

Figure 3: *Sclerococcum thelotrematicola* (Imshaug 57066 – holotype). A. Apothecia. B: Ascospores. Scale bars: A = 1.0 mm: B = 25  $\mu$ m.

#### Four new species and new records of buellioid lichens (Caliciaceae, Ascomycota) from Antarctica

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#### Abstract

*Amandinea windmillensis* Elix, *Buellia minispora* Elix, *B. rodseppeltii* Elix and *Tetramelas lokenensis* Elix are described as new to science. The new combination *Tetramelas filsonii* (C.W.Dodge) Elix is proposed for *Buellia filsonii* C.W.Dodge. In addition, *Buellia vilis* Th.Fr. is reported for the first time from Antarctica and *Amandinea isabellina* (Hue) Søchting & Øvstedal and *Buellia illaetabilis* I.M.Lamb are recorded for the first time from continental Antarctica.

In their monograph *Lichens of Antarctica and South Georgia*, Øvstedal & Lewis-Smith (2001) reported three species of *Amandinea* and 30 species of *Buellia sens. lat.* Four of the latter species have since been transferred to *Amandinea* (Søchting *et al.* 2004) and nine to *Tetramelas* (Kalb 2004; Nordin 2004; Elix 2017, 2018). Øvstedal subsequently described a further species of *Buellia* from Antarctica (Øvstedal & Lewis-Smith 2004), which has also been transferred to *Tetramelas* (Elix 2017). Following the study of 1105 Antarctic collections housed in BM, CANB, MEL and HO, I am describing new species of *Amandinea*, *Buellia sens. lat.* and *Tetramelas*, and reporting the occurrence of *Buellia vilis* Th.Fr. from the continent.

#### Methods

Observations and measurements of thalline and apothecial anatomy, asci, ascospores and conidia were made on hand-cut sections mounted in water and treated with 10% potassium hydroxide (K) and 50% nitric acid (N). Asci were also observed in Lugol's Iodine (I), with and without pretreatment in K. Chemical constituents were identified by thin-layer chromatography (TLC) (Elix 2014) and comparison with authentic samples. Most of the collections were made by Dr R.D. Seppelt, and are housed in HO.

#### The new species

**1. *Amandinea windmillensis*** Elix, sp. nov. Figs 1, 2  
Mycobank No. **MB 828954**

Similar to *Buellia evanescens* Darb., but differs in having larger, *Physconia*-type ascospores, 11–[14.1]–17  $\times$  6–[6.8]–9  $\mu$ m, a dark brown, N– epihymenium, a dark brown hypothecium and curved, filiform conidia.

*Type:* Antarctica, Wilkes Land, Windmill Islands, Clark Peninsula, [66°15'S, 110°33'E – 66°15'12"S, 110°34'E] on stones, *M. Hovenden s.n.*, 1993 (holotype – HO).

*Thallus* crustose, epilithic, areolate to granular; areoles dispersed or becoming congested and heaped, subglobose to hemispherical, 0.05–0.5 mm wide, grey-white to pale brown; prothallus thin, black, marginal or not apparent; photobiont cells 8–20  $\mu$ m wide. *Medulla* white, lacking calcium oxalate (H<sub>2</sub>SO<sub>4</sub>–), I–. *Apothecia* 0.1–0.5 mm wide, abundant, lecidine, scattered and roundish, broadly adnate to sessile; disc black, epruinose, plane to convex; proper exciple thin, distinct, initially raised above disc but excluded in older, convex apothecia, in section 25–30  $\mu$ m thick; outer part dark brown, K–, N–; inner part brown. *Epihymenium* 8–10  $\mu$ m thick, dark brown, K–, N–. *Hypothecium* 75–125  $\mu$ m thick, brown to dark brown, K–. *Hymenium* 60–80  $\mu$ m thick, colourless, not interspersed; subhymenium 20–25  $\mu$ m thick, yellow-brown, not interspersed; paraphyses 1–1.5  $\mu$ m wide, sparingly branched, with apices 3.5–4  $\mu$ m wide, with

brown caps. *Asci* 8-spored, *Bacidia*-type. *Ascospores* *Physconia*-type, 1-septate, pale brown then brown, ellipsoid, 11–[14.1]–17 × 6–[6.8]–9 µm, not constricted at the septum, sometimes curved; outer wall smooth to finely ornamented. *Pycnidia* common, punctiform, superficial or emergent; ostiole black. *Conidia* curved, filiform, 23–29 × 0.7–1 µm. *Chemistry*: Medulla K–, C–, PD–, UV–; no lichen substances detected.

