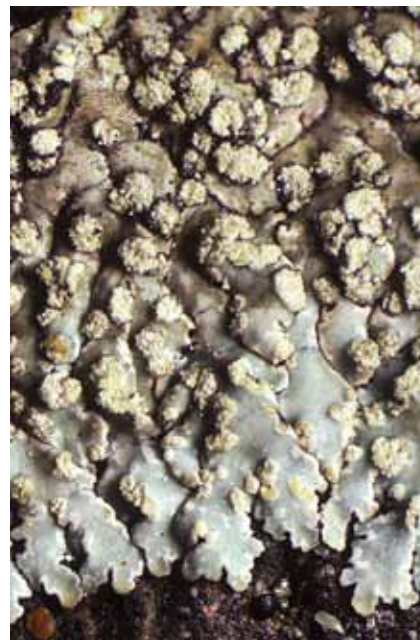


Australasian Lichenology

Number 80, January 2017 ISSN 1328-4401



Australasian Lichenology

Number 80, January 2017 ISSN 1328-4401

In Australasia, the cosmopolitan *Pyxine subcinerea* colonizes bark, lignum (fenceposts), and coastal rock, mostly in northern New Zealand and both eastern and western Australia (New South Wales, Queensland, and Western Australia). Among its notable traits are glistening patches of whitish laminal pruina, a yellow to ochre medulla, marginal soralia spreading to the upper lamina, and medullary lichexanthone (UV+ citrine yellow).

1 mm 

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New species and new records of buellioid lichens
(Physciaceae, Ascomycota) from New Zealand and Tasmania

John A. Elix

Research School of Chemistry, Building 137
Australian National University, Canberra, A.C.T. 2601, Australia
e-mail: John.Elix@anu.edu.au

Allison Knight

Department of Botany, University of Otago
PO Box 56, Dunedin 9054, New Zealand
e-mail: alli_knight@hotmail.com

Dan Blanchon

Department of Natural Sciences, Unitec New Zealand Te Whare
Wānanga o Wairaka, Private Bag 92025, Auckland, New Zealand
e-mail: dblanchon@unitec.ac.nz

Abstract

Buellia akatorensis Elix & A.Knight, *B. hypopurpurea* Elix & A.Knight and *B. kantvilasii* Elix, Blanchon & A.Knight are described as new to science. *Baculifera micromera* (Vain.) Marbach and *Buellia stellulata* var. *tasmanica* Elix & Kantvilas are recorded for the first time from New Zealand.

This paper continues our investigation of *Buellia*-like lichens in New Zealand and Tasmania, and follows from the previous accounts of *Buellia* and related genera (Elix *et al.* 2015, Elix 2016, Elix & Mayrhofer 2016) and our additions and revisions to *Amandinea* (Blaha, Mayrhofer & Elix 2016, Mayrhofer *et al.* 2016). In this paper, we deal with a further three new saxicolous species of *Buellia* in the broad sense. Methods are as described in previous papers cited above.

The new species

1. *Buellia akatorensis* Elix & A.Knight, sp. nov. Figs 1, 2
Mycobank No. MB 818431

Similar to *Buellia procellarum* A.Massal., but differs in having smaller, commonly curved ascospores, 15–25 × 8–13 μm, white to pale grey-pruinose discs and in containing medullary norstictic acid rather than diploicin.

Type: New Zealand, South Island, Otago, Akatore Creek, 46°06'45"S, 170°11'30"E, alt. 1 m, on schistose rock 15 m seaward from coastal cliff, *A. Knight s.n.*, 26.xi.2015 (holotype – OTA 065319; isotype – CANB).

Thallus crustose, to 25 mm wide and 1.2 mm thick, epilithic, rimose-areolate, chinky, ± forming small rosettes, subeffigurate at the margins; upper surface off-white to pale grey, matt, cracked; prothallus not apparent or dark brown to black, marginal; photobiont cells 8–15 μm wide; medulla lacking calcium oxalate (H₂SO₄-), I-. *Apothecia* 0.4–1.2 mm wide, lecidine, roundish, scattered, initially immersed then broadly adnate to sessile; disc black, epruinose or often sparsely white- to pale grey-pruinose, weakly concave to convex; proper exciple thin, persistent, in section 25–60 μm thick, outer part dark brown to brown-black, K+ yellow then forming red, needle-like crystals, N-, inner part brown. *Epihymenium* 12–15 μm thick, dark brown, N-. *Hypothecium* 100–140 μm thick, dark brown to brown-black, K+ yellow then forming red, needle-like crystals, N+ orange-brown. *Hymenium* 100–120 μm thick, colourless,

