelomycetous fungi. For examination, sections were cut using a freezing microtome. Sections and squash preparations were mounted in lactophenol.

The location record of local specimens examined is followed by the name of the arbitrarily defined geographic region (Crosby et al. 1998) in which the specimen was collected. The account of the New Zealand distribution of an organism is based principally on herbarium (NZFRI-M) records and on the database maintained by the New Zealand Forest Research Institute and is presented for each geographical region, with the number of records for that region in parentheses.

Descriptions of Fungi

Corticolous Ascomycota

*Rugonectria castaneicola* (W.Yamamoto & Oyasu) Hirooka & P.Chaverri (Figures 1a, b & c)

Habitat: Cankers on living stem of *Quercus robur* Linnaeus × *canariensis* Willdenow.

Specimen examined: on cankers on stem of *Quercus robur* × *canariensis*, Carbine Road, Auckland (Auckland), 4.iii.2011, B.J. Rogan, NZFRI-M 5734.
New Zealand distribution: Auckland (1).

*Rugonectria castaneicola* has been recorded on cankers on stems of *Castanea crenata* Siebold & Zuccarini (Yamamoto et al. 1957) and has been shown to be a wound pathogen causing perennial cankers on stems of *Abies veitchii* Lindley and *Acer crataegifolium* Siebold & Zuccarini (Kobayashi et al. 2005). The fungus has also been found on cankered stems of many broadleaf species including *Quercus* spp. (Hirooka et al. 2005).

This is the only record of *R. castaneicola* from New Zealand. The infected tree has been removed (Ho et al. 2014) and the fungus has not been recorded in New Zealand since that time.

Foliicolous Ascomycota

*Acrospermum gaubae* Petrak (Figures 2a, b, c & d)

_Sydowia_ 9: 564, 1955.

Anamorph not known.

Leafspots none. Ascomata perithecial, solitary, superficial, seated loosely on the underside of leaves among leaf hairs without a firm point of attachment, doliform to nearly cylindrical, surface covered in large scales, reddish brown, becoming darker in KOH, flattened apically, ostiolate, (320)-400-(450) μm high, diameter (170)-200-(240) μm at base and (110)-140-(190) μm at the top. Perithecial wall in two layers: outer layer of angular cells with reddish brown walls with the outermost cells forming scales, 15–20 μm wide; inner layer of hyaline, thin-walled, elongate cells, 5–15 μm wide. Asci unitunicate, 4-8-spored, long clavate, without specialised apical discharge mechanism, thin-walled, evanescent at maturity, (150)-180-(220) × 6–7 μm. Ascospores fusiform, rounded at one end and tapering at the other, multisepate, (115)-140-(160) × 1–2 μm, sometimes disarticulating, parallel and twisted round each other in the ascus, hyaline, smooth.

_Habitat:_ Superficial among leaf hairs on the underside of living leaves of *Banksia spinulosa* J.E.Smith and *B. ericifolia* Linné fil. × *spinulosa* J.E.Smith.

_Specimens examined:_ on living leaves of *Banksia ericifolia × spinulosa*, Te Rapa South, Hamilton (Waikato), 10.xi.2008, J.A. Bartram, NZFRI-M 5514; on living leaves of *B. spinulosa*, Seymour St., Picton (Marlborough Sounds), 27.i.2010, M. Hansen, NZFRI-M 5727.

New Zealand distribution: Waikato (1), Marlborough Sounds (1).

The Investigation and Diagnostic Centre of the Plant Health and Environment Laboratory of the former Ministry of Agriculture and Forestry (now Ministry for Primary Industries) did a molecular analysis on DNA extracted from ascomata of this fungus but found no match with any of the registered sequences. A search of the literature and use of various keys led us to the revised family
**Acrospermataceae** (Minter et al. 2007) and the genus *Acrospermum*. A search in *Index Fungorum* yielded the names of 66 species and subspecies in *Acrospermum*. We then began to examine the protologues of each of these names. That for *Acrospermum gaubae*, described by Petrak (1955) from *Banksia ericifolia* from Pigeon House Mountain in the Budawang Range, New South Wales, Australia, matched our collections well, except that the New Zealand specimens are larger. A comparison is given in Table 1.

This is the first record of *A. gaubae* in New Zealand; indeed, apart from the initial report of Petrak (1955), it appears to be the only other record of the fungus in the literature. *Acrospermum gaubae* is purely superficial and causes no damage to its hosts.

*Dictyothyrium hibisci* (F.Stevens) comb.nov. (Figures 3a, b, c & d) ≡ *Microthyriella hibisci* F.Stevens, Bernice P. Bishop Museum Bulletin 19: 88, 1925

Anamorph not known.