*Etymology*: The species is named after the type locality.

#### Remarks

The areolate thallus of this new species closely resembles that of *B. evanescens*, which is also present in Antarctica. However, the latter has significantly smaller, *Buellia*-type ascospores, 11–12 × 6–8.5 µm, an aeruginose-black, N+ purple-brown epihymenium and a colourless or very pale brown hypothecium and bacilliform conidia *c.* 2 × 0.3 µm (Lamb 1968). Morphologically, the thallus of *A. windmillensis* also resembles *B. minispora* (described below), but that species differs in having very small *Buellia*-type ascospores, 7–10 × 3–4 µm.

At present the new species is only known from the Windmill Islands in Wilkes Land. Associated species include *Buellia frigida* Darb., *Pseudophebe minuscula* (Nyl. ex Arnold) Brodo & D.Hawksw., *Umbilicaria decussata* (Vill.) Zahlbr. and *Usnea spachelata* R.Br.

#### ADDITIONAL SPECIMEN EXAMINED

*Antarctica*. • Wilkes Land, Windmill Islands, Bailey Peninsula, SSSI, 30 m E of CMS1 study site, 66°17'S, 110°32'E, on stones amongst moraine debris, *R.D. Seppelt 18368*, 18.ii.1989 (HO).

#### 2. *Buellia minispora* Elix, sp. nov. MycoBank No. MB 828955

Fig. 3

Similar to *Buellia subtegens* B.J.Murray, but differs in having smaller ascospores, 7–[8.1]–10 × 3–[3.8]–4 µm, and a dark brown, N– epihymenium.

*Type*: Antarctica, Wilkes Land, Windmill Islands, Clark Peninsula, 50 m NE of old Wilkes Station radio transmitter building refuge hut, 66°15'30"S, 110°32'E, 10 m alt., on stones in moraine debris, *R.D. Seppelt 13489*, 29.xii.1982 (holotype – HO).

*Thallus* crustose, epilithic, areolate to bullate-areolate; areoles dispersed or becoming congested and heaped, subglobose to hemispherical, 0.2–1 mm wide, grey-white to pale brown; prothallus thin and black or not apparent; photobiont cells 8–20 µm wide. *Medulla* white, lacking calcium oxalate (H<sub>2</sub>SO<sub>4</sub>–), I–. *Apothecia* 0.1–0.4 mm wide, abundant, lecideine, scattered and roundish, broadly adnate to sessile; disc black, epruinose, plane to convex; proper exciple thin, distinct, initially raised above the disc but excluded in older convex apothecia, in section 25–40 µm thick; outer part brown-black, K–, N+ orange-brown; inner part brown. *Epihymenium* 5–10 µm thick, dark brown, K–, N–. *Hypothecium* 85–125 µm thick, dark brown to brown-black, K–. *Hymenium* 35–50 µm thick, colourless, not interspersed; subhymenium 20–25 µm thick, brown, not interspersed; paraphyses 1–1.5 µm wide, sparingly branched, with apices 3.5–5 µm wide, with brown caps. *Asci* 8-spored, *Bacidia*-type. *Ascospores* *Buellia*-type, 1-septate, brown, ellipsoid, 7–[8.1]–10 × 3–[3.8]–4 µm, becoming constricted at the septum, not curved; outer wall smooth to finely ornamented. *Pycnidia* not seen.

*Chemistry*: Medulla K–, C–, PD–, UV–; no lichen substances detected.

*Etymology*: This species is named after its very small ascospores.

#### Remarks

The dispersed areoles of this new species resemble those of *B. subtegens*, which is also present in Antarctica. However, the latter has larger ascospores, 9–[11.8]–14 × 6–[7.1]–9 µm, and an

aeruginose-black, N+ purple-brown epihymenium (Murray 1963; Elix 2019). Another morphologically very similar Antarctic species is *Buellia lignoides* Filson, but that species has a strongly amyloid medulla and a very prominent black prothallus (Filson 1966; Øvstedal & Lewis-Smith 2001).

At present the new species is only known from the type collection. Associated species include *Amandinea petermannii* (Hue) Matzer, H.Mayrhofer & Scheid., *Buellia frigida* Darb., *Pseudophebe minuscula* (Nyl. ex Arnold) Brodo & D.Hawksw., *Rhizoplaca melanophthalma* (Ram.) Leuckert & Poelt, *Usnea antarctica* Du Rietz and *Xanthoria elegans* (Link) Th.Fr.