with a few scattered oil droplets; subhymenium 50–75 μm thick, pale brown, interspersed with oil droplets; paraphyses 1.5–2 μm wide, sparingly branched, with apices 4–6 μm wide and dark brown caps; *asci* (4–6)8-spored, *Bacidia*-type. *Ascospores* *Callispora*- then *Buellia*-type, 1-septate, pale then dark brown, ellipsoid, 15–[21.3]–25 × 8–[10.8]–13 μm, becoming constricted at the septum and broadly fusiform with age, often curved; outer wall moderately to strongly ornamented. *Pycnidia* common, punctiform, immersed, ostiole black. *Conidia* bacilliform, 4–6 × 1–1.5 μm. *Chemistry*: Thallus K+ yellow then red, P+ yellow-orange, C-, UV-; atranorin (major), norstictic acid (major), connorstictic acid (minor or trace).

Etymology: The species is named after its type locality.

Remarks

The new species is characterized by the crustose, thick and chinky, rimose-areolate, off-white to pale grey thallus, the interspersed subhymenium, ± white to pale grey-pruinose discs, the often curved, *Callispora*- then *Buellia*-type ascospores that often become broadly fusiform with age and have an ornamented outer wall, and the presence of atranorin and norstictic acid. *Buellia akatorensis* is superficially similar to *B. procellarum*, a common saxicolous species in Australia (Elix 2009). However, the latter differs in having epruinose discs, a densely interspersed hymenium, larger, straight ascospores (22–40 × 10–18 μm) and in containing atranorin and diploicin. *Buellia fallax* Elix & Kantvilas, present in Tasmania and New Zealand (Elix & Kantvilas 2016) has similar but slightly smaller ascospores (15–22 × 7–10 μm) and has epruinose discs and a medulla that contains calcium oxalate (H₂SO₄+) and hafellic acid.

At present the new species is known from Otago in the South Island of New Zealand, where it occurs on siliceous rocks in coastal areas. Commonly associated species include *Amandinea nitrophila* (Zahlbr.) Elix, *A. pelidna* (Ach.) Fryday & L.Arcadia, *Caloplaca cribrosa* (Hue) Zahlbr., *C. gallowayi* S.Y.Kondr., Kärnefelt & Filson, *Halecania subsquamosa* (Müll.Arg.) van den Boom & H.Mayrhofer, *Lecanora subcoarctata* (C.Knight) Hertel, *Pertusaria graphica* C.Knight, *Rinodina blastidiata* Matzer & H.Mayrhofer and *Jackelisia ligulata* (Körb.) S.Y.Kondr., Fedorenko, S.Stenroos, Kärnefelt & A.Thell.

SPECIMENS EXAMINED

Otago: • Type locality, on coastal schistose rock, *A. Knight s.n.*, 26.xi.2015 (CANB, OTA 065318 *pr.p.*); • Black Head, Dunedin, 44°55'11"S, 170°27'13"E, 2 m alt., on basalt boulder at base of cliff in splash zone, *A. Knight s.n.*, 28.xi.2015 (CANB, OTA 069081 *pr.p.*), (CANB, OTA 069084 *pr.p.*).

2. *Buellia hypopurpurea* Elix & A.Knight, sp. nov. Fig. 3
Mycobank No. MB 818432

Similar to *Buellia stellulata* (Taylor) Mudd var. *stellulata*, but differs in having an hypothecium and excipulum that effuse an intense purple solution in K and a non-aeruginose, N- epihymenium.

Type: New Zealand, South Island, Otago, Akatore Creek, 46°06'34"S, 170°11'03"E, alt. 2 m, on rocks beside estuary, c. 250 m from mouth, *A. Knight s.n.*, 26.xi.2015 (holotype – OTA 065320; isotype – CANB).