Leaf spots none. Ascomata thyriothecial, scutate, roughly circular, superficial, densely gregarious, arranged in approximately concentric circles, appressed closely to the cuticle, superficial mycelium absent; on upper surfaces of leaves. Upper wall of thyriothecium composed of dark brown angular cells forming a reticulum, basal wall not seen, (100)-105-(120) μm in diameter × (30)-36-(40) μm high, ostiole distinct, (16)-17-(20) μm in diameter, occasionally with two or three smaller secondary ostioles. Asci ovate to globose conical, 8-spored, (19)-21-(23) × (12)-13-(14) μm.

---

**Table 1 Characteristics of Acrospermum gaubae**

| Character | Petrak (1955) | NZFRI-M 5514 |
|-----------|---------------|--------------|
| **Perithecia** | Hypophyllous, solitary, reddish brown, lageniform, broadly attached to leaf hairs, ostiolate, 100-300 μm high, 130–170 μm broad at the base. Wall 25-35 μm wide, parenchymatous, outer layer of reddish cells, inner layer subhyaline. | Hypophyllous, solitary, reddish brown, doliform to cylindric, seated among leaf hairs, ostiolate, 320–450 μm high, 170–240 μm broad at base. Wall 20–35 μm wide, outer layer of angular cells with reddish brown walls, inner layer of hyaline, elongated cells. |
| **Asci** | Elongate cylindric, rounded at the top, 4-spored, 110–140 × 6–7 μm. | Elongate clavate, without apical discharge mechanism, 4-8-spored, 150–220 × 6–7 μm. |
| **Ascospores** | Filiform, multiseptate, disarticulating. | Filiform, multiseptate, sometimes disarticulating, 115–160 × 1–2 μm. |
| **Host** | *Banksia ericifolia* | *Banksia ericifolia* × *spinulosa* |

---

**Figure 2 Acrospermum gaubae.** a Ascoma on leaf (Bar = 0.2 mm). b T.S. Ascoma (Bar = 100 μm). c Asci and ascospores (Bar = 20 μm). d Ascospores (Bar = 10 μm).
Ascospores fusiform, 1-septate with the upper cell larger than the lower cell, (10)-12-(13) × (4)-5-(6) μm, smooth, hyaline.

Habitat: Living leaves of *Hibiscus rosa-sinensis* Linnaeus.

Specimens examined: On living leaves of *Hibiscus rosa-sinensis*, Rapahoe House, Gloucester Park Road, Onehunga, Auckland (Auckland), 19.ix.2012, J. Goodenough, NZFRI-M 5764; on leaves of *Hibiscus* sp., Meiland Place, West Auckland, Auckland (Auckland), 20.ix.2001, J.A. Bartram, NZFRI-M 4589; on leaves of *H. rosa-sinensis*, Sunken Garden, Marine Parade, Napier (Hawkes Bay), 23.v. 2003, B.J. Rogan, NZFRI-M 5024.

*New Zealand distribution:* Northland (1), Auckland (2), Bay of Plenty (1), Gisborne (1), Hawkes Bay (1).
This fungus was originally described from Hawaii on Hibiscus sp. as Microthyriella hibisci (Stevens 1925). According to Müller and von Arx (1962) Microthyriella Höhnél is a synonym of Schizothyrium Desmazières. This view is generally accepted (Kirk et al. 2008) and most species previously placed in Microthyriella have been transferred to Schizothyrium. Müller and von Arx (1962) also pointed out that Microthyriella hibisci, did not follow the type of Microthyriella and was wrongly placed in that genus. Microthyriella rickii (Rehm) Höhnél, the type species of Microthyriella (in common with species in Schizothyrium), does not have an ostiole, the whole surface of the shield splitting and allowing the ascospores to escape. As Microthyriella hibisci has a distinct ostiole, it does not belong in Microthyriella and has to be redispersed to a genus other than Schizothyrium. Morphologically, M. hibisci belongs to the Micropeltidaceae and all keys (Batista, 1959; Müller and von Arx, 1962; Luttrell 1973; von Arx and Müller 1975) show that it is best placed in Dictyothyrium Theissen. Molecular analysis yielded no close matches to any records in Genbank.

The thyriothecia of the fungus are entirely superficial, the shield-shaped fruiting bodies merely sitting on the leaf surface without a basal wall. No superficial mycelium was seen and there is no penetration of the host tissue. The concentric arrangement of the thyriothecia (Figure 3A) makes the fungus easily recognisable. It is not uncommon in New Zealand. It has also been recorded (as Microthyriella hibisci) in Australia (Walker and McLeod 1971).

Foliicolous coelomycetes

Pestalotiopsis adusta (Ellis & Everhart) Steyaert (Figures 4a & b)

Transactions of the British Mycological Society 36: 82, 1953.