#### 3. *Buellia rodseppeltii* Elix, sp. nov. MycoBank No. MB 828956

Fig. 4

Similar to *Buellia russa* Darb., but differs in having sublobate to subeffigurate margins, larger, bacilliform to elongate-ellipsoid conidia, 5–7 × 1–2 µm, constricted ascospores, and in lacking norstictic acid.

*Type*: Antarctica, Wilkes Land, Windmill Islands, Clark Peninsula, W end of Wilkes Peninsula, 66°15'S, 110°31'E, 20 m alt., on rock flakes in ice-plucked rock, *R.D. Seppelt 18592*, 17.i.1989 (holotype – HO; isotype – CANB).

*Thallus* crustose, to 45 mm wide, rimose-areolate, verruculose-areolate or bullate, margins sublobate to subeffigurate; areoles and verrucules 0.4–1 mm wide, irregular, angular or rounded, rarely becoming pulvinate; upper surface white, off-white to brown or brown-black; prothallus pale to usually black, prominent; photobiont cells 7–20 µm wide. *Medulla* lacking calcium oxalate (H<sub>2</sub>SO<sub>4</sub>–), I–. *Apothecia* 0.2–1 mm wide, abundant, lecideine, roundish, scattered or crowded, immersed then adnate to sessile; disc black, epruinose, plane to convex; proper exciple thin, excluded in convex apothecia, in section 50–60 µm thick; outer part aeruginose-black, K–, N+ purple-brown; inner part dark brown. *Epihymenium* 10–13 µm thick, dark aeruginose, K–, N+ purple-brown. *Hypothecium* 125–150 µm thick, brown to dark brown, K–. *Hymenium* 80–100 µm thick, colourless, not interspersed; subhymenium 15–25 µm thick, pale brown, not interspersed; paraphyses 1.5–2 µm wide, sparingly branched, with apices 3–4 µm wide and aeruginose caps. *Asci* 8-spored, *Bacidia*-type. *Ascospores* of the *Buellia*-type, 1-septate, brown, ellipsoid, 12–[15.6]–20 × 6–[9.1]–12 µm, becoming constricted at the septum, not curved; outer spore-wall finely ornamented (microrugulate). *Pycnidia* common, superficial; ostiole brown-black. *Conidia* straight, bacilliform to elongate-ellipsoid, 5–7 × 1–2 µm.

*Chemistry*: Thallus K–, C–, KC–, P–, UV–; no lichen substances detected by TLC.

*Etymology*: The species is named after the Australian biologist Dr Rod Seppelt.

#### Remarks

This species is characterized by a rimose-areolate to verrucose-areolate or bullate, white, off-white to brown or brown-black thallus with sublobate to subeffigurate margins, a non-amyloid medulla and the absence of lichen substances. It has immersed then adnate to sessile lecideine apothecia 0.2–1 mm wide, an aeruginose, N+ purple-brown epihymenium, relatively large, *Buellia*-type ascospores, 12–20 × 6–12 µm, which become constricted at maturity, and bacilliform to elongate-ellipsoid conidia, 5–7 × 1–2 µm. It is morphologically similar to *B. russa*, but the latter differs in containing norstictic acid, in having a thallus with effuse margins, non-constricted ascospores and shorter bacilliform conidia, 3–4 × 0.5–0.7 µm (Lamb 1968).

At present the new species is known only from continental Antarctica (MacRobertson Land, Princess Elizabeth Land, Wilkes Land). Associated species include *Candelariella flava* (C.W.Dodge & G.E.Baker) Castello & Nimis, *Buellia frigida* Darb., *Pseudophebe minuscula* (Nyl. ex Arnold) Brodo & D.Hawksw., *Rhizoplaca melanophthalma* (Ram.) Leuckert & Poelt, *Umbilicaria decussata* (Vill.) Zahlbr., *Usnea antarctica* DuRietz and *Xanthoria mawsonii* C.W.Dodge.