Thallus crustose, to 25 mm wide and 0.1 mm thick, epilithic, rimose-areolate, areoles irregular, 0.2–0.5 mm wide; upper surface off-white to pale brown, matt, cracked; prothallus prominent, black, marginal and between areoles; photobiont cells 8–17 μm wide; medulla lacking calcium oxalate (H₂SO₄-), I-. *Apothecia* 0.1–0.4 mm wide, lecidine, roundish, scattered, mainly immersed, rarely becoming adnate; disc black,

epruinose, concave; proper exciple prominent, persistent, raised above disc, in section 50–75 µm thick, outer part brown-black, K+ forming an intense purple solution, N+ orange-brown, inner part brown. *Epithymenium* c. 10 µm thick, brown, N–. *Hypothecium* 75–120 µm thick, brown to brown-black, K+ forming an intense purple solution. *Hymenium* 60–80 µm thick, colourless, not interspersed; subhymenium 20–30 µm thick, pale brown; paraphyses 1.5–2 µm wide, sparingly branched, with apices 3–4 µm wide and pale brown caps; *asci* 8-spored, *Bacidia*-type. *Ascospores* *Buellia*-type, 1-septate, pale then dark brown, ellipsoid, 10–[13.8]–17 × 6–[7.3]–9 µm, becoming constricted at the septum, outer wall weakly ornamented. *Pycnidia* not seen. *Chemistry*: Thallus K+ yellow, P+ yellow, C–, UV–; containing atranorin (major), rugulosin monoacetate (major), unknown yellow pigment (trace), ± 2'-*O*-methylperlatolic acid (minor).

Etymology: The epithet refers to the colour of the solution produced by treating the hypothecium and excipulum with K.

Remarks

This new species belongs to *Buellia* in the broad sense (Bungartz *et al.* 2007; Elix 2009) and is characterized by the thin, crustose, rimose-areolate, off-white to pale brown thallus, the prominent black prothallus, small, immersed apothecia, a dark brown to brown-black hypothecium and excipulum which give an intense purple solution in K, *Buellia*-type ascospores and the presence of atranorin and the anthraquinone rugulosin monoacetate. Morphologically, the new species closely resembles *Buellia stellulata* var. *stellulata*, but can be readily distinguished because the latter has a K-hypothecium and excipulum (Elix 2011).

At present, the new species is known from Otago in the South Island of New Zealand and Campbell Island, where it occurs on coastal siliceous rocks. Commonly associated species include *Amandinea nitrophila* (Zahlbr.) Elix, *A. pelidna* (Ach.) Fryday & L.Arcadia, *Caloplaca cribrata* (Hue) Zahlbr., *C. gallowayi* S.Y.Kondr., Kärnefelt & Filson, *Halecania subsquamosa* (Müll.Arg.) van den Boom & H.Mayrhofer, *Lecanora subcoarctata* (C.Knight) Hertel, *Pertusaria graphica* C.Knight, *Rinodina blastidiata* Matzer & H.Mayrhofer and *Jackelisia ligulata* (Körb.) S.Y.Kondr., Fedorenko, S.Stenroos, Kärnefelt & A.Thell.

SPECIMENS EXAMINED

• Otago, Tavora Reserve near Goodwood, 45°31'50"S, 170°45'36"E, 7 m alt., on rocks in splash zone, first rocky point at N end of sandy beach, *A. Knight s.n.*, 7.vi.2014 (CANB, OTA 065263 *pr.p.*); • Campbell Island, near Bull Rock, on ledges of molly-mawk rookery, 52°29'S, 169°13'E, *H.A. Imshaug* 47272, 19.i.1970 (MSC).

3. *Buellia kantvilasii* Elix, Blanchon & A.Knight, sp. nov.

Fig. 4

Mycobank No.: **MB 818433**

Similar to *Buellia albula* (Nyl.) Müll.Arg., but differs in having immersed apothecia, weakly concave to flat discs, interspersed subhymenium and siliceous rock substratum.

Type: Australia, Tasmania, Freycinet Peninsula, Sleepy Bay, 42°08'S, 148°19'E, sea level, on vertical, sheltered faces of coastal granite rocks, *G. Kantvilas* 136/84 & P. James, 2.ii.1984 (HO – holotype; CANB – isotype).