Leafspots roughly circular (5–10 mm in diameter), light brown to grey with a dark brown margin, on both surfaces of leaves but more commonly on the upper surface. Conidiomata acervular, subepidermal, later partly erumpent by the scaling off of an irregular disc-like portion of the epidermis exposing a black mass of conidia, scattered, 100–150 μm in diameter, acervular stroma composed of brown angular cells. Conidiogenous cells annelidic, hyaline, subcylindrical, up to 25 μm long. Conidia fusiform, 4-septate, straight or slightly curved, (20)-22-(24) × (5)-7-(8) μm, bearing apical appendages, basal cell obconic, hyaline, (2)-3-(4) μm long with a pedicel 6–7 μm long, 3 median cells subcylindrical, concolorous, olivaceous brown, not or slightly constricted at the septa, together (14)-16-(19) μm long, apical cell conical, hyaline, (4)-5-(6) μm long, bearing a crest of 2–3 (mostly 3) divergent, tubular, hyaline, filiform, flexuous, 18–20 μm long appendages.

Habitat: Living leaves of Macadamia tetraphylla L.A. S. Johnson.

Specimen examined: On living leaves of Macadamia tetraphylla, Puketutu Island, Mangere, Auckland (Auckland), 26.vi.2012, C. Inglis, NZFRI-M 5742.

New Zealand distribution: Auckland (2).

Pestalotiopsis adusta has been recorded once before on Macadamia tetraphylla from Titirangi, Auckland in 1976 (PDD 34322). The fungus is cosmopolitan but is more common in the sub-tropical and sub-temperate regions. It has a very wide host range; Guba (1961) listed 27 angiospermous species in 21 families (7 in the Rosaceae) as hosts. In New Zealand, it has been found on necrotic patches on living leaves of M. tetraphylla but the damage has been minor.

Septoriella halensis B.Sutton & Melnik (Figures 5a & b)

Mikologia i Fitopatologia 33: 369, 1999.

Leaf spots grey to straw-coloured with a broad dark brown margin, roughly circular, up to 5 mm in diameter,
on the upper surfaces of leaves. Conidiomata pycnidial, scattered, subepidermal, globose to subglobose, black, (160)-180-(210) × (130)-160-(190) μm, outer wall composed of dark brown angular cells, inner wall of thin-walled, hyaline cells, ostiole central, circular, surrounded by blackish brown, thick walled cells. Conidiophores absent. Conidiogenous cells lining the wall of the conidioma, hyaline, short cylindrical to ampulliform, holoblastic, 5–6 μm long. Conidia fusiform, with an obtuse apex and truncate base, 7-septate, not constricted at the septa, straight or slightly curved, (27)-32-(40) × (4)-5-(6) μm, verruculose, pale brown, bearing a 1–2 μm thick mucoid appendage at the apex and at the base.

Habitat: Leaf spots on living leaves of *Pachystegia insignis* (Hooker fil.) Cheeseman.

Specimen examined: On living leaves of *Pachystegia insignis*, Newton St., Tauranga (Bay of Plenty), 28. ix.2012, D.L. Brunt, NZFRI-M 5749.

New Zealand distribution: Bay of Plenty (1).

The genus *Septoriella* is characterised by mucoid appendage-bearing pale brown multiseptate conidia formed on holoblastic conidiogenous cells (Sutton 1980). The genus was reviewed later by Adrianova and Minter (2007) who recognised 11 species in the genus and provided a key to them. Only two of the species, *S. halensis* and *S. phragmitis* Oudemans have conidiomata (160–220 μm wide) and conidia (fusiform, 30–45 μm long and 5-7-septate) that are similar to those of the New Zealand fungus (Table 2).

A comparison of the three descriptions shows that the New Zealand fungus cannot be distinguished from *S. halensis*. Use of the key to accepted species of *Septoriella* (Adrianova & Minter 2007) also leads to *S. halensis*.

This is the first record of a species of *Septoriella* in New Zealand. Most of the eleven taxa accepted in the genus are from temperate areas, the only exception being *S. rockiana* (Petrak) Nag Raj from Hawaii. Ten species occur on monocotyledon families and only one, *S. viciae* Adrianova & Minter, has been recorded on a plant (*Vicia unijuga* A.Braun) belonging to a dicotyledon family (*Fabaceae*). This record of *S. halensis* on *P. insignis* adds another dicotyledon family (*Asteraceae*) to the list. Most species of *Septoriella* have been recorded on dead or dying leaves or culms and are regarded as saprobes. The New Zealand collections of *P. halensis* were from leaf spots on living leaves of *P. insignis* but whether the fungus was acting as a pathogen or not is not known.