#### ADDITIONAL SPECIMENS EXAMINED

*Antarctica*. ● MacRobertson Land, Falla Bluff, 67°34'S, 61°29'E, on stones in moraine debris, *K. Kerry ADT-1344*, 8.ii.1972 (HO); ● MacRobertson Land, Chapman Ridge area, 67°28'S, 60°57'E, 40 m alt., on weathered fine-grained rock, *L. Williams 224*, 10.x.1984 (CANB, HO). ● Princess Elizabeth Land, Ingrid Christensen Coast, Rauer Islands, Cape Rybachi, 68°54'S, 77°56'E, on weathered western coastal ridge of outcrop, *G. Cracknell R225*, 15.xii.1983 (HO); ● Princess Elizabeth Land, Vestfold Hills, Clear Lake area, 66°38'15"S, 77°59'36"E, 10 m alt., on charnockite, *R. Williams ADT-23265*, 10.i.1979 (HO). ● Wilkes Land, Windmill Islands, Clark Peninsula, old Wilkes Station area, near old radio transmitter building refuge hut, 66°15'30"S, 110°32'E, 8 m alt., on stones in moraine debris, *R.D. Seppelt 13530*, 30.xii.1982 (HO).

**4. *Tetramelas lokenensis*** Elix, sp. nov.  
Mycobank No. **MB 828957**

Figs 5, 6

Similar to *Buellia lignoides* Filson, but differs in having longer, ellipsoid to broadly fusiform, *Callispora*- to *Physconia*- then *Buellia*-type ascospores 12–[15.5]–20 µm long.

*Type*: Antarctica, Wilkes Land, Clark Peninsula, Loken Moraine line, E of old Wilkes Station, 66°16'S, 110°37'E, 140 m alt., on stones in moraine, *R.D. Seppelt 13732*, 3.i.1983 (holotype – HO).

*Thallus* crustose, areolate, to 90 mm wide and 0.4 mm thick; areoles irregular, rounded or angular, flat or often convex, 0.2–0.5 mm wide, separate and scattered or becoming contiguous and crowded; upper surface white to grey-white, brown or blackening, dull, epruinose; prothallus black, marginal, continuous or often fimbriate, rarely not apparent; photobiont cells 8–18 µm wide. *Medulla* white, lacking calcium oxalate (H<sub>2</sub>SO<sub>4</sub>-), I+ purple-blue. *Apothecia* 0.1–0.6 mm wide, lecideine, broadly adnate to sessile on or at the margin of areoles; disc black, epruinose, plane to markedly convex with age; proper exciple distinct but excluded in older, convex apothecia, in section 40–50 µm thick; outer part aeruginose-black, K-, N+ reddish purple to purple-brown, dark brown within. *Hypothecium* 125–200 µm thick, brown to dark brown. *Epithymenium* 10–15 µm thick, dark olive-brown to aeruginose-black, K-, N+ reddish purple to purple-brown. *Hymenium* 60–75 µm thick, colourless, with ± scattered oil droplets; subhymenium 15–20 µm thick, pale brown; paraphyses 1–2 µm wide, simple to sparsely branched, with apices 3–5 µm wide and aeruginose caps. *Asci* of the *Bacidia*-type, 8-spored or sometimes with 2, 4 or 6 spores. *Ascospores* initially *Callispora*- to *Physconia*-type, then of the *Buellia*-type, 1-septate, brown, ellipsoid to broadly fusiform, 12–[15.5]–20 × 7–[8.1]–11 µm, becoming constricted at the septum, sometimes curved, rarely with additional endosepta; outer spore-wall finely ornamented (microrugulate). *Pycnidia* immersed, punctiform. *Conidia* bacilliform to elongate-ellipsoid, 3–4 × 1 µm.

*Chemistry*: Thallus K-, P-, C-, UV-; no lichen substances or traces of atranorin detected by TLC.

*Etymology*: The species is named after the type locality.

#### Remarks

The thalline morphology of the new species closely resembles that of some specimens of the common and very variable Antarctic lichen *Buellia lignoides*, but the latter has shorter, *Buellia*-type ascospores and longer bacilliform conidia, 7–9 µm long. The ascospores of *T. lokenensis* closely resemble those of another Antarctic species, *Tetramelas nelsonii* (Darb.) Elix, but *T. nelsonii* contains 6-*O*-methylarthonin and traces of atranorin, and has a non- or only weakly amyloid medulla (Lamb 1968; Elix 2018).

At present the new species is only known from Wilkes Land in eastern Antarctica. Associated species include *Buellia frigida* Darb., *Lecidea cancriformis* C.W.Dodge & G.E.Baker, *Pseudophebe minuscula* (Nyl. ex Arnold) Brodo & D.Hawksw., *Umbilicaria decussata* (Vill.) Zahlbr. and *Usnea sphaelata* R.Br.