Thallus crustose, continuous, rimose to rimose-areolate, to 40 mm wide and 0.7 mm thick, becoming inflated and sublobate at the margins; upper surface white, grey-white or pale grey, shiny, becoming cracked, white-pruinose; prothallus not apparent; photobiont cells 7–15 µm wide; medulla white, containing calcium oxalate, (H₂SO₄), I–. *Apothecia* 0.3–0.6 mm wide, lecidine, separate and ± round to crowded and dis-

torted by mutual pressure, mainly immersed, rarely adnate; disc black, usually white-pruinose, weakly concave to plane; proper exciple prominent, persistent, elevated above disc, in section 25–40 µm thick, the outer part dark brown to deep olive-brown, K+ yellow solution forming orange-red, needle-like crystals, N+ purple-brown to weak red-brown, paler brown within. *Hypothecium* 80–120 µm thick, chestnut-brown to brown-black below, K+ forming orange-red, needle-like crystals. *Epithymenium* 10–12 µm thick, deep olive-brown, K–, N+ purple-brown to weak red-brown. *Hymenium* 60–95 µm thick, colourless, not interspersed; subhymenium 20–30 µm thick, pale brown, interspersed with oil droplets; paraphyses 1.5–2.0 µm wide, simple to sparsely branched, with apices 3.5–4 µm wide and brown caps; *asci* of the *Bacidia*-type, 8-spored. *Ascospores* of the *Buellia*-type, 1-septate, brown, ellipsoid, 10–[12.5]–15 × 5–[6.4]–8 µm, not constricted at the septum; outer spore wall smooth to finely ornamented. *Pycnidia* immersed, punctiform. *Conidia* bacilliform, 3–5 × 1–1.5 µm.

Chemistry: Thallus K+ yellow then red, C–, P+ orange-red, UV–; containing norstictic acid (major), connorstictic acid (minor).

Etymology: The species is named after our colleague, friend and collector of the type specimen, Dr Gintaras Kantvilas.

Remarks

In many respects this new species resembles *B. albula*, a very common lichen on calcareous rocks in New Zealand and Australia (Elix 2011). Both species are characterized by the presence of norstictic acid, a non-amyloid medulla, ±pruinose discs and similar ascospores, conidia, apothecial anatomy including similar reactions of the hypothecium and epithymenium. However, *B. albula* differs in having apothecia that are initially immersed but soon become broadly adnate to sessile, discs that become markedly convex, a deep, red-brown hypothecium and in growing exclusively on limestone or limestone-impregnated rocks. Superficially, *B. kantvilasii* resembles *B. hypostictella* Elix & H.Mayrhofer, a species that also occurs on siliceous coastal rocks in New Zealand. However, the latter has longer conidia (5–9 µm), and contains hypostictic acid (Elix & Mayrhofer 2016).

At present, this new species is known from coastal rocks in New Zealand and eastern Tasmania. In New Zealand associated species include *Amandinea coniois* (Wahlenb.) M.Choisy ex Scheid. & H.Mayrhofer, *A. pelidna* (Ach.) Fryday & L.Arcadia, *Buellia cranwelliae* Zahlbr., *Caloplaca allanii* Zahlbr., *Pertusaria xanthoplaca* Müll.Arg., *Jackelisia ligulata* (Körb.) S.Y.Kondr., Fedorenko, S.Stenroos, Kärnefelt & A.Thell and *Xanthoparmelia* species.

SPECIMENS EXAMINED

New Zealand. • North Island, Great Barrier Island, Motu Kaikoura, Crawford Bay, 36°11'12"S, 175°19'41"E, 1 m alt., on coastal volcanic rocks, *D.J. Blanchon s.n.*, 12.xii.2008 (CANB, UNITEC); • North Island, West Auckland, Waitakere Ranges, Cowan Bay, 36°59'55"S, 174°28'36"E, 2 m alt., on basalt blocks in conglomerate on rocky bluff beside dune lake, *D.J. Blanchon s.n.*, 16.v.2013 (CANB, UNITEC); • North Island, West Auckland, Piha, Lion Rock, 36°57'11"S, 174°28'00"E, alt. 2 m, on fallen boulders on N side of rock, *D.J. Blanchon s.n.*, 16.vi.2013 (CANB, UNITEC); • North Island, Auckland, Motutaiko Island, Hauraki Gulf, 36°12'58"S, 175°17'23"E, 3 m alt., on volcanic conglomerate cliff, splash zone, *A. Knight s.n.*, 13.ii.2015 (CANB, OTA); • South Island, Canterbury, Banks Peninsula, Rapaki Bay SW of Lyttelton, 43°36'25"S, 172°40'55"E, 1–3 m alt., on coastal basalt rocks, *J. Blaha* 0110 *pr.p.*, 16.iii.2001 (GZU).