### Table 2 Morphological characters of NZFRI-M 5749, *Septoriella halensis* and *S. phragmitis*

|                        | NZFRI-M 5749 (this paper) | *S. halensis* (Sutton and Melnik 1999) | *S. phragmitis* (Nag Raj 1993) |
|------------------------|---------------------------|--------------------------------------|-------------------------------|
| **CONIDIOMATA**        |                           |                                      |                               |
| Size (μm)              | 160-210 × 130-190         | 175 × 200                            | 200-220 × 200-450              |
| Form                   | Globose to subglobose     | Globose to subglobose                | Oval to subglobose             |
| Conidiogenous cells    | Short cylindrical to ampulliform, 5–6 μm long. | Cylindrical to ampulliform, 5–6 μm long. | Ampulliform, 4–8 μm long.      |
| **CONIDIA**            |                           |                                      |                               |
| Size (μm)              | 27-40 × 4-6               | 30-43 × 3.5-4.5                      | 29-46 × 3.0-3.5                |
| Form                   | Fusiform                  | Fusiform                             | Fusiform                      |
| Number of septa        | 7                         | (5–6) 7                              | (3)-5-(7)                     |
| Microconidia           | Absent                    | Absent                               | Present                       |
Competing interests
The authors declare that they have no competing interests.

Authors’ contributions
PG was responsible for the microscopy and MD did the photomicrography. Both authors have an equal share in species identification and preparation of descriptions. All authors have read and approved the final manuscript.

Acknowledgements
We thank Brent Rogan, John Bartram, Don Brunt, John Goodenough, Mark Hansen and Chris Inglis for collecting specimens. The critical comments of John Bain, Ruth Gadgil and Ian Hood are much appreciated.

Received: 28 September 2014 Accepted: 24 November 2014
Published online: 31 December 2014

References
Adrianova, TV, & Minter, DW. (2007). New species of Bartalinia and Septoriella from the Altai Mountains (Russia). Mycotaxon, 101, 297–313.
Batista, AC. (1959). Monografia dos Fungos Micractinaceae (Publicação No. 56, Instituto do Micologia, Universidade do Recife).
Crosby, TK, Dugdale, JS, & Watt, JC. (1998). Area codes for recording specimen localities in the New Zealand subregion. New Zealand Journal of Zoology, 25, 175–183.
Guba, EF. (1961). Monograph of Monochaetia and Pestalotia. Cambridge, Mass., U. S.A: Harvard University Press.
Hirooka, Y, Kobayashi, T, & Natsuaki, KT. (2005). Neonecrotia castaneicola and Neo. rugulosa in Japan. Mycologia, 97, 1058–1066.
Ho, H, Dick, M, Flint, H, Pearson, H, Rogan, B.J, & Alexander, B. (2014). A biosecurity post-border success story: detection and removal of Rugonectria canker fungus in an oak tree. Surveillance, 41, 45–46.
Kirk, PM, Cannon, PF, Minter, DW, & Stalpers, JA. (2008). Ainsworth & Bisby’s Dictionary of the Fungi. Wallingford, U.K: CABI.
Kobayashi, T, Hirooka, Y, Natsuaki, KT, Kawashima, Y, & Ushiyama, K. (2005). New canker diseases of Abies veitchii and Acer crataegifolium caused by Neonectria castaneicola. Journal of General Plant Pathology, 71, 124–126.
Luttrell, ES. (1973). Loculoascomycetes. In GC Ainsworth, FK Sparrow, & AS Sussman (Eds.), The Fungi, An Advanced Treatise (pp. 135–219). London, U.K: Academic Press.
Minter, DW, Peredo, HL, & Watson, AT. (2007). Acrospermum chilense sp.nov. from Chile and the Acrospermatales ord.nov. Boletino Sociedades Argentinas de Botanica, 42, 107–112.
Müller, E, & von Arx, JA. (1962). Die Gattungen der didymosporen Pyrenomyceten. Beiträge zur Kryptogamenflora der Schweiz, 11, 1–922.
Nag Raj, TN. (1993). Coelomycetous Anamorphs with Appendage-Bearing Conidia. Waterloo: Canada: Mycologue Publications.
Petrak, F. (1955). Neue Mikromyzeten der australischen Flora. Sydowia, 9, 559–570.
Stevens, FL. (1925). Hawaiian fungi. Bernice P. Bishop Museum Bulletin, 19, 88–89.
Sutton, BC. (1980). The Coelomycetes. Kew, U.K: Commonwealth Mycological Institute.
Sutton, BC, & Melnik, VA. (1999). Septoriella halensis sp. nov. from Germany. Mikologia i Fitopatologia, 33, 369–371.
von Arx, JA, & Müller, E. (1975). A re-evaluation of the bitunicate Ascomycetes with keys to families and genera. Studies in Mycology, 9, 1–159.
Walker, J, & McLeod, RW. (1971). New records of plant diseases in New South Wales. Agricultural Gazette of New South Wales, 82, 48–54.
Yamamoto, W, Maeda, M, & Oyasu, N. (1957). Some Nectriaceae and Elsinoe species from Japan. Science Reports of the Hyogo University of Agriculture, Series Agricultural Biology, 3, 15–18.