#### ADDITIONAL SPECIMENS EXAMINED

*Antarctica*. ● Wilkes Land, Windmill Islands, Loken Moraine, E of Wilkes Station, 66°16'S, 110°37'E, 140 m alt., on stones in moraine, *R.D. Seppelt 13745*, 3.i.1983 (HO); ● Wilkes Land, Bunger Hills, Obruchev Hills, NE end, 66°35'S, 99°45'E, on stones in talus, *D. Adamson & R.D. Seppelt 17064 pr. p.*, 4.ii.1986 (HO).

#### New combination

***Tetramelas filsonii*** (C.W.Dodge) Elix, comb. nov.  
Mycobank No.: **MB 828958**

Figs 7, 8

*Buellia filsonii* C.W.Dodge, *Lichen Flora of the Antarctic Continent and Adjacent Islands* 313 (1973).

*Type*: Antarctica, MacRobertson Land, North Masson Range, Painted Peak, 67°45'S, 62°51'E, [710 m alt.] on rock, *R.B. Filson 4418*, 27.xi.1962 (MEL 1063078 – isotype, labelled as *R.B. Filson 4418a*).

*Thallus* crustose, to 25 mm wide, verruculose-areolate or granular; verruculae 0.1–0.5 mm wide, compacted and becoming elevated to form small, pulvinate cushions to 3.5 mm high; upper surface dull, off-white, cream to pale brown or brown-black; prothallus pale or not apparent; photobiont cells 7–20 µm wide. *Medulla* lacking calcium oxalate (H<sub>2</sub>SO<sub>4</sub>-), I+ purple. *Apothecia* 0.2–0.8 mm wide, abundant, lecideine, roundish, scattered or crowded, adnate to sessile; disc black, epruinose, plane to strongly convex; proper exciple thin, soon excluded, in section 45–55 µm thick; outer part dark brown to brown-black, K-, N-; inner part brown. *Epithymenium* 10–12 µm thick, dark brown, K-, N-. *Hypothecium* 150–200 µm thick, deep red-brown, K-. *Hymenium* 50–75 µm thick, colourless, not interspersed; subhymenium 20–30 µm thick, pale brown, not interspersed; paraphyses 1.5–2 µm wide, sparingly branched, with apices 4–6 µm wide and brown caps. *Asci* 8-spored, *Bacidia*-type. *Ascospores* initially of the *Callispora*-type, then of the *Buellia*-type, 1-septate, brown, ellipsoid, 12–[14.4]–18 × 6–[7.5]–10 µm, becoming constricted at the septum, sometimes curved; outer spore-wall finely ornamented (microrugulate). *Pycnidia* common, superficial; ostiole brown-black. *Conidia* straight, bacilliform, 4–6 × 0.7–1 µm.

*Chemistry*: Thallus K- or K+ yellow then red, P- or P+ yellow, C+ yellow, UV+ pale orange; containing 6-*O*-methylarthonin (major or minor), ± norstictic acid (major or minor).

#### Remarks

This species is characterized by a verruculose, off-white, cream to brown or brown-black thallus, the verruculae becoming compacted and elevated, forming small cushion-like clumps to 3.5 mm high; it contains 6-*O*-methylarthonin and often norstictic acid, but lacks medullary calcium oxalate. It has an amyloid medulla, adnate to sessile, lecideine apothecia, 0.3–0.8 mm wide, a dark brown to olive-brown, N- epithymenium, *Callispora*- then *Buellia*-type ascospores, 12–17 × 6–10 µm, which become constricted at maturity, and bacilliform conidia, 4–6 × 0.7–1 µm. It is morphologically very similar to *T. darbishirei* (I.M.Lamb) Elix, but the latter differs in having longer ascospores, 14–[17.4]–21 µm, and contains additional atranorin but lacks norstictic acid (Lamb 1968; Elix 2018). *Tetramelas austropapillatus* (Øvstedal) Elix has identical chemistry to *T. filsonii*, but that species grows on moribund mosses and bryophytes, has larger ascospores, 15–[17.6]–23 × 8–[9.5]–11 µm, and contains calcium oxalate in its medulla (Øvstedal & Lewis-Smith 2004; Elix 2017).