New records

1. *Baculifera micromera* (Vain.) Marbach, *Biblioth. Lichenol.* 74, 134 (2000)

This species was known previously from Australia (Elix & Kantvilas 2014), Central and South America, and southern and eastern Africa (Marbach 2000). It is characterized by a white to pale grey, crustose thallus containing atranorin (K+ yellow), a green to greenish black epihymenium [containing *micromera*-green pigment: K+ greenish, N+ purple-black or grey-black (Bungartz *et al.* 2007)], *Buellia*-type ascospores, 12–17 × 5–7 μm, with weak subapical wall-thickenings and a strongly ornamented outer wall, and bacilliform conidia, 4–5 × 1 μm. A detailed description is given in Marbach (2000). *Baculifera pseudomicromera* Marbach is rather similar, but differs in containing additional norstictic acid and in having ascospores with a weakly ornamented outer wall, while *B. macromera* Elix & Kantvilas has larger ascospores with a smooth outer wall and lacks the *micromera*-green pigment in the epihymenium (Elix & Kantvilas 2014).

SPECIMENS EXAMINED

New Zealand. • North Island, South Auckland, Domain Drive, Museum Reserve, Parnell, 36°51'43"S, 174°46'52"E, alt. 60 m, on fallen bark, *A. Knight s.n.*, 24.ii.2015 (CANB, OTA); 36°51'36"S, 174°46'45"E, alt. 60 m, on fallen oak branches, *A. Knight s.n.*, 24.ii.2015 (CANB, OTA).

2. *Buellia stellulata* var. *tasmanica* Elix & Kantvilas, *Australas. Lichenol.* 73, 32 (2013)

This taxon was previously known from Australia (New South Wales and Tasmania). Morphologically, it is identical to *Buellia stellulata* var. *stellulata*, but can be readily distinguished chemically, because the latter contains additional 2'-O-methylperlatolic acid (major) and confluent acid (minor). A detailed description is given in Elix & Kantvilas (2013).

SPECIMENS EXAMINED

New Zealand. • North Island, Auckland, Kawau Island, Bon Accord Harbour, Stockyard Bay, 36°25'01"S, 174°49'34"E, 2 m alt., on quartz vein in cliff, splash zone, *A. Knight*, 16.ii.2015 (CANB, OTA); • Antipodes Island, just S of Hut Cove, 49°40'30"S, 178°48'42"W, 45 m alt., on rock outcrops in tussock grassland, *R.C. Harris* 5813A, 19.i.1970 (MSC).

Acknowledgements

We thank Dr Alan Fryday (MSC), Dr Gintaras Kantvilas (HO) and Dr H. Mayrhofer (GZU) for their kind cooperation in arranging the loan of key collections.

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Fig. 1. *Buellia akatorensis* (holotype in OTA). Scale = 1 mm.

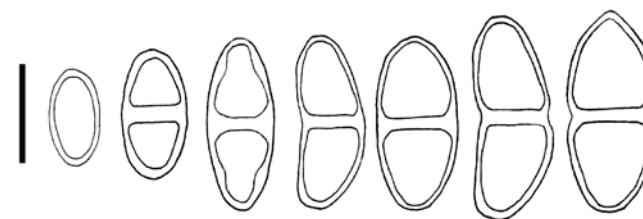


Fig. 2. Ascospore ontogeny of *B. akatorensis*. Scale = 10 μm.