At present the species is known from several localities in the Masson Range, MacRobertson Land, continental Antarctica. Associated lichens include *Candelariella flava* (C.W.Dodge & G.E.Baker) Castello & Nimis, *Buellia frigida* Darb., *Rinodina olivaceobrunnea* C.W.Dodge & G.E.Baker and *Usnea antarctica* Du Rietz.

#### ADDITIONAL SPECIMENS EXAMINED

*Antarctica*. ● MacRobertson Land, South Masson Range, Branson Nunatak, 67°55'07"S, 62°45'35"E, on rock, *R.B. Filson 4476*, 16.xii.1962 (MEL); ● MacRobertson Land, Masson Range, Mt Twintops, 68°05'S, 62°63'E, on rock in scree debris, *K.R. Kerry ADT-33794*, 2.ii.1972 (HO).

## New records

### 1. *Amandinea isabellina* (Hue) Søchting & Øvstedal, *Biblioth. Lichenol.* **88**, 615 (2004)

This species was previously known from the Antarctic Peninsula, the South Orkney Islands, South Shetland Islands, South Georgia (Lamb 1968; Øvstedal & Lewis Smith 2001; Søchting *et al.* 2004) and from alpine areas in south-eastern Australia, Tasmania (Elix & Kantvilas 2013) and New Zealand (Elix *et al.* 2015). It is characterized by a grey-white to pale brown or brown thallus composed of congested verruculae, a thin black to brown-black marginal prothallus, broadly adnate to sessile apothecia up to 0.8 mm wide with epruinose discs, straight to slightly curved, ellipsoid, *Physconia*- then *Buellia*-type ascospores, (12–)14–18(–20) × 7–10 µm, which become constricted at the septum, filiform conidia 10–23 × 0.7–1.0 µm and by the absence of lichen substances. A detailed description is given in Lamb (1968, as *Buellia isabellina*). This species has shorter conidia than *A. coniops* (Wahlenb.) M.Choisy ex Scheid. & H.Mayrhofer and grows on exposed rocks, typically forming small, well-separated thalli amongst other crustose lichens. New to continental Antarctic

#### SPECIMENS EXAMINED

*Antarctica*. • Victoria Land, Cape Hallett, 72°19'08"S, 170°14'20"E, 30 m alt., on stones near edge of late snow bank, *R.D. Seppelt 22799, 22800*, 3.i.1999 (HO); • Victoria Land, Cape Hallett area, 72°19'23"S, 170°13'24"E, 30 m alt., on stones in scree slopes E of camp beach, *R.D. Seppelt 35052*, 10.i.1999 (HO).

### 2. *Buellia illaetabilis* I.M.Lamb, *British Antarctic Survey Reports* **61**, 29 (1968)

This species was previously known from the Antarctic Peninsula and South Shetland Islands (Lamb 1968; Søchting *et al.* 2004). It is characterized by an areolate thallus that often forms small rosettes to 10–40 mm wide, with flat to more often convex, dispersed or contiguous areoles, 0.1–0.3 mm wide, an off-white to grey or blackening upper surface, a prominent effuse to fimbriate, black prothallus, a non-amyloid medulla, sessile apothecia, 0.2–0.5 mm wide, an aeruginose, N+ purple-brown epihymenium, a brown hypothecium, brown, ellipsoid, *Buellia*-type ascospores, 9–14 × 5–8 µm, bacilliform conidia, 3–4 × 0.7–1 µm, and lacks lichen substances. New to continental Antarctica.

#### SPECIMENS EXAMINED

*Antarctica*. • MacRobertson Land, Prince Charles Mountains, Else Platform, 70°22'S, 68°48'E, on small stones in moraine debris, *N. Conrick ADT-35445, ADT-35448*, 28.i.1990 (HO); • MacRobertson Land, Prince Charles Mountains, Beaver Lake, Jetty Peninsula area, 100 m alt., on sandstone, *A. Drinnan 29A, 31A*, 16.i.1992 (HO). • Princess Elizabeth Land, Ingrid Christensen Coast, Vestfold Hills, 1 km N of Lake Druzhby field camp, 68°35'S, 78°16'E, 10 m alt., on stones in debris, *R.D. Seppelt 8250*, 13.i.1979 (HO). • Victoria Land, Cape Hallett area, Football Saddle, 72°30'20"S, 169°42'43"E, 652 m alt., on basalt, *R.D. Seppelt 25028, 25054*, 20.xi.2004 (HO); • Victoria Land, Cape Hallett area, Red Castle Ridge, 72°26'54"S, 169°56'51"E, 652 m alt., on basalt, *R.D. Seppelt 25224*, 30.xi.2004 (HO). • Wilkes Land, Windmill Islands, Beall Island, 66°18'S, 110°29'E, on stones amongst moraine debris, *R.D. Seppelt 13756, 13758*, 4.i.1983 (HO); *R.D. Seppelt 18574*, 13.i.1989 (HO); • Wilkes Land, Windmill Islands, Herring Island, W end of island, 66°24'S, 110°37'E, on stones amongst moraine debris, *R.D. Seppelt 14220, 14222, 14225*, 17.i.1983 (HO).