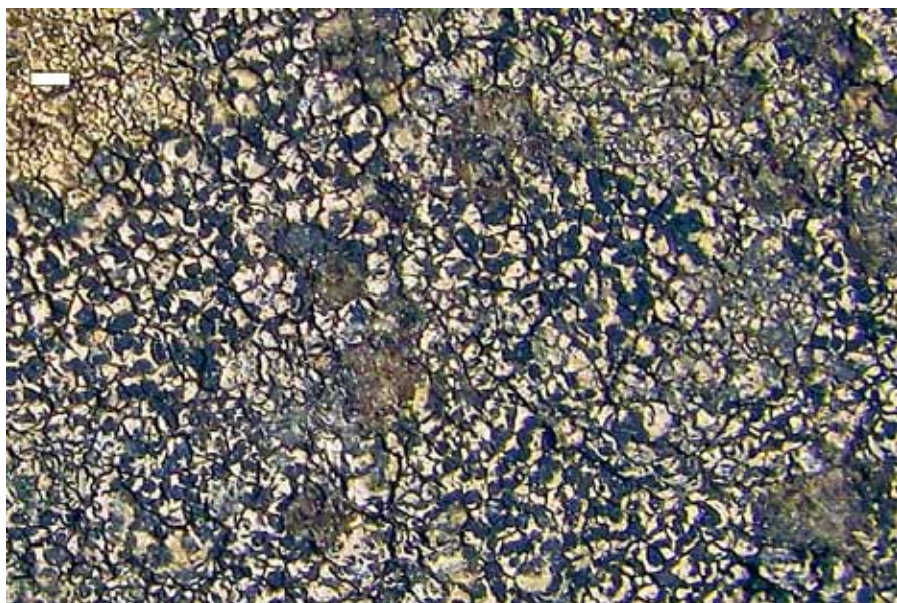


Fig. 3. *Buellia hypopurpurea* (holotype in OTA). Scale = 1 mm.



Fig. 4. *Buellia kantvilasii* (holotype in HO). Scale = 1 mm.

A new species of *Scytinium* (Ach.) Gray (lichenized Ascomycota, Collemataceae) from the Australian Capital Territory

Patrick M. McCarthy

64 Broadsmith St, Scullin, A.C.T. 2614, Australia

e-mail: pmcc2614@hotmail.com

Abstract

Scytinium tenuilobum sp. nov. (Collemataceae) is described from small limestone outcrops in *Eucalyptus* woodland in the Australian Capital Territory. This diminutive lichen has exceptionally small thalli, short and narrow, pseudocorticate lobes, clustered *Nostoc* cells and persistently transversely septate ascospores.

The large, cosmopolitan genera *Collema* F.H.Wigg. and *Leptogium* (Ach.) Gray, which have dominated the cyanolichen family Collemataceae, were until recently characterized by the absence of a true cortex in the former, with *Leptogium* having eucorticate thalli (e.g. Degelius 1954, 1974; Clauzade & Roux 1985; Filson 1992; Verdon 1992; Galloway 2007; Jørgensen 2007; Gilbert & Jørgensen 2009; Gilbert & Jørgensen 2009). However, molecular studies by Otálora *et al.* (2013) confirmed the monophyly of ten morphological groups within or spanning *Collema* and *Leptogium*, the groups being defined not only by the presence or absence of a true cortex or pseudocortex, but also by growth form and the dimensions of lobes, as well as ascospore characteristics, other attributes of thallus anatomy and habitat preferences. As a consequence, *Collema* and *Leptogium* were recircumscribed, several old generic names were resurrected, and new genera were described (Otálora *et al.* 2013). One of the resurrected genera, the comparatively heterogeneous *Scytinium* (Ach.) Gray, has minute to medium-sized thalli that are crustose, squamulose or foliose, and occupy the full suite of potential substrata, mainly in temperate latitudes. A cortex or pseudocortex can be present or absent, apothecial anatomy is variable, and the ascospores are comparatively small and predominantly submuriform to muriform. As explained by Otálora *et al.* (2013), the genus includes species formerly placed in three sections of *Leptogium* (*Homodium*, *Collemodium* and *Leptogium*) and three species groups previously included in *Collema* (the *fragrans*, *callopismum* and *leptogioides* groups).

An undescribed species of Collemataceae, collected from limestone outcrops in *Eucalyptus* woodland in the Australian Capital Territory, is assigned here to *Scytinium* by virtue of its diminutive size, crust-like habit and minute, pseudocorticate lobes. While its ascospores are persistently transseptate, rather than submuriform or muriform, this difference cannot reasonably be considered an obstacle to its inclusion in *Scytinium*. Conversely, placement in the resurrected *Blennoophora* Trevis., which includes foliose species with transversely septate ascospores, would be inappropriate given its larger thalli and more robust lobes that are invariably ecorticate and isidiate (Otálora *et al.* 2013). Similarly, species of *Enchylium* (Ach.) Gray (formerly the *Collema tenax* group) can have ascospores with one or more transverse septa (or submuriform in some species), but the thallus is also foliose, ecorticate and isidiate (Otálora *et al.* 2013).

Methods

Observations and measurements of thalline, apothecial and pycnidial anatomy, asci, paraphyses, ascospores and conidia were made on hand-cut sections mounted in water.

Scytinium tenuilobum P.M.McCarthy, sp. nov.

Mycobank No. MB 818622

Figs 1, 2

Characterized by the blackish, minutely and radially lobate, crust-like thallus that is pseudocorticate and non-isidiate and contains clusters of non-filamentous *Nostoc*