### 3. *Buellia vilis* Th.Fr., *Kongl. Vetensk. Akad. Handl.* **7**(2), 44 (1867)

This species was previously known from temperate to Arctic regions in Europe and North America (Bungartz *et al.* 2007). It is characterized by a discontinuous, thin or mainly endolithic

thallus, a white medulla that lacks calcium oxalate (H<sub>2</sub>SO<sub>4</sub><sup>-</sup>), a deep reddish brown outer exciple (N+ deep purple), a dark brown, N+ deep purple epihymenium, and a colourless inner exciple and hypothecium. The inner exciple, hypothecium and thalline hyphae react deep blue with iodine. It has brown, ellipsoid *Buellia*-type ascospores, 12–20 × 5–10 µm, which are constricted at the septum and with smooth outer walls, bacilliform conidia, 4–7 × 0.7–1 µm, and it lacks lichen substances. A detailed description is given in Bungartz *et al.* (2007) and an illustration in Bungartz (2004, p. 109). New to Antarctica.

#### SPECIMENS EXAMINED

*Antarctica*. • Wilkes Land, Bungler Hills, NE end of Obruchev Hills, 66°35'S, 99°45'E, on stones in talus, *R.D. Seppelt 17177 pr. p.*, 4.ii.1986 (HO); • Wilkes Land, Bungler Hills, DeLay Point, N side of Melba Peninsula, 12 km W of Cape Charcot, 66°27'S, 98°15'E, on stones in scree, *R.D. Seppelt 17179*, 4.ii.1986 (HO); • Wilkes Land, Windmill Islands, Bailey Peninsula SSSI, SW end, on small stones in moraine debris, *R.D. Seppelt 18496*, 4.i.1989 (HO).

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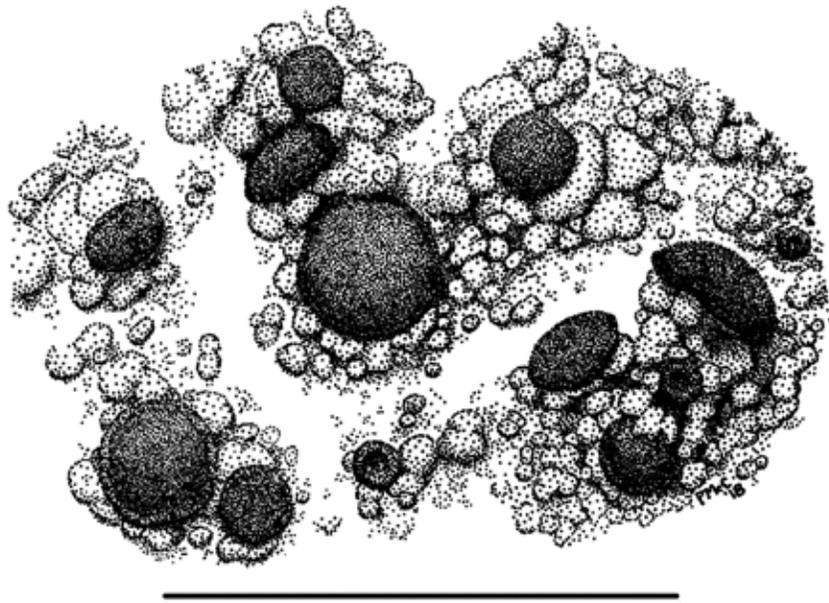


Figure 1. *Amandinea windmillensis* (holotype in HO). Scale = 1 mm



Figure 2. Ascospore ontogeny of *A. windmillensis*. Scale = 10  $\mu$ m.

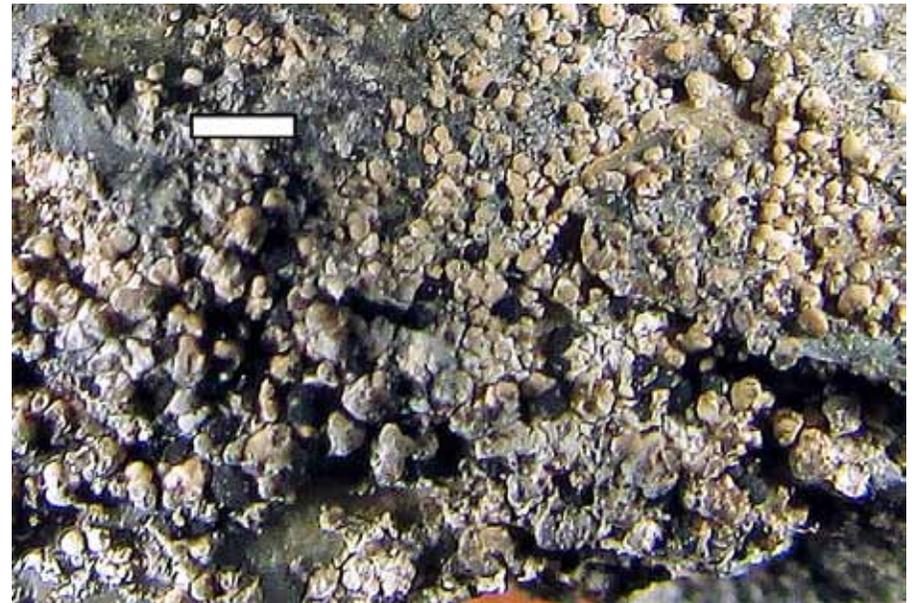


Figure 3. *Buellia minispora* (holotype in HO). Scale = 1 mm.

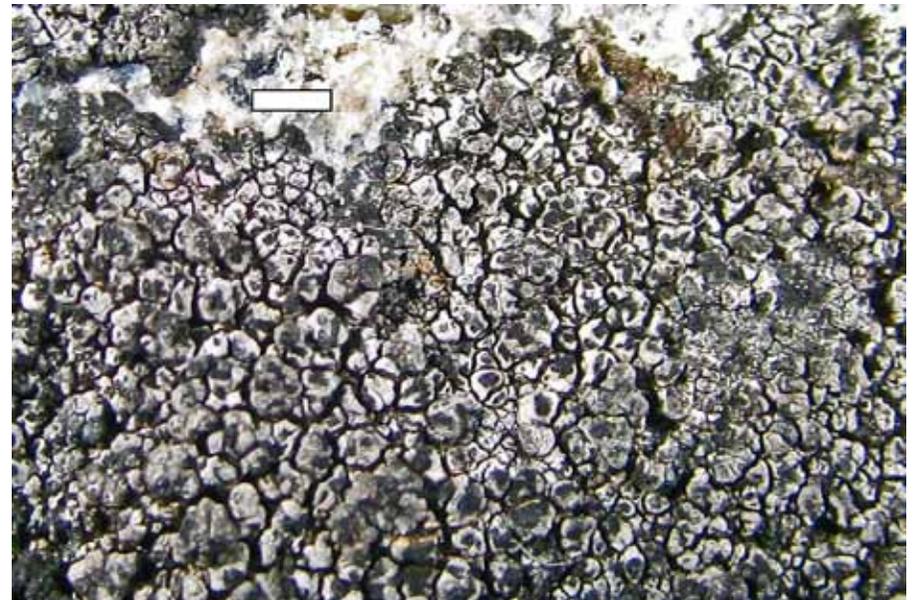


Figure 4. *Buellia rodseppeltii* (holotype in HO). Scale = 1 mm.



Figure 5. *Tetramelas lokenensis* (holotype in HO). Scale = 1 mm.



Figure 7. *Tetramelas filsonii* (Kerry ADT-33794 in HO). Scale = 1 mm.



Figure 6. Ascospore ontogeny of *T. lokenensis*. Scale = 10  $\mu$ m.

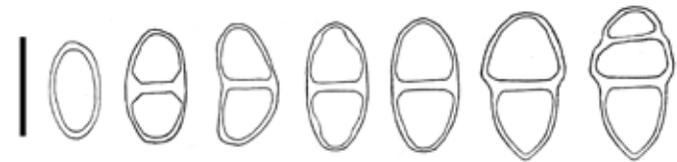


Figure 8. Ascospore ontogeny of *T. filsonii*. Scale = 10  $\mu$ m.